

Integrated Rural Energy Planning for South Africa

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I dedicate this dissertation to Rael,
whom I look up to in more ways than one.

I, Marc John Loon, submit this dissertation to the University of Cape Town in fulfilment of the requirements for the degree of Master of Science in Engineering. I declare that this is my original work and that it has not been submitted in this or similar form for a degree at any University.

Abstract

Poor rural communities of South Africa frequently face shortages of convenient, affordable energy services. Sub-sectoral energy interventions that are not properly coordinated with each other and with the development context are unlikely to address the problems effectively. The methodology of 'integrated rural energy planning' (IREP) is a possible means of achieving this coordination. This process encompasses a new paradigm which is an improvement on the supply-driven thinking of the past. It seeks to overcome anomalies in the rural energy system in a way that places the final users of energy services at its centre, that coordinates planning between different energy sub-sectors, and integrates energy planning with economic planning processes. It emphasises continuity, efficient utilisation of resources, and genuine participation of rural people. Although originally designed for the energy sector as a whole, the theoretical methodology is applicable to rural regions of developing countries with only small modifications. International and local experience in IREP is not extensive, but it nevertheless provides valuable lessons regarding methodological and institutional requirements. The current trends in the institutional framework in South Africa show that while there are many obstacles to implementing an IREP process, there are also many unique aspects which suggest that an IREP process could be very effective. It seems clear that an appropriate way forward would be to launch a well-resourced and strategically-located initiative that would investigate, with care and foresight, the potential and relevance of an IREP process in South Africa.

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CHAPTER ONE

Introduction

'It might be said that energy is for the mechanical world what consciousness is for the human world. If energy fails, everything fails' (Schumacher 1974, p101).

Energy is a pivotal aspect of human society. It permeates every activity, from massive production schemes such as those of factories and mines, to domestic tasks such as cooking, lighting and keeping one's home warm in winter. Indeed, energy is regarded as an essential element of survival, along with water, air and land. Energy has a mythical significance to people's lives, for 'since the beginning of time, women and men have needed fire to cook food, to warm themselves, and to ward off danger. Legends in many cultures are focused on the discovery or the bringing of fire' (Wilson and Ramphele 1989, p44). Because energy is so much part of our existence, it is easy to take it for granted, seldom thinking what life would be like without it. 'Thus it is with something of a shock that one discovers that fire, or the fuel that feeds it, can no longer be guaranteed; that for millions of people around the world poverty means increasing difficulty in obtaining the basic energy necessary for cooking, heating and lighting. As an Indian official put it in a famous question, "Even if we somehow grow enough food for our people in the year 2000, how in the world will they cook it?"' (ibid).

In rural areas, where people are closer to 'the elements', problems with energy are particularly noticeable, and its effect on poor people's ability to meet their basic needs for survival is often felt more intensely than in urban areas. Fuelwood is frequently difficult to find and an extraordinary amount of time is usually spent on its collection, so much so that 'if wood gathering is counted as part of food preparation, more effort is put into the preparation of food than the growing of it' (Gandar, quoted in ibid, p44). The little energy that is purchased often constitutes a major portion of a poor rural household's budget (Eberhard, 1990; Borchers et. al. 1990). Yet energy is not only important to rural people for survival: access to certain fuels, particularly modern fuels, improves the potential for people to improve their lot – generating income through small-business ventures or increased agricultural productivity, as well as reducing inconvenient or unhealthy energy practices such as using an indoor woodstove without a chimney.

In contrast to urban or industry-based areas where most energy is consumed by industry, mines, and transportation systems, energy users in rural areas are mainly individuals who require energy to meet their domestic needs and to service small-scale business or agricultural requirements. With this and the pervasiveness of energy in mind, it is clear that the rural economy would also benefit significantly from improvements in access to affordable and appropriate fuels. Suitable rural energy conditions are important for individuals as well as for general economic well-being.

While adequate individual energy supply does not guarantee economic growth in an area, it is unarguably a precondition. Energy is therefore an essential component in an overall plan of economic development of a rural area. Energy is an input to all economic sectors, and adequate energy supplies are a necessary requirement for economic development. It cannot simply be assumed that sufficient and appropriate energy supplies will exist. Furthermore, energy supplies are frequently inaccessible or unreasonably expensive for individual rural people, and energy services are consequently met by inappropriate fuels, such as paraffin for cooking and candles for lighting. The opportunity costs to the regional economy are significant when one takes into account the lost contribution of rural people who would otherwise be capable of partaking in the commercial economy productively.

A common response of administrators and planners to the call for concern about energy in rural development is that they are 'already working under great pressure, that rural development is a difficult business, and that energy has not been a significant input to rural development projects in the past – so why add yet another burden to an already overburdened system?' (Hurst and Barnett 1990, p1). Besides referring to the ever-worsening effects of rural energy problems – such as their impingement on rural people's respiration, diet, and on their time, productivity and incomes, Hurst and Barnett also quote various administrative reasons for giving attention

to energy in rural development: rural projects of the 1970s and 1980s have been cursed with recurrent failures because oil-based products were not available or were prohibitively expensive; internationally accepted rural development practice recognises that most objectives can be achieved only by combining a number of inputs, one of which is energy; many inputs to rural development (such as energy) are not viable on their own, but when combined with other interventions provide enhanced benefits; and, also, conditions of rural energy supply and demand are known to vary considerably over time and between locations and therefore require careful investigation at each location (ibid, p2). The issue is not one of complicating the task of rural development: energy is already an essential ingredient of rural development whether administrators like it or not. Its pervasiveness indicates that recognition of the energy dimension in almost all projects is a necessary requirement for optimising their success.

In South Africa, the popular perception (by many rural people and politicians alike) that rural energy needs are being addressed – through electrification – is incorrect. The electricity required for the more energy-intensive domestic services are likely to be unaffordable to most rural people, and in addition, electricity is not likely to be available to the entire population for the foreseeable future. Furthermore, the complexities of energy consumption, such as fuel-switching and multiple fuel use, and the general point that 'energy is not consumed for the sake of consuming energy, but always for an ulterior purpose, e.g. for mobility, for producing goods and services, or for obtaining a certain comfort level' (APDC 1985a, p170), suggest that an holistic, deliberate strategy of planning rural energy flows – with electricity, the flameless fire, as just one of its components – is called for.

It is clear that South African is not unique among the developing countries of the world: it too has serious energy anomalies in its rural areas. A striking example is noted by Archer and Meyer (quoted in Wilson and Mamphela 1989, 46) of a village in the Karoo, where people are compelled to chop out the wooden window frames and doors of deserted houses because fuelwood is so scarce. The issue of energy is an important one, and to dismiss it without careful consideration would be short-sighted. Although most rural people in South Africa have access to *some* form of energy to survive (mainly fuelwood and crop residues), there are critical problems with various aspects of energy usage in rural areas. These conditions are similar to those in other developing countries. Some of those countries have become aware of the need to implement an energy planning process, and the concept of such a process following an integrated, demand-oriented methodology is gaining popularity. This methodology (which is described variously by different authors) is referred to in this document as an Integrated Rural Energy Planning (IREP) process.*

An IREP process endeavours to seek ways for government to achieve the elimination of anomalies in the energy flows of rural areas in an integrated way so that energy services are improved: supplies are more accessible, affordable and convenient, and consumption is more efficient and safer. The process would have to balance meeting communities' energy needs as they see them with the working toward development goals such as sustainability and equity. Through a combination of local community involvement and desk-based analysis, IREP promises to improve rural energy conditions.

It is unarguably important to clarify a vision for energy conditions in rural areas of the country: if implemented, what could IREP achieve in the short, medium and long terms? If one casts one's eye into the future, imagine a situation where all rural villages have full access to affordable and convenient energy services for their well-being and income generation, yet without conditions of over-supply or inefficient consumption. Imagine rural energy supplies actually meeting demand. Imagine a development process that integrates a carefully-designed but flexible needs-driven electrification planning process meshing well with sound planning processes in each of the other energy sub-sectors. Imagine energy decisions made within a context of broad economic planning. Imagine economic decisions made with the awareness of how they affect energy flows. Imagine a rural development process which recognises the energy dimension as an essential ingredient, in which local people are involved in the planning and implementation of projects in a genuine way.

Is this possible? Can it be done? An IREP process has the potential for achieving significant progress towards these ideals. From the opposite perspective, progress towards these ideals will

* The word 'process' is chosen carefully to indicate that the initiative is necessarily an on-going one rather than a once-off construction of an integrated rural energy plan.

certainly not be achieved if no IREP process is implemented. Problems of unsustainability and poverty in the rural energy sector are serious and urgent: there is an indisputable need to address them. It is assumed that suitable mechanisms do exist, that problems can indeed be solved. The fatalist may argue otherwise, disclaiming any worth of attempting to achieve sustainability and equity. This document rests on the supposition that an optimistic and ethical attitude is justified, that something can be done to improve the lot of the poor and of future generations. One hopes that government is optimistic too, and establishes a process which endeavours to achieve progress in resolving energy problems in rural South Africa.

The document therefore provides an in-depth description and discussion of the practical requirements for implementing integrated energy planning (IEP) in South Africa is addressed. The question of whether or not the energy dimension of rural* development can and should be deliberately managed in South Africa. It is divided into the following chapters. Chapter 2 reviews Integrated Energy Planning theory and methodology and considers its applicability for rural areas of developing countries. Chapter 3 investigates the experience of IREP around the globe, and peruses the published local literature on the subject as well as relevant energy initiatives that have been implemented in South Africa. Chapter 4 considers the context of IREP for South Africa in terms of the political and institutional trends in the energy sector and in rural development. Finally, Chapter 5 looks at the way forward, with recommendations as to how the investigation into the relevance of IREP can be taken further. It is noted that the document is not an IREP manual. Instead, it is a practical critique on the relevance of IREP for South Africa, and an investigation into how an integrated energy perspective can be infused into the rural development process that has begun.

* The document does not participate in the debate on the exact definition of 'rural' for the energy context. It rests on the assumption that a suitable definition does exist, and posits that a rural/urban distinction is indeed valid because of the stark differences in conditions of energy demand and supply between cities and areas far from cities.

CHAPTER TWO

IREP theory and method: a review

2.1 Motivation

2.1.1 Motivation for planning

In many developing countries, the market has regularly failed to meet the energy needs of poor rural people. Most energy suppliers are discouraged from extending their services into poor rural areas since the return on their investment is too low and unreliable. Those suppliers that do provide energy goods and services in rural areas, do so at prices affordable only to the local elite. Liquefied petroleum gas (LPG) is an example: it is supplied in expensive canisters, and generally requires a vehicle in which to transport them. As a result, poorer families often do not have access to the fuel. The cost of appliances further inhibits people's access to energy services. The result is that energy services which could make a significant difference to the lives of the rural majority are either unavailable or unaffordable. Also, rural people often have no alternative but to utilise energy services that are inappropriately designed for their needs, such as chimney-less and inefficient woodstoves, which causes health hazards like indoor air pollution and wasteful energy use. Furthermore, laborious energy-related tasks such as fuelwood collection impinge on many other pressing needs. The consequent inconveniences experienced thwarts the attempts of poor people to escape a vicious cycle of poverty.

An inadequate energy supply is not simply an inconvenience to rural people: it is a problem which threatens their ability to meet the basic needs necessary for survival, particularly cooking. Furthermore, energy is an essential component in practically every domestic activity, from refrigeration, water-heating and space-heating to lighting, telecommunications, and television. Inadequate energy supplies may mean that these services are either not conveniently obtainable or not available at all. There are frequently high disparities in access to such services, in countries and within rural areas themselves, creating tension between groups and towards government.

At the same time, shortages of appropriate, affordable energy services have the effect of restricting production and income generation. This occurs on two fronts. Firstly, an absence of fuels can obstruct income generation directly. An example is the reliance of gravity- instead of diesel or electricity-driven irrigation which constrains agricultural productivity. A lack of commercial fuels can prevent the development of both productive and service-oriented small businesses such as electric requirements of a welding enterprise and diesel-run refrigeration at retail stores. Secondly, inadequate energy supplies can restrict income generation indirectly. Time-consuming and physically demanding drudgery from the regular collection of often scarce fuelwood and other biomass for domestic and productive services prevents the potential earning of supplementary income. Since women are usually responsible for domestic energy use, it is primarily they who would be affected in this way. Indirect negative effects are also present in inadequate energy services for community facilities, such as electricity for refrigerated vaccination in clinics and for audiovisual and computer equipment in schools.

The restriction on income generation means that local economic growth is also impeded. This, in turn, contributes to the negative effects associated with rural poverty in general: emigration to already overburdened urban areas, increasing reliance on government welfare, and so on. Less indirect costs can be readily identified as well. The social imbalances created by, *inter alia*, the enslavement of women to the task of fuelwood collection is a clear example. Although much literature points to the considerable complexities regarding the causes of deforestation (for example, Harrison 1987; see section 4.1.3) – indicating that this is not a specifically energy problem *per se* and interventions need to extend beyond the energy sector – there are many problems with conditions of supply and use of biomass energy which need to be addressed (Van Horen and Eberhard 1995, p210). These problems are destined to continue worsening until they are addressed directly.

Because of the frequent failures of energy markets in poor rural areas and their negative consequences as outlined above, there is a strong need for government to intervene to put the rural economy back on its feet. Adequate energy supply is certainly a necessary, albeit not sufficient, aspect of such an initiative. Cautious planning is necessary to ensure that the kind of energy services supplied are appropriate and in demand, and that such initiatives mesh well with other development initiatives in the area.

Unfortunately, a direct link between the national economic well-being and the well-being of poor rural people is not always apparent to development planners and administrators. Since poor people constitute the majority of the population of a developing country, however, it is indeed nationally important, from a long term perspective, that their energy needs be addressed. Neglecting to do so quashes the potential productivity of the majority of the future population. Meeting basic energy needs can therefore be justified on economic grounds and not merely as an ethical obligation of a representative government.

The situation is urgent: problems do not remain static, as if waiting patiently for improvement. If they are not being reversed, then they are undoubtedly deteriorating. Poor rural people often require suitable energy services urgently simply to be able to live at an acceptable level of health with a reasonable quality of life. The longer such problems remain unresolved, the more critical the conditions will become, and the more difficult – and taxing on government resources – it will be to resolve them. On the other hand, without considerable care in designing a programme to address rural energy problems, such an initiative could be premature and ineffective, and worse, prejudice political support for a second chance.

2.1.2 Motivation for demand-oriented approach

Although the need for planning the resolution of rural energy problems seems justified, the method by which government is able to succeed in doing so is far from clear. This has been demonstrated in many developing countries where rural energy interventions have frequently failed to achieve the intended benefits. Sharma (1988, p427) confirms that 'by and large, most of the rural energy development programmes have achieved limited success'. The primary cause of failure has been the tendency of governments to adopt a supply-oriented approach: 'This is what energy we have, this is the technology we want to use, now where can we put it to use?' has generally been the implicit philosophy.

This approach is an offshoot from the economic paradigm that is overly concerned with national economic growth, as defined by aggregated statistics. These statistics can hide conditions of widespread poverty and misuse of resources. The tendency in the past has been to equate energy consumption with national economic growth in a direct causal way, assuming that increasing the amount of energy consumed will contribute to the growth of the economy.

Firstly, this is simply not true: economic growth may not necessarily result from increases in consumption, simply because many preconditions besides sufficient and appropriate energy supplies exist for economic growth to occur. Furthermore, productivity and quality of life may improve as a result of enhancing the efficiency of systems, even though this would reduce energy consumption. Reddy *et al* (1991, p6) confirm, 'Efficiency improvements can lead to dramatic enhancements in the quality of life without corresponding increases in energy consumption.' An example is the use of modern fluorescent lamps which provide superior illumination but consume only a quarter of the energy of normal incandescent bulbs. Demand-side management of energy use may have considerable impact in rural areas. Also, many opportunities for energy production from indigenous resources in rural areas are frequently neglected, as is the case of local generation of electricity from animal waste, or, instead of merely burning excess wood as a means of controlling bush encroachment, redistributing it to areas of scarcity. Basing policy decisions on plots of energy consumption versus GDP is common failing. Although noticeable trends are common, also common are deviations and exceptions to these trends. A direct linear relationship between these two quantities cannot be assumed.

Secondly, the *effect* of such a paradigm often results in a mismatch. 'The economy must grow,' implies the paradigm, 'Therefore here, energy user, take this energy and do something productive with it.' The problem here is that the energy user's needs are not taken into account.

It is unlikely that energy supplied in this way will match the energy services that are in demand. Consequently, energy users force-fed in this way often remain at a loss as to how to meet their energy needs or how to increase their productivity as 'planned'.

This is frequently the case when the category of energy users in question includes poor people without a strong political voice, since in contrast to large corporations and national interests, they are not easily able to make their needs heard, especially if planners are not making a conscious effort to listen. Poor rural people in particular fit into this category.

The alternative to this supply-oriented approach is a demand-oriented approach: considering, in a systematic way, what energy is in demand, what end-uses this energy would be servicing, and in what amount. Certainly, it is not always clear what the energy needs of the poor majority are; but while demand-oriented planning is difficult, the force-feeding approach of supply-oriented energy planning is simply wrong – and the scenarios it proposes impossible (Reddy *et al* 1991, p36). It is seldom recognised that, if demand is ignored, there is an obvious danger of a non-optimum energy supply. If a fuel is under-supplied, the result is the suffering of the energy consumers and accompanying inhibition of economic growth, as mentioned above. If a fuel is over-supplied, which is commonly the case with large-scale energy interventions, the capital investment by the supplier is unnecessarily high and local variations in demand are not addressed. It is frequently the case that conditions of over-supply in one sub-sector exist while gross inadequacies in others remain ignored. Supply-oriented energy planning is closely allied to the technocratic paradigm that regard single technologies as miraculous cure-alls for people's needs.

One should note that a supply-oriented planning approach is often not an intentional or explicit strategy. Those agencies which are supply-oriented may take cognisance of energy demand, but go about designing a supply configuration to meet the demand as if the latter is a *fait accompli*. Demand-side management is not taken into account. Energy-saving options such as improved woodstoves, design of houses to enhance their thermal performance, and the use of fluorescent instead of incandescent lightbulbs, are examples. Also, a market analysis is seldom undertaken which investigates the extent to which services being supplied can be afforded by the majority of targeted users. The underlying implication is the false assumption that an endless supply of energy is available, but energy sources are mostly non-renewable and depleting. The point here is that supply-oriented agencies do not recognise their own supply orientation. They do not choose *not* to implement demand management: they are generally unaware of the possibility of doing so.

Awareness seems to be growing, though. As a result of a significant amount of research done in evaluating energy projects and planning processes, the woes of unrealistic, technocratic attempts at solving energy problems, most obviously those in developing rural areas, are being exposed.

'There has been a growing realisation that the conventional supply-obsessed approach to energy planning is failing on economic and environmental grounds. It is proving to be impossibly expensive and environmentally ruinous. The utilities and the local governments have to depend increasingly on external agencies for capital.... [I]n addition, the conventional approach is undermining self-reliance and by-passing the needs of the poorest sections of society' (Reddy *et al* 1991, p32).

Apparently, planners are becoming increasingly enlightened as to the advantages of a demand-oriented perspective toward energy.

One is cautioned that an 'integrated' rural energy strategy is not equivalent to being 'demand-oriented': even an apparently well-coordinated set of rural energy interventions may be supply-oriented. Consider the hypothetical strategy of combining solar electrification, improvements and price controls in the gas and paraffin distribution networks and a far-reaching afforestation scheme; such a multi-dimensional strategy may not succeed simply because it may be perceived by the beneficiary communities as being imposed on them, whose fervent desire may be for grid electricity and nothing else. While demand-driven planning does not require succumbing to all rural people's wants, what is crucial is that rural energy consumers be involved in the process of planning in a genuine way, so that if what they regard as an option is not viable or possible, this is communicated and explained. A genuine demand-driven process of rural energy planning

entails a process of mutual learning on the part of the energy user and energy planner, in which careful consideration is given to the consequences and impacts of interventions on the different sectors within the community in question, the neighbouring communities, and communities beyond the horizon.

One is also cautioned that a 'demand-orientation' can easily be misinterpreted. Demand-side options can be implemented in a supply-oriented way. Improved woodstove dissemination programmes, for example, which are certainly a demand-side energy intervention as they address the consumption rather than the supply of biomass energy, are notorious for being implemented along top-down, technocratic lines, basing design on technical efficiency under laboratory conditions alone, neglecting to consider factors such as existing patterns of cooking or size of traditional pots, nor taking market conditions into account such as the cost of the stoves being too high for the poorer households or the use of unsustainable subsidies (Harrison 1987, p210).

In order to meet rural energy needs, a demand-oriented approach towards energy planning is essential. It is necessary to construct a rational, flexible set of future energy scenarios, and to design practical strategies that work towards them. This would allow planners to make informed recommendations regarding energy policy and interventions.

2.1.3 Motivation for an integrated approach

Linked to the supply-orientation of past energy planning initiatives is the common neglect of an 'integrated' approach. While detailed attention to each energy sub-sector is necessary (examples include social forestry programmes, low-smoke coal programmes, bringing supplies of gas and paraffin closer to households, and rural electrification planning), initiatives which neglect to consider the broader context in which the sub-sector exists can bring undesirable consequences, wasted opportunities, and compromises in efficiency and equity. Rural grid electrification is an obvious example here: resources have often been wasted in over-supply because of unreasonable expectations of consumption – an ILO study (quoted in Foley 1992, p145) confirms, 'A major impression one retains from a review of the pertinent literature and statistics is that the benefits of rural electrification, including the social benefits, tend to be over-estimated and the costs understated.' Also, benefits to electrical services are frequently unevenly distributed to wealthier rural people who can afford to buy electrical appliances and pay electricity tariffs. A lack of intersectoral communication between the energy sector and agencies outside it can have considerable negative impact on the economy and its people. (Admittedly, it is easy to see errors in hindsight, but there should at least be a deliberate attempt to avoid them).

Not coordinating energy initiatives with other economic sectors, and vice versa, is negligent, because it leads to a situation where the blind lead the blind. A government makes decisions which have profound implications on the lives of millions of its people without consideration of the secondary effects which such decisions will have on them, without knowledge of the complexities of the problems which they face or efforts to properly resolve such inadequacies in knowledge, and without investigation as to whether or not needs could be better met by an alternative energy service.

Rural energy interventions are especially problematic because of the decentralised nature of energy systems and the absence of well-defined demand sectors. Analysis of rural energy supply and demand is neither elementary nor an inexpensive process (in comparison with, for example, energy analyses in the industry or transportation sectors). Furthermore, it is difficult to implement rural energy interventions that are equitable. Targeted beneficiaries of such interventions frequently do not benefit as intended: instead, distribution middlemen and local elites and other minorities have benefited. With intervention in paraffin and coal distribution chains, for example, benefits are often not realised by the final energy user at all. However, this problem is relevant to the nature of rural development in general and not confined specifically to rural energy interventions. Since any intervention is likely to benefit only a section of the population, the challenge is to ensure that that section constitutes the majority, that the needs of the poorest are not ignored, and that one section of the population does not benefit at the expense of another. It is not necessary to attempt to strive for equal benefits for all: this is not possible, except perhaps to make people equally poor.

The energy sector is one of the more complex economic and social systems, and in rural areas this is particularly evident. Different energy sub-sectors may from one perspective appear closely linked, but from another, worlds apart. Energy carriers are linked physically and can be measured by the same scientific unit. Energy sub-sectors are also connected in that they service similar and competing energy services, such as cooking, water heating, space heating, lighting, and agricultural or other productive activities. However, while related to each other, each sub-sector has substantial differences in cost structures, institutional arrangements and local preferences. Compare for instance an intervention in biomass with one in the grid electricity sub-sector. Differences in pricing policies, data requirements, environmental impact analyses and the necessary institutional arrangements would be extreme.

The integration of grid electricity, petroleum products, biomass, non-conventional sources of energy such as solar electricity, as well as animal draught power and human labour, provide for a highly complex process of comparative analysis. Furthermore, the energy sector cuts across most economic sectors. Most rural development initiatives will fail without adequate and appropriate energy supplies, and energy interventions will fail if cognisance is not taken of the rural development context in which such interventions find themselves. Sinha *et al* (1994, p403) emphasise that providing energy should not be the end in itself, but a means of achieving sustainable economic development, with regard to subsistence requirements as well as requirements for economically productive activities. An unambiguous energy planning strategy with explicit purpose and defined objectives is called for.

The process of Integrated Rural Energy Planning (IREP) is an application of the methodology of Integrated Energy Planning (IEP) for rural areas. IREP endeavours to analyse the energy flows in rural areas, from their final end-use back to their source, assessing where imbalances between supply and demand exist and investigating how these imbalances can be corrected most effectively. The foregoing discussion provides the context for the implementation of the process of IREP. Two alternative conclusions could possibly be drawn from the above discussion.

1. Because of the considerable complexities inherent in the rural energy system, IREP is an essential process, which, if neglected, will result in rural energy problems either remaining unaddressed or resolved in a manner which will be ad-hoc, supply-oriented and wasteful. The complexities imply that a holistic consideration of the linkages between energy sub-sectors, and between the energy sector and other economic sectors is crucial. Such analysis would provide guidance and coordination of separate energy interventions, and it would encourage the advantageous employment of demand-side management in addition to increasing supplies. It would allow scarce resources to be used to the full, and it would enable energy to gain visibility in the political arena. From such a process, the establishment and maintenance of an optimum equilibrium of rural energy flows will be possible.

or

2. Because of the considerable complexities inherent in the rural energy system, rural energy planning is a task so fraught with difficulties and energy interventions are so open to abuse, that an analytical process of IREP is a dead duck before it is even hatched. It is more worthwhile to concentrate on the administrative requirements of single energy interventions than to attempt to analyse the effects of those interventions on the rest of the energy sector and the economy with doubtful accuracy and questionable use. 'Integrated Rural Energy Planning' is a romanticised idea invented by academics, demanded by neither government nor the rural poor themselves. The process would be expensive in terms of requirements in skilled human resources, data collection and analysis: the returns do not justify the investment.

Clearly, these two somewhat extremist views are in direct opposition. The truth probably lies somewhere in between. It is the objective of this document to analyse the worth of an Integrated Rural Energy Planning process in South Africa, and whether or not its implementation is a practical approach towards the resolution of rural energy problems.

2.2 Core theory

2.2.1 Defining 'Integrated Rural Energy Planning'

There is a multitude of interpretations possible from the use of the term 'Integrated Rural Energy Planning'. They vary in type and degree of integration: integration of the supply of various fuels; integration of different technologies (such as grid and off-grid electricity); integration of energy and other services; integration of energy and social economic issues; integration of energy provision and land-use management; integration of long-term and short-term strategies; integration of rural and urban energy policies; integration of national, regional and local policies; integration of meeting men's and women's energy needs; integration of energy for production and energy for consumption; integration of energy analysis and energy provision. The list can be expanded. What is to be made of the plethora of interpretations of an 'integrated' approach to rural energy planning?

Much of the confusion originates from different uses of the word 'integrated'. It may be used to mean 'coordinated' or 'holistic', or it may imply 'sustainable' or 'efficient' – and each word has various interpretations themselves. Indeed, it is sometimes apparent that this word is applied to every kind of planning process simply because its absence could raise suspicion. It is proposed that the use of the term in Integrated Rural Energy Planning is not vacuous. It implies a specific set of activities which may or may not be worthwhile. Such activities will be investigated in the subsequent sections 2.2.3 and 2.3.

As the Asian and Pacific Development Centre (APDC) points out, the process of IREP is perceived very differently by different role players in the energy sector:

To policy makers at the national level, it is a part of their package of developmental measures. It is also a means of impressing upon the rural masses and a massed electorate that those at the helm of affairs have not forsaken the people who are, for the most part, overtaken by events and trends at the higher levels ... To planners, the rural energy component is an integral part of the [energy] "system", frequently daunting by its very magnitude. It cannot be left out, if only for the sake of completeness in the planning exercise; at the same time, getting into it is akin to stepping into a quagmire where the greater the exertion, the worse it gets. To those in the field of technological research and promotion, rural energy plans are vexatious hurdles to cross before one actually gets into the practical tasks of installing and operating technological devices. Yet, despite being construed as hindrances at times, such plans are also considered crucial, for, by incorporating certain technological options, they do provide the stamp of legitimacy to them. To the social scientists, [while rural development is familiar ground] ... the technology-intensive characteristics of these issues elude the very hands which are used to grappling with the seemingly more slippery issues of socio-economics. To voluntary organisations, planning of any sort is somewhat utopian in nature. For them, projects and, at worst, programmes, at the decentralised level are the only real solutions. Their strong idealism is a sorely needed requirement for rural development as such; yet, this same idealism can be a fragile thing which can get shattered in the face of successive failed experiments with rural energy. (APDC 1988, pxvii).

Indeed, a significant problem in the debate regarding whether or not IREP is worthwhile and possible is that people perceive the concept of IREP in different ways. Their definitions depend on their perspective, which in turn depends on their experience in the energy or rural development field and their exposure to different types of integrated energy initiatives. The result is that discussions over this issue often consist of discordant points, apparent disagreement often being illusory since differing aspects of the IREP process are being considered. A prerequisite in resolving the debate is clearly to elucidate exactly what is being discussed, thereby minimising misunderstandings.

Perhaps the greatest confusion about the definition of IREP comes from a distinction between 'integrated planning' indicating a planning process at national or regional level, and the planning process which precedes rural development projects or programmes. The former focuses on *analysis*, and entails policy-oriented manipulation of rural energy flows and guidance to ensure certain principles are followed and contradictions in interventions do not occur. The latter refers to the local planning and coordination that precedes *implementation* of

specific development projects or programmes on the 'ground'. Both analysis-based and implementation-based interpretations of an integrated planning approach to the rural energy system are valid applications of IREP. In general this document refers to the analysis-oriented application of IREP, unless implementation-based IREP is referred to explicitly.

2.2.2 IEP principles

Mohan Munasinghe was the first major proponent of an integrated planning approach to the energy sector. Through extensive work on this subject since 1980, he has been a pioneering architect of Integrated Energy Planning (IEP). He provides a useful perspective in visualising an IEP framework, depicted diagrammatically in Figure 1.

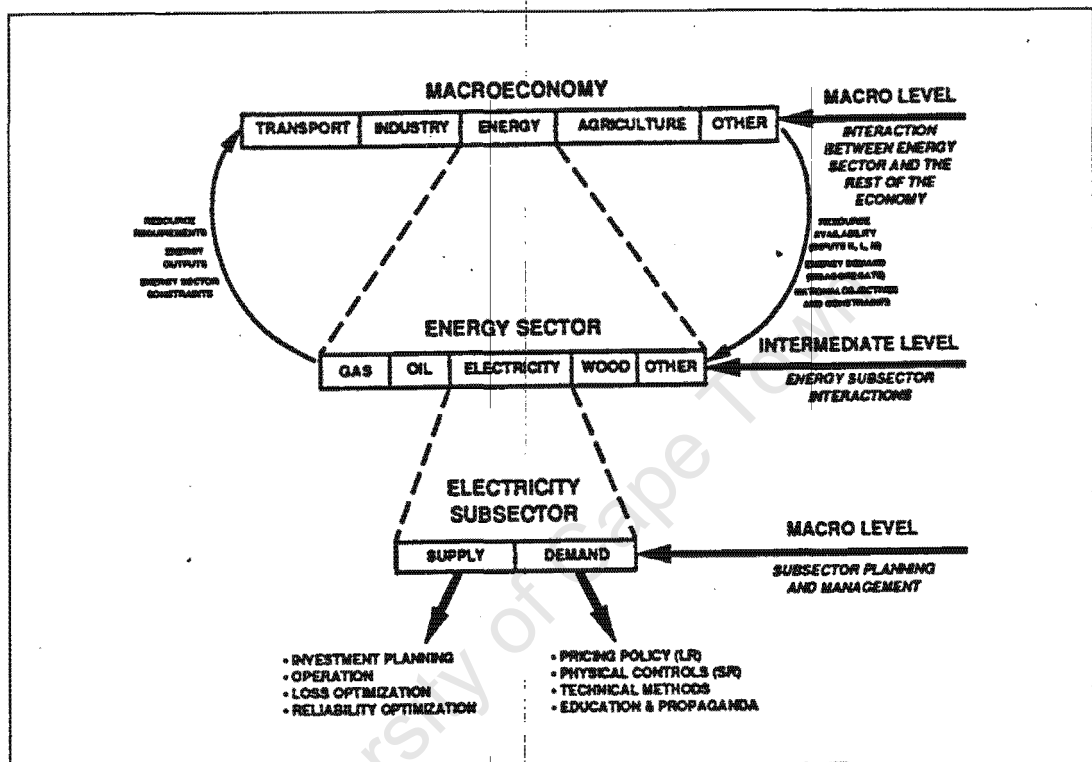


Figure 1 - Munasinghe's depiction of IEP (Munasinghe 1990, p20)

Munasinghe distinguishes three levels of analysis. At the first level the energy sector is viewed as a participant in the overall economy, with national energy planning issues and broad supply-demand management being clarified at an aggregate level with explicit links between the energy sector and the rest of the economy, such as transportation and industry, as well as labour and environmental considerations. At the second level, the energy sector is treated as a separate entity composed of sub-sectors such as electricity, petroleum products and woodfuel. Interactions between energy sub-sectors, particularly policy conflicts or competition for similar end-uses, are investigated. The third level is the most disaggregated level and entails careful planning and policy formulation within each energy sub-sector, such as the electricity sub-sector as depicted.

However, a conceptual problem with this perspective exists when energy planning for rural areas is being considered. There is an implicit perception that the economic framework is the focus of integrated energy planning: the macroeconomy is considered first, then the energy sector, and thereafter the separate energy sub-sectors. What this paradigm neglects is *people*. Conditions of the supply and demand of various energy carriers and their position within the macroeconomy ignores the people who use these fuels and who are affected in often a radical and even survival-threatening way by 'market fluctuations'. Particularly for poor rural areas – in which commercial markets sometimes do not even exist – this is an inappropriate paradigm through which to perceive energy planning.

Nevertheless, Munasinghe's overall three-tier framework is paralleled closely – just in reverse order – by the three principles delineated by the APDC in its *IEP Manual* (APDC 1985a, p7), commonly regarded as the primary source on the theory of IEP. Because of their conciseness, APDC's principles manage to capture the essence of previous and subsequent proponents of IEP. Although the implementation of these principles will overlap, especially in their application for developing rural areas, they are distinct and separable. These three principles are outlined below, including a brief consideration of their relevance for developing rural areas. Thereafter, the theoretical procedural methodology of IEP is outlined (section 2.2.3), and in the following section (2.3) the scope for which these principles are relevant for the rural context are investigated in more detail.

A. *End-use driven*

Perhaps the most significant lesson learnt from the failures of previous energy planning exercises in developing countries is that supply-oriented energy planning does not work. A country's energy resources should not be regarded as disposable, but rather irreplaceable natural capital to be utilised for optimum and sustainable benefit of society. As mentioned above (section 2.1.2), there is much evidence to show that increased energy consumption is not necessary for, and does not necessarily cause, increased economic growth. Energy supply options should only be considered in the context of energy demand.

Applying an end-use driven approach to energy planning in poor rural areas is highly desirable. While planners' knowledge of energy systems in these areas is almost always inadequate, much of the information is known, albeit non-quantitatively, by the energy users themselves. An end-use driven approach will be able to tap this information resource, enabling government to make informed energy-related decisions. This principle encompasses the additional need to provide information on the energy policies of government to energy users, in order to enable them to make informed plans at individual and community levels. An end-use driven energy planning approach in rural areas entails starting from a *people-centred* perspective. This emphasises the point that, in contrast to energy demand sectors of mining, industry or transportation, in rural areas it is individual people rather than sectors or organisations that are the main energy-users. Therefore, rather than an extensive analysis of different energy sectors, in poor rural areas the *energy service* requirements of people need to be properly understood. As part of this principle, local participation in the planning process is recommended. Depending on local capacity as well as the extent to which government is willing to support this principle, the degree of local involvement can vary from consultation, to participation, to ownership (Thom 1994).

B. *Integration of energy sub-sectors*

This principle is a core feature of the concept of IEP. Rather than focusing on single energy interventions to meet energy needs, a diversity of energy solutions in different energy sub-sectors are considered. Gandar (1989, p7) suggests the energy system can be thought of as an ecosystem: 'In ecology, it is generally accepted that the stability of a system derives in part from its diversity and that loss of diversity usually leads to reduced stability ... In a diverse system there are several alternative pathways, so it is buffered against perturbations.' Since different fuels service similar or competing energy needs, and because of the usually fragmented nature of the energy sector, coordination between the different sub-sectors is called for by IEP proponents. This principle requires the adoption of a *resource-conscious* attitude: unused resources and wasteful usage thereof must be eliminated. A least cost mix of energy interventions, including the usage of demand-side management, is a goal. This can be achieved by assessing imbalances between demand and supply of the various energy carriers, and, in response, implementing well-conceived policies that take into account the effects on other sub-sectors. Liaison and communication will be necessary between the different energy suppliers, in both the private and public sectors, and the government body that has the mandate and the power to pass energy-related legislation. In particular, coordination of non-electricity options with the spatial and time plans of a large scale electrification programme will be essential.

In poor rural areas, the idea of diversity for stability is especially relevant because of the instability inherent in poverty. The unreliable nature of poor rural incomes have significant effects on energy usage, particularly the application of multiple fuel-use and sporadic fuel-switching. Single technological solutions (grid electrification is a case in point) are unlikely to solve the energy-related problems at least in the medium term. A diversity of energy

interventions will provide the rural energy user with the ability to choose. IEP proponents assert that an ad-hoc implementation of separate energy interventions is unlikely to achieve the impacts desired, because of likely contradictions and conflicts between the different interventions. Intersectoral analysis will achieve a rational, coordinated energy strategy.

C. *Integration of energy with economic development*

IEP proponents also call for the analysis of the interdependence of energy and the economy. Since the utilisation of energy forms a part of the activities of many other sectors in the economy, it seems reasonable that integration with these sectors be sought. Effects of energy policies on the economy and the effects of policies in other economic sectors on the demand and supply of energy should be assessed. Included in this principle is the important need to consider aspects such as historical perspective, political considerations and institutional arrangements. The spatial perspective is also important, such as the location of energy production. Neglecting to consider such linkages, say IEP proponents, will create contradictions between energy policies and policies in other sectors, automatically stunting the impact of both. Liaison will be necessary between institutions involved in the governance and supply of energy and government agencies in other sectors. In developing rural areas, this principle has a twofold application.

- Integration of energy options into the rural development process at local level is necessary. Energy interventions must be adequately integrated with existing local development initiatives and the local development process as a whole. Rural energy interventions must of necessity be acceptable to the majority, for like all rural development initiatives, they are doomed without community support. Furthermore, they should address the needs of the neediest and show promise in contributing to an improved quality of life and/or increased economic growth. Interventions also need to balance energy for subsistence with energy for development. It is clear that an integrated look at energy and the local economy is closely allied to Principle A above: the need for an end-use driven approach. As part of the same point, local development initiatives in many sectors require energy as an input. Energy planning for these initiatives would enable them not to fixate on single energy carrier solutions, nor assume, unjustifiably, that a sufficient and appropriate energy supply is automatically available.
- It is necessary to ensure that energy options satisfy, or at least do not conflict with, broader economic principles and strategies. At national level, policies such as the support of democratic principles, local capacity building, use of labour-intensive rather than mechanised practices, and the protection of the natural environment may be of relevance in this regard. At regional level, economic development, land-use management, and agricultural reform policies need to be considered.

The two applications of this principle are distinct, and consequently may conflict. Sinha *et al* (1994, p410) refer to the need for energy strategies to 'dovetail' with local economic development as well as with national objectives. Contradictions require that compromises need to be sought.

An important additional source contributing to the theory of integrated energy planning is the International Energy Initiative (IEI) based in Bangalore, India. Led by Dr A K N Reddy, IEI has designed an energy planning methodology entitled 'DEFENDUS'. The DEFENDUS ('DEvelopment-Focused, END-Use-oriented, Service-directed') paradigm is designed to 'defend us' against the various crises which face the energy sector of developing countries (Reddy 1994, p 14). The methodology arose from a disillusionment of the unsustainable conventional approaches to energy planning – regarding endless economic growth as being necessary for development (Reddy *et al* 1991). The neglect of energy efficiency improvements in the planning process was unacceptable from the point of view of sustainability. DEFENDUS methodology was also born out of the need to avoid the problems of existing energy planning software packages – namely, that they were unnecessarily complex for developing countries and that energy planners were totally dependent on the software programmers, since the formulae describing the energy system were embedded into the package. There arose a great need for 'a simple method of computing energy demand and supply in which the planner has complete control over the entire procedure' (Reddy *et al* 1995, p3).

A correspondence between DEFENDUS and APDC's principles is apparent. Principle A, the need for an end-use driven approach (which includes the focus on energy services) is supported explicitly. The final end-use of energy sources is the appropriate perspective from which energy planning should be viewed. Conversion efficiencies of energy appliances, health hazards and impacts of technological change on the social dynamics of energy use are relevant here. Current energy demand must be assessed and future scenarios formulated before supply-side options are considered. It is necessary to be aware of what is required at the end-use side of energy networks in order for energy suppliers to know what, how much and in what way to supply. An emphasis is placed upon the need for decentralised planning (Thom et al 1995), and the creation of local employment through interventions such as electrification is considered essential (Reddy *et al* 1991, p15). However, it should be noted that DEFENDUS does not explicitly emphasise local participation in the planning process itself.

A 'service-directed' approach reinforces the end-use perspective of Principle A. It refers to the viewpoint that 'what human beings and their individual and collective activities require is not energy *per se* but the work that energy performs and the services that energy provides' (Reddy 1994, p11). The emphasis here is exposing the error in thinking that increased levels of energy consumption will bring economic growth, especially in developing communities. The unnecessary and too-often implicit connection made between GDP growth and energy consumption in energy planning must be eliminated and the full variety of generation and energy saving options for increasing the quality and quantity of energy *services* must be considered. It is frequently ignored or forgotten that technological improvements can lower energy demand while retaining the same level of energy-derived services (Reddy 1995, p11). The level of energy consumption does not imply better or worse services. A shift in perception is necessary: when energy projects are directed toward the services energy provides rather than the energy consumed, then they contribute more meaningfully to the improvement in the quality of life of the recipients. Quality-of-life-oriented thinking is what is required.

The link between DEFENDUS's development focus and Principle C, the need to contextualise energy planning with local and regional economic growth, is self-evident. Reddy *et al* (1995, p10) mention that a development focus entails aligning energy planning with how development is perceived by the government in question, be it satisfaction of basic needs of the neediest or increase of the GDP. A development focus obviously supports integrating energy planning with regional economic growth, and local economic growth is supported through DEFENDUS's apt assertion that a development focus requires that energy planning acquires 'a human face' (Reddy 1994, p14). It needs to be people-centred and community-based, creating employment and improving people's living conditions.

Less apparent is DEFENDUS's support for Principle B, that of integrating different energy sub-sectors. This exposes the background of the methodology: DEFENDUS was designed initially for the electricity sub-sector with the intention of expanding it to the entire energy sector (Reddy *et al* 1995, p4). While DEFENDUS proponents claim that integrating energy sub-sectors is an inherent part of the methodology, and that the first case study was an electricity planning exercise for Karnataka which 'buried the *methodology* in the *application*' (ibid, p5, original emphases), I am unaware of a planning exercise employing DEFENDUS methodology that incorporates all energy-sectors on an equal footing.

This notwithstanding, the Karnataka study (Reddy *et al* 1991) deserves credit in demonstrating unequivocally how much can be neglected during electrification planning. Various generation options, both centralised and decentralised, and demand-side management measures are generally ignored. The study showed that not only do these other options contribute to the optimisation of energy resource utilisation, they are also more cost-effective. Furthermore, the study's 'service-directed' planning approach suggests that such a principle is automatically relevant for the energy sector in general, particularly in rural areas.

One particularly useful contribution of the DEFENDUS methodology is Figure 2 on the following page. The usefulness of this diagram lies in its simplicity. As in any sphere of development planning, there is a great need for simplicity – that is the difficulty. This diagram demonstrates that through an end-use analysis which combines the energy-related goals and the

context of the energy system, strategies can be devised. These need to be translated into policies, through which, through the utilisation of policy instruments and in liaison with policy agents, a well-designed set of interventions in the various sub-sectors of energy can be implemented. The diagram conveys the importance of regarding the separate procedures of energy planning as a single process. Reddy *et al* (1994, p5) remind us that, 'for goals to be attained, strategies must be implemented; for strategies to be implemented, policies must be given effect to and operated; for policies to be given effect to and operated, policy instruments must be initiated and maintained, and in addition, policy agents must wield the policy instruments.'

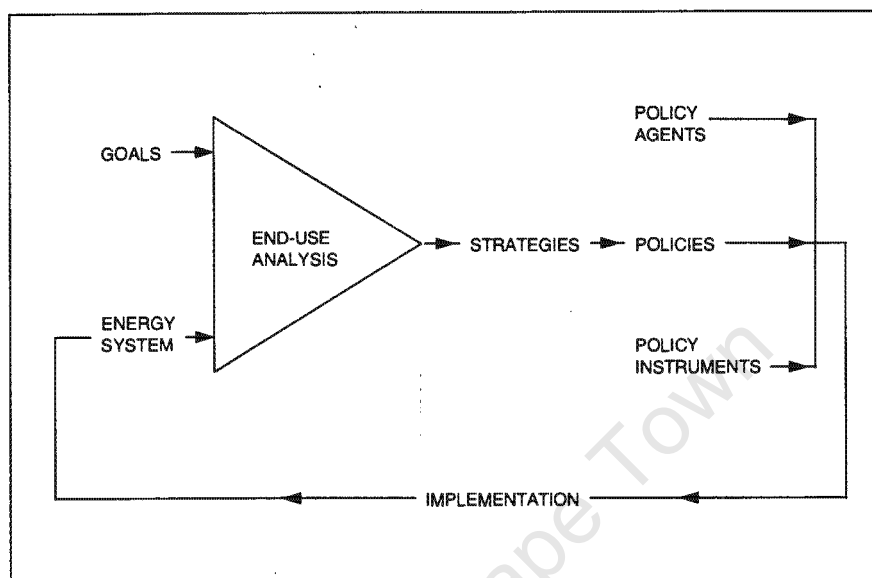


Figure 2 - Systems perspective of IEP (Reddy *et al* 1995)

IEP principles and methodologies (as envisaged by APDC, Munasinghe and Reddy) have all been designed for an integrated planning approach of the national energy sector as a whole. From the way the principles have been phrased it may not be obvious how these terms are applicable to the rural context. They can appear overly abstract, perhaps inappropriate in a rural environment which is absent of well-defined sectors, developed institutionalisation, and well-established development planning procedures. Despite this, the above discussion seems to suggest that, in theory, the implementation of a process of analysis embodying a combination of the above principles does seem to have concrete applications for rural areas. It would be useful to briefly highlight a core aspect of each principle for the rural context, and in this way illustrate the applicability of these principles for IREP.

- Principle A: a *people-centred* approach is an essential characteristic of an end-use driven rural energy planning process, since it is people rather than enterprises who are mainly the end-users of energy in rural areas.
- Principle B: a *resource-conscious* perspective is an imperative when looking at the integration of energy sub-sectors, particularly since the scarcity of resources is highly visible in rural areas.
- Principle C: the need for energy planning to be *locally and regionally relevant* is crucial when considering integrating energy planning with economic development since rural energy initiatives often ignore broader needs of people, and since energy is often a vital yet ignored element of existing various development initiatives in rural areas.

Although these phrases do not encompass the full implications embodied in the formal principles (for example, end-use driven planning requires that energy *services* be emphasised), it appears that they successfully contextualise the principles for a rural energy planning process.

Whichever terms are employed, the fruits of such a process are what count. The successful implementation of a process that employs these principles would indeed be fruitful: it would have the stamp of legitimacy from a people-centred approach; it would eliminate the wasteful

usage of resources through adopting a resource-conscious attitude; and interventions would fit well into the context of local rural development and satisfy already-defined broader development goals. In its recommendations, the FAO (1990, p5) summarises these principles with its statement that 'The central feature of the new approach is the preparation and implementation of area-based decentralised energy plans for meeting energy needs for subsistence and development at the least cost to the economy and the environment, and linking the micro-level plans with national economic planning and development programmes, including those for the energy, agriculture and rural development sectors.' However, seldom are theoretical principles completely realisable in practice. Whether or not a suitably successful implementation of such a process is possible and whether or not its benefits justify the investments is not clear. Constraints are many: institutional, political, economic and logistic. The rural development process in the country in question may be ill-designed for IREP. On the other hand, perceived limitations may simply be obstacles that can and should be overcome.

2.2.3 Methods of IEP

A discussion of IREP needs to be based around the various recommended methodologies for a national IEP process. The next section (2.3) discusses how adaptable IEP is for the rural context. Eberhard (1994, p8-10) provides a useful summary of the literature, and the methodological steps he delineates will be used in the ensuing discussion, thereby avoiding the duplication that would result if each methodology would be analysed separately. The current section outlines these steps.

1. Definition of goals and scope

Definition of broad goals need to be defined, and macro-economic variables whereby these goals may be measured need to be identified. Also, it is important to clarify the scope and the planning horizon of the process. This is a useful step in ensuring that all role-players agree as to the definition and interpretation of the IEP process being attempted. Care and effort is necessary at this early stage to avoid future hiccups in the process.

2. Database development

Data collection, collation and presentation of all energy-related data is required here. This step entails a description of conditions in the demand sectors (such as industry, mining, transportation, residential sector, disaggregated by energy end-use, consumer category and fuel type) and supply sectors (such as grid electricity, petroleum products, renewable sources, with a description of the energy chain from primary production through the phases of energy conversion until final consumption). Specific methods of data presentation have been devised which include 'energy balances' and 'energy system networks'. Too often neglected by energy planners is the collection of information regarding the demand and supply of non-commercial biomass fuels: in rural areas this is particularly important because they are often the dominant fuel source. Also, analysis will inevitably have to ensue even though the data set is incomplete. It is usual in these cases that the processes of database development and analysis are implemented in parallel, with iterative feedback between them.

3. Demand analysis and projections

Past and present energy demand, disaggregated by end-use, is analysed and different future demand scenarios are projected with the utilisation of models. It is likely that quantitative consumption data being used would need to be supplemented with qualitative data in order to give a more textured analysis. Various energy models can be used to facilitate analysis, including the controversial endeavour to forecast energy demand in the future.

4. Supply analysis

Past and present energy supply trends are analysed and possible future scenarios are constructed. The availability of energy sources and conversion technologies are assessed, evaluating alternatives and their potential impacts on the rest of the economy. Future scenarios can be either projective (extension of past trends) or normative (redirection of

past trends); a long-term, realistic time horizon would entail a combination of both. Supply analysis includes an assessment of existing resources and an evaluation of technologies under consideration.

5. *Balancing supply and demand and construction of future scenarios*

Past and present imbalances between supply and demand, its causes and its consequences on development patterns, are analysed. Key factors that will help achieve the desired goals identified in step 1 are identified. Then, with the assistance of the preceding steps, alternative future supply and demand configurations for energy are developed, tracing energy flows from each end-use, back through conversion technologies to energy source. Configurations are juxtaposed against a 'business-as-usual' scenario (no policy changes) to determine the nature, timing and scale of the possible impact that policy interventions could make. The most desirable configuration is selected.

6. *Policy options*

Policies are formulated in order to achieve the desired configuration of energy demand and supply. A wide variety of policy instruments is available to support this endeavour: physical controls such as rationing of supplies; technical methods such as selecting a least-cost mix of technologies; implementing energy investment policies such as in rural electrification; education and promotion of a particular energy option or set of options, for example as an alternative to grid electricity; pricing, taxes and subsidies; and reforms in market organisation, regulatory framework and institutional structures (Munasinghe 1990, p21). Instruments must be used with care and foresight. Demand management options are important interventions easily neglected in the face of consumption-oriented supply interventions. Caution is necessary to design the deployment of selected policy instruments that are most likely to bring about the desired outcome with the least amount of undesirable side-effects in the energy sector and beyond it.

7. *Impact analysis*

Without feedback, the extent to which policies that were implemented have been successful is unknown. A monitoring process is necessary to evaluate the impact of policy interventions on the macroeconomic variables whose significance were identified in step 1, as well as impacts on the less-quantifiable variables such environmental impact and certain socioeconomic objectives.

8. *Iterations*

IEP is not a set of guidelines in drawing up an energy master plan. A prerequisite for the success of IEP is that it is an on-going process rather than a once-off plan. Many iterations of these eight procedures will be required before errors and inconsistencies in the methodology are eliminated. At first, policy measures are likely to be not well coordinated, even clumsy. Only through repeated attempts will the understanding of the participants and their agencies be improved, and, in turn, will the IEP process and its contribution to the energy system be refined. Slowly, through the implementation of an IEP process, the energy system can be improved to the point where only fine-tuning is necessary. In addition, feedback and possibly iteration between successive phases of single IREP attempts may be necessary.

The above steps are not a fixed sequential procedure, mainly because different agencies or units would be called upon to perform different tasks, or different aspects of certain tasks. The steps are rather a logical framework from which IEP methodology can be more easily applied. Several steps would be performed concurrently, and feedback or iteration between adjacent steps would be common. The linkage between demand and supply analyses would be close, for example, and database development would be an on-going effort throughout.

2.3 Assessing the IEP methods for IREP

The IEP methodology is difficult to imagine without a diagrammatic representation, but APDC's diagrams seem too complex and rigid for the rural context. Figure 3 below is a modification which is hopefully more useful in this regard. Procedural steps of IREP are nevertheless called the same as in APDC's IEP methodology, and are delineated in the diagram by blocks, numbered in correspondence with the numbered steps in section 2.2.3.

As depicted, the IREP process consists of steps 1 to 8. Spending adequate time and resources in setting realistic, far-sighted, and clearly defined goals, scope and time horizons (step 1) will be a pivotal determinant in the effectiveness of the overall IREP process, and may need to be redefined during subsequent iterations. Database development (step 2) is less a 'step' than an on-going process running in parallel with other IREP procedures. Demand analysis (step 3) entails an assessment of local energy needs, implemented in conjunction with a supply analysis (step 4) which entails a consideration of the various sub-sectoral conditions. By balancing energy demand and supply (step 5) from a synthesis of the outputs of steps 3 and 4, possible future rural energy scenarios can be constructed. Policy options can then be devised (step 6) to guide the rural energy system in the direction of a desired scenario. The need for regular assessment of the impact of interventions (step 7) follows. This entails allocating resources in advance to acquire feedback from communities and to collate lessons learnt. Lastly, and perhaps most importantly, an iterative process (step 8) is necessary as it is only through successive attempts at disentangling the morass of rural energy issues that they can have a hope of being resolved.

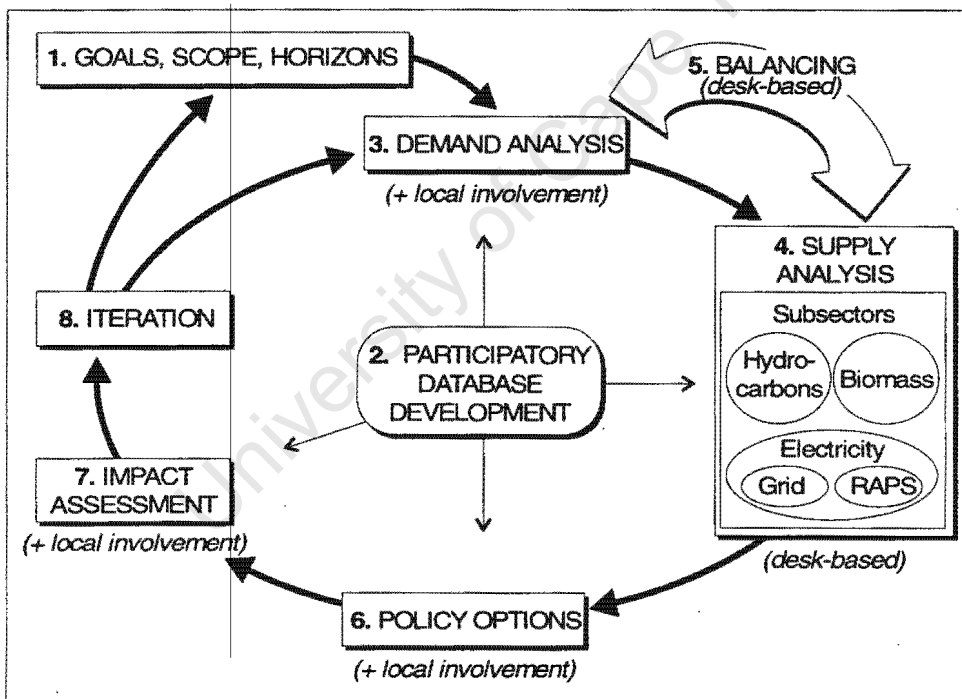


Figure 3 - Proposed IREP methodology

Involvement of local people is necessary in several of the IREP steps, as depicted. Step 2, database development, is particularly relevant in this regard, with the need to employ participatory techniques of data collection in order to gain a properly textured understanding of rural energy conditions. It may, however, be appropriate to approach rural people about their energy needs indirectly (via other data collection processes) as many do not perceive 'energy' as an identifiable concern, even though they may recognise many energy-related problems. Step 6, policy options, is also an important procedure where analysis must not be desk-based, as decisions will need to be the result of a compromise between the inevitable conflicting views held by government, energy suppliers and different groups of local people. Steps 3 and 7 also entail local involvement: demand analysis requires communication with local people as to their needs and preferences, and impact assessment entails inquiring from local people what degree they

perceive interventions to be successful or not, and why. In contrast, steps 4 and 5 – supply analysis and demand and supply balancing – is predominantly desk-based.

Although critical comment is surely possible of the theoretical IEP/IREP methodology in general, this document's focus is on its applicability for rural areas. Some theoretical points regarding this question are considered below.

Techniques that have been traditionally employed by governments of developing countries and donor countries in order to address rural energy problems have regularly failed. Can an IREP process be helpful in avoiding past problems of rural energy initiatives? To what extent is IEP methodology applicable for an IREP process? Will the advantages IREP brings such as intersectoral coordination and a demand-driven planning perspective justify the effort and investment that is involved? In order to address such questions, the way IEP methodology (section 2.2.3) caters for the planning requirements of rural areas needs to be investigated.

Certainly, rural areas exhibit very different energy characteristics, in both demand and supply, compared with urban and industrialised areas. Rural energy systems are particularly decentralised. With the dominance of biomass as an energy source, production and consumption occurs mainly at household level, often without linkages to a commercial market or even between households in the same village. Demand analysis is therefore very difficult in comparison with, for instance, industry that consists of well-defined energy consumers and easily-quantifiable energy-consuming processes. Economic complexities associated with the poverty in developing rural areas such as the overlapping of economic sectors and multiple fuel use present considerable problems to the energy planner. Tensions of individual needs and wants conflicting with national economic and political interests often exist, particularly in terms of the provision of highly sophisticated services such as electrification. Social dynamics further complicate the issue: culturally defined gender-specific roles and rights and the vagueness of household boundaries (and the consequent lack of a clear defined basic unit of domestic energy demand) are examples. In addition the wide diversity of needs in poor rural communities is problematic for the planner who needs to balance energy needs for production and those for consumption.

Furthermore, energy needs are not easily divisible from rural development needs, and rural people seldom perceive 'energy' as a discrete problem among their various others (Thom per communication). Many, or even most, rural development needs have implications for the energy sector. There is the danger that 'energy projects' may be impositions that addresses problems perceived more by academic researchers than the poor people themselves. Applying the urban-based IEP principles and methods to rural areas will clearly be different and difficult.

As was evident above, IEP is a methodology designed mainly for planning the improvement of the national energy sector. An end-use driven approach (Principle A) to the national energy system requires that analysis be structured around energy demand sectors. Unavoidably then, those which are more energy-intensive and therefore indicate higher levels of financial resources, such as mining, industry and transportation, receive more emphasis than those which are less energy-intensive even though they may be equally important from a political or social perspective, such as the residential sector or agriculture. Poor rural areas are a combination primarily of the less visible demand sectors: the residential sector and small-scale agriculture.

Also, since rural areas are not small-scale versions of the national energy sectors (and therefore do not consist of distinct energy demand sectors such as industry, transportation, and business), a small-scale version of IEP may be inapplicable to these areas. The vague, overlapping boundaries of rural demand sectors seems to indicate that the final end use of energy should be focused upon rather than the 'sector' to which it belongs. It is apparent that the general IEP principles (section 2.2.2) may be more applicable to rural energy planning than the specific procedural steps (section 2.2.3). Nevertheless, the procedural steps are useful as a starting point from which a rural energy planning methodology can be built up from experience.

The IEP Manual (APDC 1985a, p9) proposes that 'rural areas' be regarded as another demand sector. This label is problematic (Thom 1994). The analytical separation of rural areas could imply the perception that the rural energy demand profile is sufficiently uniform and constant

to be able to be dealt with as a separate sub-sector. This is invalid: energy demand in rural areas is equally or even more complex than elsewhere, mainly in terms of social dynamics and practices of multiple fuel use and erratic fuel-switching (Thom 1994). On the other hand, such a separation of rural areas from other demand sectors would be useful. Without one, rural energy needs will likely be immersed and largely forgotten in the other more energy-intensive sectors. This is because the rural contribution to the demand of – and payment for – energy in these sectors is mostly negligible. Therefore, allocating rural areas a separate sub-sector on their own is an acceptance of these complexities and an acknowledgement of the need to address them. Alternative ways of emphasising these issues are possible, though, such as separating low-income households as an identifiable demand sector.

Conceptual problems of IEP such as these are less problems of APDC's methodology than an inherent problem in the entire concept of 'energy'. By its nature, energy is an abstract, intersectoral and all-pervading service, perceived more clearly by the academically minded. This should be taken only partly as a note of cynicism, for, to a certain extent, these inconsistencies themselves are academic inventions and 'energy' remains a very real part of rural society. In rural areas this is certainly the case, and even more visibly so. The intrinsic importance of energy in rural areas need not be explicitly recognised by the energy users for it to be an essential aspect of their well-being and the economic growth of their area.

One should note that, despite the significance of energy in rural areas, the profoundly complex nature of the rural energy system means that the elimination of any inconsistency will create a new one elsewhere. In practice, such theoretical inconsistencies can be ironed out during successive iterations. More significant than conceptual inconsistencies in the theory is political and economic resistance in even experimenting with the idea in practice. Pilot exercises are necessary to test whether or not an IREP process could be effective – producing more efficient, sustainable and equitable energy conditions to an extent that justifies its implementation. There is usually much implicit resistance to such experimentation, mainly because of a limited awareness of the significance of energy in society (even though the excuse is invariably insufficient resources). In theory, an end-use driven, integrated approach to energy planning can be adapted to rural areas quite easily, given the common failure in many developing countries of supply-oriented, uncoordinated rural energy strategies. However, in practice, an end-use driven, integrated approach is one which can be slow and expensive: staying power and adequate resources are necessary to establish the legitimacy of such a process.

2.3.1 IEP methods for IREP: Goals, horizons, national guidelines

In order for an IREP process to have at least the possibility of being successful, it is important that, from the outset, the three IEP principles outlined above be built into the process. Factors artificially inserted into a programme will serve as nothing but useless retrofits. Although relevant and worthy of experimentation, such afterthoughts will have little effect and the planning process may remain as supply-oriented, uncoordinated and inefficient as ever.

For this process to be useful, it is important that energy be placed solidly within the context of the broader process of local rural development (Principle C). This implies that the rural development process should obey a demand-driven, integrated approach itself. Clearly the most advantageous planning environment in which IREP could find itself is one which endeavours to perform a process of Integrated Rural Development Planning (IRDP). Energy needs can then be inferred from the development needs assessments rather than the problematic process of directly approaching rural people who are unlikely to perceive energy as a discrete need or service. FAO (1990, p3) agrees, 'Systematic and comprehensive rural energy planning should be carried out in conjunction with integrated rural development planning in particular, and overall national and energy planning in general.' This does not mean that IREP is worthless outside an existing IRDP process: only that an IRDP process would allow almost automatic acceptance of IREP, whereas without it intersectoral coordination will need to be led by IREP.

Since a scarcity of resources, both of sufficient financial and suitably skilled human resources, is common, an all-encompassing IRDP strategy is usually overly ambitious and inappropriate in the context of such urgent development needs. However, ad-hoc planning promises a wasteful use of financial, human and physical resources. An approach that employs a single sectoral focus such as is encompassed by the concept of 'critical-path analysis' can be a profitable

compromise. This approach entails defining a *critical path*, which defines the close links between key factors from various sectors which have to be satisfied to achieve a specific sectoral objective. An example is the need for better water supply, transport, and secure land ownership before food security can be ensured. The critical path can be more complex, such as planning a large-scale low-cost housing scheme in this way: coordination with domestic water supply, provision of household sanitation, potential for households electrification, the development of roads and the agency responsible for land tenure may be deemed necessary. When development projects are planned and implemented using this approach, attention is paid to other sectors only if they are essential to the success of the central sectoral development objective (Williams 1995, pB-4). This is a more realistic approach towards planning, balancing administrative tasks with the need to perform planning from an holistic perspective. While it is questionable whether or not energy should be employed as a lead sector in rural development, because of its pervasiveness energy is likely to constitute an essential element along the critical paths of many initiatives in other sectors.

Besides pre-defined goals, time horizons and scope of analysis also need to be reviewed here. Clear distinction of different time horizons, such as short-, medium- and long-term horizons, is appropriate. Each horizon can be tagged with certain goals, such as the milestone dates by which certain types of needs should be met, specific aspects of an energy database should be developed, and the envisaged deadline when the institutional framework should be suitably restructured. Connection with time horizons of economic plans (which are invariably shorter-term) and the extent to which environmental considerations are to be considered are also relevant in determining suitable horizons.

Regarding defining the scope of an IREP process, the need for an holistic perspective should be remembered. All activities of rural people and their associated energy needs or implications on supply should ideally be considered, independent of whether or not such activities may formally fall into one economic sector or another. It would be preferable to scale down planning by limiting the level to which analysis is decentralised or disaggregated rather than exclusion of demand sectors or supply technologies. For instance, it may be decided that disaggregation by seasons would burden planning resources excessively. In parallel to such analysis, specific demand sectors and supply technologies can be promoted as an implementation-based application of IREP.

It is advisable that, initially, 'quick and dirty' overall studies to village or district levels be implemented, gauging approximate levels of broad economic, demographic and energy-related characteristics. In subsequent iterations, the depth and quality of analysis can be increased and improved.

Linked with the definition of the scope of the planning process, it is necessary to clarify to what extent an end-use driven, people-centred process is to be followed. To what degree is local involvement to be considered: consultation, participation, or ownership? Is the focus more on capacity building or on the provision of energy services? In other words, is the strategy to support ownership-oriented local involvement if local capacity and practicality allows, or will local participation be predetermined to a limited level in order to get energy interventions implemented as soon as possible? Seeking to achieve both sides of these questions simultaneously is surely appropriate: that is, achieving a balance between opposing objectives. The balance should be determined explicitly, so that the extent to which each objective should be implemented is clarified.

A crucial aspect of this preliminary phase of the planning process is the broad-minded, careful and far-sighted allocation of administrative resources. Appropriate amounts of financial resources and suitably skilled human resources should be determined for different phases and aspects of the planning process, particularly those areas which are known to experience problems in this regard. In particular, sufficient quantitative and qualitative data collection that includes genuine local community involvement, and the implementation of a process of monitoring and evaluation subsequent to the employment of policy instruments, should be allocated funds in advance.

This initial phase of the planning process also entails the clarification of how the procedures of data collection, collation and analysis will be structured institutionally. The tasks need to be allocated to the appropriate government tier so that contradicting factors such as the need for access to decentralised energy systems can be balanced with limited local capacity and the need for firm regional coordination and guidance. Institutional considerations are investigated in greater depth later in this chapter (section 2.4).

Note that a tension exists between this step of goal definition and the need for an end-use driven process (Principle A). Whereas an end-use driven process calls for a bottom-up attitude of openness by not setting any goals before energy demand is assessed, this step of the IEP methodology requires that goals are set in the traditional top-down planning way. The tension here is essentially the same tension between projective and normative planning, respectively. Projective planning considers past trends and extrapolates them into the future; normative planning selects a desirable scenario of demand and supply and endeavours to work towards it. Projective planning is more end-use driven (Principle A), for it allows local needs to dictate the direction of energy trends; the normative planning is better able to support a resource-conscious perspective (Principle B), for measures to conserve energy and other resources is supported by working *toward* a scenario. This tension is constructive in that it serves to balance the sometimes conflicting aims of planning criteria. Through the implementation of an iterative process of IREP or IEP, the elusive energy configuration which meets this balance may then be achieved.

Note also that a tension exists between the concept of integrated energy planning itself and calls for deregulation of the energy sector. Successive iterations will help iron out tensions, but here it is also important that iterations are guided by unambiguous policy around the role of the state.

2.3.2 IEP methods for IREP: Database development

Planners require extensive information of energy systems in rural areas, disaggregated in terms of the end uses that the various fuels provide. Without an adequately sized and suitably detailed energy database, IREP is not an option. Economic, demographic, agricultural and sociological information is required in addition to the demand and supply of energy. Without such information at the planners' fingertips, planning will be ad-hoc, inefficient, and, simply, wrong. Other data required includes reliability of access to disposable income, educational background, conditions of land tenure, quality of arable land, and local perceptions toward different energy solutions. Also, various cultural factors need to be investigated such as gender roles, energy-related relationships between households (a social fire, for example), and religious beliefs that may inhibit (or enhance) the success of an energy intervention. An energy database provides the energy planner with the invaluable knowledge of 'what's out there', in affirmation of the adage 'knowledge is power'.

Possibly, this step is conceptually ill-placed as a specific procedural step of IREP methodology; IREP database development is a constant input to all stages of the planning process. Development of a rural energy database is a slow process because of the usual factors of gross inadequacies of existing secondary data, low capacity available for primary data collection, and socio-political obstacles such as communication with community members representing conflicting interests. The slowness of rural data collection means that it needs to be a continuous, on-going process, implemented concurrently with the other procedural steps.

Because of the need for planners to communicate directly with remote rural energy users, it may be difficult to distinguish data collection from the later phases of analysis. During the process of data collection and collation, analysis is unavoidably being performed, at the same time, in the mind of the planner. The way data is presented reflects a subjective perspective. Nor would a separation be appropriate: rural energy analysis seems unsuited to a solely urban, desk-based environment. An endeavour should be made to implement the tasks of data collection, collation and presentation as objectively as possible.

According to Bhatia (1988, p63), the development of a rural energy database at the national level is required for three reasons: (a) it places rural energy needs in the context of the overall energy demand of the country, underlining the significance of meeting the 'basic energy needs' of rural populations as well as the growing energy demand of rural agricultural, industrial and transport sectors; (b) the ecological impacts of conditions of energy use often have national or

regional implications and require interventions at national or regional levels; and (c) a number of policy decisions affecting demand and supply of rural energy are in fact taken at national or regional levels – for example, decisions regarding rural electrification in various regions, allocation of funds for renewable energy sources, and pricing policies for electricity, liquid fuels and coal, are all taken at a centralised level but have significant implications for the decentralised rural populations.

The size of area upon which micro-level planning will be based is an important decision for the data collection process. The size should be small enough to bring out the interdependence between development programmes and energy needs for purposes of both consumption and production, but sufficiently large enough, however, to expose variances in conditions (of an ecological, climatic, economic, social or energy-related nature) between different communities. It should also be of an adequate size to justify the collation of the decentralised data at provincial and national levels. A cluster of villages which also coincides with an administrative area may be a suitably sized area (FAO 1990, p13).

A significant weakness of the idea of 'database development' is located within the connotation of this term. It implies the construction of an information resource that will provide the government with enough knowledge to implement policy options that will bring about the changes it desires. While this may be appropriate for planning of the national energy sector for which this term was intended, poor rural areas do not lend themselves to this conceptualisation. In poor rural areas, the absence of specific formalised organisations with well-documented or easily-observed energy-consuming activities means that the process of data collection is not an impartial activity. Consequently, although it is evident that different energy consumers perceive their needs differently, it is difficult to identify and analyse these differences. Additionally, poor energy users may communicate a distorted picture of their needs in fear of putting across a self-detrimental message. The planners may not be aware of dynamics such as these, resulting in a lack of awareness of the extent to which the resultant database is representative of actual community needs.

It should be borne in mind that because rural energy data collection entails contact with poor rural people in situations of a very personal nature – at their homes in particular – much empathy on the part of the planner is required. Since contact with 'high-powered' government representatives can be intimidating to members of a poor rural community, the environment in which data is collected should be chosen sensitively, and it should be ensured that the community understand exactly why the information is sought, who receives this information, and for what it is to be used.

An end-use driven, people-centred approach to rural energy planning entails that, as far as possible, the rural community should be genuinely involved in the administration of the planning process, and aware of all communication between energy planners and users. Liaison through local community leadership must be employed, including communication with formal community authorities as well as with de facto leaders such as successful local businessmen and women. However, it is usual that communities contain people whose interests are not recognised by the local leadership, particularly poorer households and women, as well as youth, the elderly, the landless and owners of inferior land. An endeavour should be made to identify and address their needs too. Sensitive diplomacy may be necessary in order to communicate through the proper channels yet remain steadfast in the endeavour to assess the great diversity of local needs. In a rural context where internal political and social divisions are common, it may be considerably difficult to assess a variety of complex and often conflicting needs and demands, especially when planners are rushed and financially stretched. This is made more difficult by local socio-political dynamics: even listening to the needs of different groups may flare local tensions. Following improper channels of communications may undermine the existing structures which are likely to be unstable already. Although these structures may have many weaknesses, they do provide local people with a voice and government with a degree of administrative control.

Broadly, a process of 'participatory database development' is called for. Such a process will entail a shift of ownership of the planning process away from the urban-based energy planner's office toward more of a partnership between energy planner and user. Unless such a shift – that

is, towards a genuine demand-driven, people-centred planning process – occurs, the chance for success of IREP will be small. The greater this shift, the greater the chance of success.

An important aspect of 'participatory database development' in rural areas is that flows of information should not be unidirectional, from energy consumer to energy planner – that is, from people to government. Rural people also require information from the government: plans regarding electrification and afforestation interventions, for example, and generally ensuring communities are aware what government assistance is available. Just as information from rural energy consumers will empower government to plan effectively, information from energy planners will empower energy consumers to make effective individual and community-level plans. For IREP, therefore, database development is more a process of interactive communication than one of compilation of statistics.

A bi-directional flow of information is thus required. This will improve the degree of local support for a government-initiated programme such as IREP. The energy consumers should be adequately informed regarding government plans which effect their lives. At the same time, knowledge on the part of the planners of the economic, social, and cultural dynamics of the beneficiary community is essential for its success as well.

'Neither rural people nor outsider scientists can know in advance what the others know. It is by talking, travelling, asking, listening, observing, and doing things together that they can most effectively learn from one another. For that, special attitudes and behaviour are called for from both parties but especially from the outsiders since it is with them that most of the initiative lies' (Chambers 1983, p100).

The energy planner and energy user have information which the other does not know but needs to know.

Only if flexibility and honesty exists will this process meet the objectives of accurate information collection and local empowerment successfully. A sense of openness on the part of the outsiders is crucial, and openness on the part of the local people should also be encouraged, including a representation of the full spectrum of the local community in the process. A vital element here is trust. Rural people need to trust those representing government, and this trust will depend largely on the experience they have had with government in the past, but other factors such as transparency of electrification plans are also relevant. Planners also need to trust rural people in their honesty and capacity to feed back accurate and useful information. While a degree of trust is a prerequisite to initiating the process, the process can also serve to build mutual trust between government and people.

A significant limitation in the prospect of developing a rural energy database by and for government is that survey practices can be prohibitively expensive, especially with the very decentralised nature of rural energy systems. Only if rural energy users become involved in the collection and tabulation of data can the obstacle to extracting adequate rural energy statistics be overcome. Since literacy and numeracy levels of the majority of rural energy users are usually low, much assistance through capacity building programmes would be necessary. It appears that while costs associated with capacity building would increase the process of data collection initially, in time the transfer of skills will provide substantial savings in planning costs.

Besides limited capacity, the probable absence of appropriate mechanisms to carry out the various planning tasks such as data collection and collation is a significant obstacle to a successful IREP process. Local government in these areas is frequently either absent or incapable of doing all but the more menial tasks, and regional government may regard it as an over-burdensome load for their scarce resources.

Nevertheless, a sense of creativity and improvisation can allow a data collection programme to improvise. The various existing agencies and institutionalised mechanisms 'on the ground' such as resource information centres or training centres can be adapted to its requirements, in the absence of an able local government office. Wherever there is an interaction between the rural public and government, a process of information dissemination and feedback is possible. As

proposed by Prasad (1994), there is the possibility of a formalised statistical energy data collection process through adapting school curricula to the collection of biomass statistics:

'While one may lament over the lack of universal schooling, there does exist a much greater number of high schools than of energy practitioners. It seems essential that we try and attempt to incorporate this type of practical work into school curricula. Instead of dreaming up hypothetical exercises for purposes of making school children learn arithmetic and observational skills, it seems much more effective for them to collect energy statistics. This will not only provide the much needed source of data but also bring about an awareness about the nature of the problem. The effort involved here is worth it if we balance it against the educational value of such an approach.'

Because of the above factors affecting the information required of rural energy systems (by both the energy planners and the users), and the fact that textured qualitative information is required in addition to traditional survey-based data, the use of participatory planning techniques can be very useful. The techniques of 'participatory rural appraisal' (PRA) are particularly valuable. These techniques have evolved from different sources where participatory planning has been practiced in the past, including analysis of farming systems, applied anthropological studies, and the so-called rapid rural appraisal (RRA) techniques (Chambers 1994, p953). Methods may vary from group workshops and mapping exercises to guided walks through a village and prioritisation games. They have great scope for providing planners with in-depth information regarding social dynamics, local perceptions and socioeconomic factors which would otherwise go unnoticed – as would be the case in a conventional questionnaire-based survey.

Comparing results from a questionnaire survey of 63 households and a set of in-depth individual and group interviews of the same area and topic (agroforestry), Rocheleau (in Chambers 1994, p1258) found that 'the formal survey took three times as long and reproduced the same main results as the group interviews and chain of interviews, with less detail and coherence.' Collinson (ibid) found that the RRA-type 'Exploratory Survey' of a farming system was 'never contradicted in any major way by the subsequent longer, drawn out and more expensive Verification Survey which represented the major commitment of professional time and funds.' Chambers quotes other authors who concur in this regard. In addition, he notes that results are presented far more efficiently: an RRA-study of local forestry knowledge in Sierra Leone 'presented results four days after the last location was surveyed, whereas the questionnaire report was still not available six months after the completion of fieldwork.' Furthermore, where disparities exist, the findings of the questionnaire surveys are usually dubious (ibid). On the other hand, participatory planning techniques are not infallible, as Pottier (in Chambers 1994, p1259) points out that interviews can in some cases lead to misleading conclusions if interviews are hurried and data not cross-checked. 'Rapid' appraisal must not be interpreted as 'hasty': RRA still entails in-depth analysis. In fact, there is strong evidence to show that such methods are frequently superior to quantitative surveys, with regard to more textured, coherent data of local conditions without loss of accuracy.

At the same time, there is the advantage that rural people are assisted in thinking through their priorities, perceptions and plans regarding the future of their communities. Conventional questionnaire surveys focus on 'data gathering', entailing a situation in which the *outsiders* – the researchers – dominate. 'They determine the agenda, obtain and take possession of information, remove it, organise and analyse it, and plan and write papers and reports. Outsiders appropriate and come to own the information. They hunt, gather, amass, compile, and process, and produce outputs' (Chambers 1994, p1255). In participatory planning, the roles are largely reversed. Outsiders merely act as facilitators, and learners. They are required to 'establish rapport, to convene and catalyze, to enquire, to help in the use of methods, and to encourage local people to choose and improvise methods for themselves. Outsiders watch, listen and learn' (ibid). Often to the researchers' surprise, local people do many of the things that researchers formerly did and believed that only they could do, such as, *inter alia*, drawing and analysing maps, walking through their village methodically investigating as the researcher would have done, and discussing (interviewing) with a wide variety of local residents. 'In consequence, they are more in command of the investigation, they own and retain more of the information, and they are strongly placed to identify their priorities for action, and then to determine and control that action' (ibid).

Although a fair abundance of participatory planning techniques have been developed over the past few years, they generally share several principles (Chambers 1994, p1254):

- A *reversal of learning* is central to most methodologies, in which local people are more involved in guiding the process, and outsiders are more encouraged to listen and learn.
- Generally, the learning is sought *rapidly*, through conscious, flexible and iterative exploration rather than by following a fixed blueprint of questions.
- A core aspect of these techniques is that *diversity is sought* – rather than seeking averages and generalisations, the researcher actively seeks out exceptions, contradictions and variability.
- Historical *biases are offset*, by ‘being relaxed and not rushing, listening not lecturing, probing instead of passing on to the next topic, being unimposing instead of important, and seeking out the poorer people and women, and learning their concerns and priorities.’
- *Tradeoffs are optimised*, particularly relating to costs of learning versus usefulness of information. Consideration should be made regarding the quantity, relevance, accuracy and timeliness of the data collected, and, particularly, the ‘principle of optimal ignorance’ – that the researcher knows what it is not worth knowing, a principle supported by Keynes’s motto (ibid) that it is better to be approximately right than precisely wrong.
- In-the-field *cross-checking* between various methods, informants, times, and places.

In addition, there are four principles which are specifically emphasised by PRA but often not by other methodologies. These are as follows (Chambers 1994, p1254-1255):

- *‘They do it’*: the outsider is strict about remaining merely a facilitator, insisting that local people generate their own analyses without prompting. This requires confidence by both the outsiders and the local people themselves that they *can* do it. The facilitator may initiate the process and then sits back or even walks away, taking care not to interview or interrupt.
- *‘Self-critical awareness’*: the facilitators are required to examine their own behaviour constantly and critically. Rather than feared, errors in this regard are welcomed as an opportunity to correct behaviour that may distort results.
- *‘Personal responsibility’*: researchers are encouraged to take personal responsibility for what is done and how. Manuals and rigid sets of rules are down-played by PRA, rather upholding the axiom to ‘use your own best judgement at all times’ (Peters, in ibid, p1255)
- *‘Sharing’*: an attitude of openness is called for between local people themselves, them and PRA facilitators, and between PRA facilitators from different organisations, regions and countries. This attitude entails an atmosphere of mutual trust, and depending on historical factors, this may have to be developed over a period of time.

Participatory planning techniques are certainly useful to provide textured information. Detailed PRA studies are especially profitable in learning about the social interaction between people of different economic interests within the village and between different individuals within the household. Less in-depth surveys are still necessary to enable a collection of data from a suitably wide sample of villages and districts. Apparently, both accelerated participatory techniques such as RRA and the conventional questionnaire surveys remain necessary in order to provide the more regional perspective. While the benefits of participatory planning techniques still need to be carefully assessed, the increasing doubt of the cost-effectiveness of conventional questionnaires and the abundance of positive reports of PRA, it is today clearly irresponsible to design a database development process around a narrow focus of questionnaire-based surveys. With the excitement in the international researcher community regarding PRA-based planning techniques, having been performed already in over 40 developing countries, it appears that databases focusing on quantitative, questionnaire-based information may be outdated. The most desirable solution in most cases is probably a combination of all techniques, from the very quantitative survey-based studies covering a large sample of data to in-depth research covering only a few representative villages. However, because of the usual neglect of the participatory methodologies today, any effort to decrease quantitative surveys and increase PRA-style studies is likely to still fall short of a healthy balance.

Because of the considerably complex nature of rural energy systems, with their inextricable links to most other economic sectors at village and broader levels, as well as compounding social and political factors, energy planners would do well to seek an in-depth, textured perspective of energy conditions. PRA techniques and its sibling methodologies would be essential components of such a strategy. Predominantly because of the reluctance of planners and politicians to trust information that is not backed by large-scale quantitative analysis (however inaccurate they may be), participatory planning techniques have not been employed in energy planning to a large extent. While this appears to be changing, as an awareness that these methodologies can enhance the accuracy and the detail of information improves, energy planning has lagged behind other development planning areas such as natural resources management and health programmes. Sinha *et al* (1994, p405), recommending RRA for energy planning of rural India, is one of a small minority of exceptions in this regard.

2.3.3 IEP methods for IREP: Demand analysis

In support of the IREP principle of end-use driven planning, it is essential that, conceptually, energy demand analysis precedes energy supply analysis. Without knowledge of the type and amount of energy needed, in terms of what services the energy is required for, interventions in energy supply are blind operations. A successful demand analysis will allow the rationalisation of interventions in the energy market, ensuring that energy is not over- or under-supplied. Furthermore, demand analysis encourages energy conservation interventions through the implementation of demand-side management measures. In practice demand and supply analyses can be implemented simultaneously, after which energy balancing takes place from a review of both.

Before demand analysis can begin, the symbiosis between energy flows and local economic development must be understood, in accordance with Principle C (section 2.2.2). 'The needs and priorities of the rural beneficiaries have to be considered together with the existing and proposed development activities and programmes' (FAO 1990, p14). Questions that would need to be asked may include: What are the trends in the rural economies? How might changes in energy supplies and consumption influence them? In comparison to other development needs, how much of a priority is an integrated improvement in energy services? Such questions are significant in determining the scope for assessing the demand for an integrated energy strategy at an implementation-level. Negative responses would not necessarily mean that the analytical application of IREP should be rejected, for both positive and negative responses to such questions would be useful in composing a rational set of decentralised rural energy strategies.

Once the linkages between energy and the local economy are clarified and the need for an integrated energy strategy (at analysis or implementation level) is affirmed, demand analysis regarding the past and present conditions of energy consumption can commence. Sufficiently representative, accurate and suitably detailed quantitative and qualitative data is required, and would be performed through the participatory database development process (section 2.3.2). A longitudinal perspective is necessary: changes in time need to be observed, and current conditions compared with historical accounts. Also required is a spatial perspective: differences in energy demand between villages and between broader areas need to be considered and the reasons for these differences identified (for example, do climate or economic conditions play a more significant role in determining energy demand?). Other issues that would require analysis include what energy sources and energy solutions would be preferred, and to what extent fuel-switching is practiced.

It is important that the diverse categories of energy needs are all represented in the analysis. However, as mentioned in section 2.3.2, energy systems in developing rural areas are not easily divided into demand categories as is the case for urban and industrial areas for which IEP methodology is traditionally aimed. The complexity of the national energy sector necessitates that analysis be divided into principal demand sectors, within which final end-uses of energy are considered. In rural areas, sector boundaries are vague and it is more appropriate that final end-uses are the focus, rather than energy sectors.

Of course, the lack of clear sectoral boundaries does not mean that rural communities are homogenous. On the contrary, there is usually a great diversity of often conflicting interests,

each with different implications on energy demand. Services such as irrigation and small-scale business production tend to conflict with services like cooking, water heating, and space heating, as the former are needs of the wealthier people of a particular community, the latter are needs of the poorer people. Also, individual and household energy needs tend to compete with community services, such as weighing up electrification of households against that of clinics and schools. Besides conflicts between the wealthier and the poorer households, and households and community services, many other areas of conflict exist: between farmers and the landless, between large and small land owners, between women and men. These varying interests are important considerations in rural energy demand analysis. The lack of clearly identifiable institutions or boundaries to identify these different groups unfortunately makes such an analysis an exceedingly arduous one.

The most significant tension in rural energy demand is energy required for production and energy for consumption. Energy for production refers to those energy needs that enable (but do not necessarily instigate) income generation, such as diesel for agricultural vehicles, paraffin for a retail store's refrigerator and electricity for a small-scale welding enterprise. Energy for consumption refers to energy needs that are connected with meeting the more basic needs, such as cooking, lighting, water and space heating, and meeting other domestic energy services.

The distinction here emphasises the need for addressing the question at the beginning of demand analysis: *energy for whom?* Usually, the consumption-based energy needs of the poorer people of rural areas are especially inadequate. These inadequacies primarily affect women, since it is traditionally their responsibility to perform most domestic tasks that involve energy services. Energy for production needs on the other hand are demanded by those rural people, usually men, who have the sufficient skills, confidence and the cultural privilege to initiate income generating schemes. There are major policy implications of decisions that focus on one or the other type of energy needs. Interventions for either type are not easily integrated. Demand analysis needs to assess the demand for both in order to allow the subsequent phase of policy options (section 2.3.6) to make an informed strategy as to how this tension is to be resolved.

So too is the question *energy for what?* an important one to answer. Needs assessments must be quite clear in delineating what energy services are in demand. It cannot be over-emphasised that energy is not consumed for itself but for the services that it provides. For example, solar water heating systems would be inappropriate for a community who may lack basic water services: such an investment would be better directed at a community which perceives water heating as a priority need (or alternatively the resources could be invested in improving the community's water supply).

Also foolhardy to neglect is the question of how energy consumption patterns have changed in the past, and how they are likely to change in the future, particularly through increased income levels and improvements of standards of living as a result of the accompanying rural development programmes. A longitudinal perspective of energy demand is essential, and planners frequently fail to analyse energy demand beyond a superficial 'snapshot' of current conditions. Adopting a longer term view inevitably requires additional resources; for these to be available implies that a policy shift towards the support of a more in-depth investigation of energy demand is necessary. In the case of shortages of such funds, the accuracy and representativeness of energy demand models would suffer. Also, the shortage of appropriately skilled human resources inhibits the scope for suitably textured, disaggregated data to be collected.

Furthermore, fluidity of the rural institutional and political environment, in combination with conditions of economic instability usually faced by poor rural people, poses questions of the reliability of energy demand projections. In addition, decisions regarding energy markets made far away in national government, such as import substitution of oil products or grid electrification policy, can have significant effects on decentralised energy systems – effects that will undoubtedly go unnoticed unless a conscious attempt is made to consider them. Nevertheless, it is usual that fairly stable trends are noticeable, particularly those regarding fuelwood consumption because of the long term nature of the supply and utilisation of this resource.

Several computer packages have been developed for the modelling of energy demand. They may be useful in preparing local level energy plans as well as simulation exercises for considering alternative energy scenarios in larger areas (FAO 1990, p16). Especially in large areas where a considerable amounts of disaggregated information is required, computer-based mathematical modelling may be desirable. Given the complexity of a rural energy planning exercise and the number of variables involved, they can be useful in encouraging 'an unambiguous definition of the system boundary, accurate estimation of all the energy sources, quantification of energy demand for the different end uses, and consideration of economics of all available technologies along the different energy conversion paths' (Sinha *et al* 1994, p406).

There are inherent limitations with the employment of mathematical modelling, however. Conditions in rural areas do not lend themselves well to a computer-based energy demand analysis. For instance, there are obvious limitations with the energy modelling exercise that was performed for the rural Wardha District in India (Malik *et al* 1994), despite extensive quantitative analysis. Mathematical models involve many assumptions. Most noticeably, assumptions are made with regard to local conditions, preferences of local people, and most suitable interventions. For example, quoting from the conclusion, 'Fuelwood is not suggested as an economic option for cooking purposes. *The study prefers* the use of fuelwood for pottery' (p478, emphasis added). Computer-based modelling tends to instill a prescriptive, technological attitude in the planning process. Planning should be computer-supported, not computer-based. If computers are to be used, it is imperative that software is simple, user-friendly and customised to take into account unique conditions of the country or region in question. A people-centred emphasis must not be sacrificed in the name of statistical accuracy. As with any analysis, but especially with rural energy demand analysis which is embedded at a very decentralised level with a vast array of unquantifiable factors, there is a real danger of the computer becoming a master rather than a servant.

At the outset of an implementation of demand analysis, it important that the term 'energy demand' is clarified unequivocally. There are several semantical distinctions which can create confusion, and therefore error. Those points of confusion that are most relevant for developing rural areas are indicated below.

Real versus perceived demand

A clear distinction should be made between real and perceived demand. This is difficult to ascertain, mainly because defining the supposedly objective term 'real energy needs' is problematic. There is no easy definition of 'basic energy needs' as there may be with nutrition or water provision.* Energy is not a basic need in itself but rather a vital means of providing support for the meeting of other basic human needs, such as energy for agriculture, food preparation, space heating, lighting, water supply, and water heating as well as energy for basic infrastructure needed to supply essential services, such as transport for access to food, fields, employment, water, or fuelwood. Because the same fuel provides a variety of uses, and because multiple fuels are used by the same energy user, it is practically impossible to create a generalised definition. While absolute basic needs are considered to be those needs necessary for physical survival – a sufficient quantity and quality of food, adequate access to clean water, and shelter to sustain bodily functions – development theory posits that meeting basic needs requires not only addressing needs for physical survival, but also needs for economic well-being as well as needs for domestic comfort are suitably met (McClintock 1988, p28). Clearly, to predetermine what fuels are necessary to meet these energy services in a general way is infeasible.

Moreover, the perception of community residents as to what their minimum essential needs are will vary widely, depending on the economic, social, political, environmental or agricultural circumstances in which they are accustomed to live and, significantly, in which they see other people living. Accordingly, 'real energy needs' becomes defined in a similar way: relatively. People will judge their minimum requirements both in terms of their physical survival, the

* Theoretically, basic needs are the needs necessary for people's physical survival. Practically, they are the requirements in the lowest income households for minimum essential services, as defined nationally according to specific quantifiable levels, such as 25 litres of water per person per day.

comforts they are accustomed to, and in terms of comparison with life-styles of people with whom they come into contact.

Nevertheless, one would need to accept the somewhat vague definition of 'real energy needs' as that amount of energy required to adequately support the meeting of other basic needs. It is desirable, then, for the energy planner to distinguish between these 'real needs' on the one hand and 'perceived needs', which may or may not be reasonable in terms of the available resources to meet those needs, on the other. The commonly perceived need for grid electricity is an obvious example: unelectrified householders who often express their desire for various electricity services and claim (sincerely) they will be able to afford them, later find they are unable or unwilling to pay for most services other than lighting. Although electric lighting is usually a priority need, planning often neglects to recognise that it is sometimes only this need which is being satisfied, and problems with meeting more basic needs such as cooking may continue to be unresolved.

From the electricity utility's point of view, it is responsible to connect villages that will benefit most from the grid electricity services, as well as being responsible to maintain the economic viability of an electrification programme. Perceived demand would typically be greater in quantity and better in quality than real demand. Exaggerated perceived needs are seldom met justifiably in the context of widespread poverty and other more urgent and widespread needs for both energy and other services. The reverse situation is also common, however, where real needs are not perceived as needs. An example is the need for refrigeration of vaccines, a need rarely recognised by most people in poor rural areas, who may regard household electrification as a higher priority than clinic electrification.

Certainly, real needs and perceived needs seldom match up. The planner's task is to balance the two objectives – meeting real needs as much as possible, while meeting perceived needs where possible and appropriate from a social or economic point of view. Moreover, energy needs are perceived differently at different levels. Certain individuals may disagree with the needs expressed by the village authorities, who may in turn conflict with the local government, provincial government, electricity utility or other energy suppliers. In addition, national government may sanction projects that, even though they fail financial or economic viability criteria, satisfy political aims. A host of different agencies with conflicting interests and agendas all need to be taken into account when performing rural energy demand analysis.

Although authors agree with each other in meaning, their differing terms can result in confusion and misunderstanding. For example, Eberhard and Dickson (1991, p63) distinguish between energy consumption, energy demand and energy requirements. While 'consumption' refers to the existing energy usage patterns, 'demand' refers to perceived needs, which conflicts to an extent with the above definition where perceived needs are distinguished from real needs. Real needs are referred to in this paper as energy 'requirements'. One should be wary of ambiguous meanings and different semantic distinctions between authors.

Consumed versus useful energy

Planners should also take care in distinguishing between consumed energy and useful energy. Depending on the energy carrier being considered and the efficiency of the appliance being utilised to convert that fuel into a useful service, the difference between the energy that is potentially available in the unused fuel and that which is actually utilised by the user may vary considerably. This distinction is important so as to determine, during the subsequent step of supply analysis, the contribution that demand-side solutions may provide to the availability of energy supplies. Demand-side management is a crucial aspect of a resource-conscious energy planning process.

Immediate versus future demand

Demand analysis should determine short-, medium- and long-term demand. These definitions would have been clarified in step 1 where time horizons were set. Short-term demand could imply immediate energy needs, medium-term demand may refer to the level of energy demand after large-scale energy programmes such as grid electrification have been completed, and long-term demand may imply the conditions when unaddressed environmental effects have become

more critical or fossil fuels have become scarce. Such definitions may vary substantially depending on the objective, and mandate of the energy planning team.

Measured versus latent demand

Analysis should also take into account that past and present energy consumption levels do not necessarily mean equivalent levels in the future. Hidden or latent demand – demand for energy not being met by the market because of bottlenecks and other supply difficulties – is a common factor in poor rural areas, worsened by social and political factors which discourage suppliers from improving conditions. Should conditions change, both as a result of the provision of affordable energy services and improved income levels and consequent increases in expectations of living standards, energy demand could increase substantially. Current energy demand should therefore be assessed in terms of current energy consumption in conjunction with estimates of latent demand.

Natural versus induced demand

In addition, demand may be artificially stimulated by various factors including price ceilings and the implementation of a large-scale energy supply programme such as grid electrification. The consequent induced demand should thus be added to the current and future demand estimates. Analysis should also be aware of the existence of projects and programmes that may have significant influence in uncovering latent demand and creating an induced demand within the time horizons being considered. Large projects such as the damming of a river and regional programmes such as a clinic building scheme are examples.

2.3.4 IEP methods for IREP: Supply analysis

Supply analysis entails the assessment of current conditions of energy supply and the consideration of different future supply options. Questions that would need to be considered here include: What energy is available? How affordable and convenient is energy being used? What is the least-cost mix of fuels and energy technologies? What kind of intervention is most suitable to provide a particular alternative? To what extent will an intervention meet demand? What impact may a demand-side intervention have on energy supplies? To what extent is an option practically implementable? What alternatives are there? What financial and institutional arrangements will be necessary?

In rural areas, various socio-cultural and political factors can affect the level of acceptability or practicality of different options significantly. Such factors should not be mere afterthoughts but essential factors to consider at the assessment of each option. Caution is required to ensure options being considered by planners are in fact options that are considered acceptable by the energy users themselves. If a village perceives an intervention in gas distribution as threatening their chances for receiving electricity, for example, it is likely to reject that intervention. If local convention dictates that women cannot plant trees and men do not perceive a fuelwood problem, then an afforestation initiative is likely to fail unless an indirect afforestation strategy can be devised.

An end-use driven, integrated planning approach necessitates a strategy of implementing local solutions for local situations. In this way the inevitable diversity in rural energy needs at village, local and regional levels can be accounted for. Such a strategy implies a policy of flexibility, openness to innovation, and decentralised control. If capacity is adequate at decentralised levels, such a strategy would be considerably advantageous. Single-technology strategies, such as grid-electrification without supplementary energy initiatives, are unlikely to meet the diverse and fluctuating energy needs of rural populations effectively. Both energy suppliers and energy users should be encouraged in expanding their view of options in meeting energy needs, especially those suppliers and users who are in decision making positions, such as the electrification planners and community leaders, respectively. The weaknesses of single-technology solutions should be exposed: to the electrification planner the likelihood of over-designing a system can be illustrated, and to the community representatives the diversity of energy needs and the instability and seasonality of incomes can be communicated. At all levels, ignorance of the problems is invariably the greatest problem.

At the same time, a supply-oriented strategy of artificially devising a least-cost mix of energy options would probably be as limited as single-technology programmes for poor rural areas. Attempting to prescribe solutions to the myriad rural energy users is simply not possible. A superior strategy is simply the endeavour to increase the *choices* that rural people can make in meeting their energy needs. Each choice must be affirmed to be acceptable either to the majority of the targeted communities or to specific targeted minorities. The provision of choice is the crux of empowerment. Lacking the power to choose is one of the primary factors that keeps poor rural people poor. Poor people are not only faced with the problem of low levels of income. Incomes are also unstable, intermittent and prone to unpredictable fluctuation. As far as possible, people should be able to perform a task, provide a service, using a fuel of their choice. Depending on the amount of available income, different fuels and different quantities thereof would be used at different times. Unfortunately, the power to choose is usually ignored in rural energy strategies, thus meeting the needs of the more visible and influential local elite, who have fairly stable incomes and whose energy needs are often comparatively well met. An IREP process can make a positive contribution in this regard.

The distinction between energy needs for production and those for consumption has already been mentioned above (section 2.3.3). During supply analysis, it is important to consider supply options that meet each type specifically. The determination of policy options can be thereby aimed at one or the other, or a combination of both.

An anti-poverty principle, in accordance with Chambers's principle of 'putting the last first' (Chambers 1983), would imply the need to focus on energy for consumption needs. Such a focus is highly justified in the usual context of widespread neglect towards poor rural people in the past, the considerable indirect opportunity costs to both the energy user and the broader economy of inadequacies in these supplies of fuels for these needs, as well as environmental impacts as a result of inadequate energy supplies. However, income-generating activities should clearly be supported through meeting energy for production needs as well, as considerable – and more sustainable – beneficial multiplier effects could be experienced by the poorer people. Examples are secondary employment, apprenticeship and skills dissemination, and an increase in local economic activity upstream and downstream of the service being directly supported. Satisfying energy for consumption needs will serve to improve local equality while satisfying energy for production needs will support local economic growth (and will contribute therefore to improving regional equality, albeit indirectly). Evidently, a balance between supplying energy for production and energy for consumption should be struck. An IREP process is highly desirable in order to coordinate energy sub-sectors in striking this balance, thus implementing an integrated energy strategy from a genuinely end-use driven perspective.

In rural areas, planners are faced with the dilemma of balancing the consideration of quantifiable factors with intangible considerations in their analysis. Theories of cost-benefit analysis have attempted to devise methods in order to draw qualitative factors into their statistical analyses. Whatever methods are used, however, the question of emphasis remains, as the estimated values ascribed to qualitative factors are inherently problematic. In the rural energy sector, this division parallels the distinction between commercial fuels and non-commercial energy sources. The predominance of non-commercial energy makes quantitative cost-benefit analysis unusually problematic. Pereira (1988, p409) proposes that whereas quantitative, financial criteria are more useful for energy planning in income-generating activities than household activities, and with regard to the latter, quantitative criteria are more relevant to urban areas, where fuels are commonly purchased and demand is thus monetised, than rural areas. Since energy use in poor rural areas is dominated by household activities utilising non-monetised fuels, rural energy planning seems to necessitate that a textured, detailed comparison between alternative supply options takes place.

Moreover, the complexities are prone to considerable variances from region to region, area to area, and even village to village. IREP cannot rely too heavily on isolated case studies. The suitability of an energy intervention in one village may not apply to others. Consequently, rural energy supply analysis should, as far as possible, adopt a decentralised strategy to allow for effective improvisation around these local variances. This has important implications for the

desirable institutional arrangements of an IREP process; these are investigated later in this chapter (section 2.4).

It is important to note that integrating the supply of different energy sub-sectors does not necessarily entail a set of several energy interventions in different sub-sectors for each rural area or community. What is necessary is that all the alternative interventions are *considered*, so that interventions that are implemented take place from an informed perspective. Different interventions may or may not take place in the end, but the integrated planning process would have served its purpose of determining the best solution for each situation. An integrated energy supply strategy may entail different energy interventions in different areas, depending on certain different economic, geographic and energy-related criteria. Such a strategy may also include different *levels* of energy supply being offered according to end-uses, such as a limited-load grid electricity supply for people who would cook with another fuel.

In addition, an integrated energy supply strategy may initiate profitable partnerships with other sectors. Particularly where energy problems are not recognised by local leaders or mass opinion, energy interventions have significantly more chance of success if they 'piggyback' onto rural development initiatives that provide needs that are publicly-expressed development priorities. Examples may be an afforestation programme attached to agricultural reform, or an improvement of liquid fuel networks linked to small business development. Besides increasing the potential benefit of the energy intervention, the initiative in the other sector would benefit from an energy planning process. Rural projects frequently fail from an invalid assumption of an appropriate and affordable energy supply (Hurst and Barnett 1990, p2).

Therefore, energy planning serves a useful supportive role for rural projects of other sectors. However, a supportive energy planning philosophy has several limitations. In particular, it would consider the energy needs of people who are recognised already. If energy planning supports primarily existing initiatives, people and villages who are being ignored continue to be so. The tendency to neglect the poorest, remotest and least vocal is a widespread phenomenon in rural development – and economic development in general, for that matter. This phenomenon is problematic with regard to energy particularly because energy problems are serious mostly in the poorer households and villages; it is they who are likely to have the most dire energy needs. Wealthier people tend to be able to 'make a plan', even though it may be an inconvenient one. An explicit integrated energy planning strategy is required to direct interventions toward these otherwise marginalised areas, villages and households, to adopt a conscious policy of 'putting the last first'.

With this in mind, a proactive energy planning strategy has a significant role to play – but how, considering the notorious ineffectiveness of prescriptive policy instruments? This limitation appears to be an obstacle which the government has the arguable democratic obligation to attempt to overcome, a responsibility to include the poorest in the benefits of state investment. In practice, however, development justified on democratic grounds is not sustainable. At analysis level as opposed to the implementation level, IREP can therefore be regarded legitimately as a proactive integration of energy sub-sectors. Policy instruments need to be considered broadly with clear consistency between each other; proactive efforts are necessary to achieve such coherence. A focused analysis on the energy system in these areas, looking at energy supply options from an integrated perspective, will be fruitful in distinguishing which policy instruments show the most promise of success.

Another important reason why a proactive integrated energy strategy is required is the need to consider energy options from a resource-conscious point of view (principle B). Energy production schemes should be located as close as possible to its use, the negative environment impacts should be minimised, and so-called waste products should be utilised as energy sources: such opportunities should be actively sought out. In particular, a resource-conscious philosophy entails the proactive consideration of demand-side energy measures. Improvements in the efficiency of energy consumption can create significant savings in energy. Energy saved can be regarded as if energy supplies had been increased. In this regard, Reddy's motto is true, 'Energy saved is as good as energy generated. *Efficiency improvements ... must therefore be treated as if they were supplies of energy*' (Reddy *et al* 1991 p10, original emphasis). Although this effect of energy savings being the same as supplying that same amount of energy is valid

for all energy sources, it is most visible where energy supply and consumption is closely connected. This is especially true in the grid electricity sector where a physical network links the supply with consumption, and in the biomass sub-sector where the physical proximity between production and consumption can bring about support more easily than say efficiency in the use of petroleum products. In general, regarding efficiency improvements during supply analysis is an important aspect of a resource-conscious perspective.

A further, and perhaps the more significant, reason for a proactive energy planning process is that the various energy problems in rural areas, of social, economic or environmental nature, are not in the public eye. The reason for this is that energy problems effect those who are traditionally marginalised and therefore mostly voiceless: primarily the poorest of the poor, women and the environment. Energy planning would bring publicity to these problems as a whole, rather than the fragmented, in effect half-hearted attempts at resolving inconsistencies, market failures and other anomalies. Agents involved in improving sub-sectoral energy problems would do well to unite, providing increased political visibility and consequent collective bargaining power. Proactive efforts are necessary not to force IREP onto rural development planning infrastructure, but to actively investigate whether or not IREP is worthwhile.

2.3.5 IEP methods for IREP: Demand and supply balancing

Once the relatively separate processes of demand analysis and supply analysis are implemented, they then need to be combined in order to provide a comprehensible representation of the rural energy system as a whole, describing in suitable detail the flows of energy from source to final use – now and possible future scenarios. Shortfalls between supply and demand are assessed so that supply-side and demand-side management can be performed rationally. This step is an important stage of IREP, as it serves as the end of the formal analytical process, whereafter actual policy strategies and options are determined and reviewed. Conditions need to be described as objectively as possible, ideally without any implicit agenda. This is unrealistic: practically, all contradicting views and perspectives should be portrayed. In particular, three tensions stand out, from the foregoing analysis: the adoption of normative or projective planning policy, the focus of energy for consumption needs or energy for production needs, and the adoption of a supportive or proactive role for energy planning. The task of this phase is not to determine which factor is superior to the other, but to describe the advantages and disadvantages of each.

An essential part of the IREP process is also a focus at this point: integration of energy with the broader economy (Principle C). The future energy scenario is selected and policy options are determined with reference to the context of general economic development of the region. Confirmation is necessary that energy policy options do not conflict with regional development strategies, and that development initiatives that may influence the rural energy system in the future has not been ignored. Although the viability of options need to be assessed during the supply analysis, a broad view of the regional economic context is still necessary.

In addition to regional factors, confirmation of consistency with national policy guidelines is necessary. For instance, consideration of political dynamics at national level that are likely to affect local politics is necessary, as are national environmental policies, as well as criteria for rural development projects such as capacity building, local involvement, and labour intensive construction. Although not guaranteed success otherwise, rural energy policies that are inconsistent with the contexts at local, regional and national levels will surely fail. An IREP process obeying the principles outlined in section 2.2.1, promises such coherence.

2.3.6 IEP methods for IREP: Policy options

It is here where decisions are made as to which route the energy system in question is to take. The significance of this phase is therefore evident. Demand and supply analyses are set up against each other, producing different energy scenarios. From the point of view of normative planning, this will enable a scenario that exhibits certain criteria to be selected and appropriate supply-side and demand-side measures to be implemented in its direction; from the point of view of projective planning, measures can be taken to cater for the anticipated energy demand.

The crux here is the rational, holistic determination of what policy options are appropriate and most likely to be effective.

Policy instruments exist in a variety of forms. Examples include physical controls of supplies at local level, direct investments or investment-inducing incentives, popularisation of technologies or education of specific habits related to energy use and use of financial mechanisms such as subsidies and taxation (Munasinghe 1990, p4). During this step the energy planning team need to be aware of the full spectrum of possible instruments at their disposal so that they do not fixate on less appropriate interventions. At the same time, they should take care not to neglect the option of introducing reforms in the regulatory framework or market organisation at national level. For instance, introducing a tax exemption on a fuel used mainly by poor consumers can have a far-reaching impact nation-wide. The aggregated orientation of such instruments do not necessarily conflict with the end-use principle of IREP; rather, they are useful tools which can be employed by an end-use driven planning process effectively.

Disagreement between energy planners and energy users is likely around initiatives of which either the energy planners or users are sceptical: planners may regard an electrification project as a misallocation of resources; users may question the use of an afforestation initiative in the light of land lost to agriculture. Energy users may be unaware of factors such as the implications of electricity tariffs on the household budget and the trade-off between an electrification project and the provision of other infrastructure or services. Energy planners may be unaware of site-specific cultural norms such as gender-specific planting rights and land ownership which would inhibit the success of an afforestation initiative. A process of mutual learning is imperative if the diverse energy needs of all the sectors of a rural communities are to be resolved. The link here with the process of participatory database development is evident.

Contravening the demand-driven principle can be more subtle. An initiative that goes under the name of IREP may itself be an imposition on the beneficiary community. Where the community perceives a single technology, such as grid electricity, to be the only solution to their energy needs, then, in accordance with the demand-driven principle, the provision of this technology must be assessed and conclusions as to whether or not this option is a possibility must be communicated clearly to the community first, before any integrated energy perspective is justified. Project planners can only hope for success if the project enjoys community support – from those members in authority and control and those people constituting the local majority, and in addition there is the ethical obligation to address the needs of the poorest people who are invariably the least visible.

An inherent limitation of IREP is the difficulty of influencing rural markets and implementing effective policy instruments successfully. Rural energy interventions seldom benefit the targeted beneficiaries as intended. For example, the abundance of rural electrification programmes producing disappointing results (such as those mentioned in Foley 1992 and James 1995) and statistics of how few people have benefited from the improved cookstoves and biogas initiatives in rural India (Sinha *et al* 1994, p405). All interventions are open to misuse, allowing the wrong people to benefit at the expense of the targeted poor. Middlemen along the distribution chain or the local elite act as a net. In many cases, a simple cash handout to the poor would have been more effective in resolving their energy problems. Other questions are equally problematic: Who manages the process? Who monitors it? How are targeted beneficiaries defined? How does one distinguish these individuals from the rest, and who is this 'one' who has the mandate to do so? Where does the money come from, and if from local taxation, who should be taxed?

Admittedly these limitations are limitations inherent in the idea of rural development as a whole rather than rural energy interventions in particular, as all interventions are faced with similar problems. The greater complexity of energy compared to other sectors may be an argument not to jettison the need for an integrated process of analysis but rather to support it. The complexities increase the need to look holistically, between energy sub-sectors and assessing the implications of energy.

Institutional considerations are an essential aspect of policy options. The involvement of suitable organisations and liaison between different role players in the public and private sectors needs to be considered. The need for sub-sectoral energy policies to be consistent with each other

entails that coordination between different tiers of government is necessary. Each energy carrier has different associated institutional characteristics and implications, so that whereas grid and off-grid electrification schemes may be coordinated at regional level, biomass initiatives would require a very decentralised strategy implemented by the lowest possible government tier and with liaison with agencies out of government that may have better capacity, will and resources to do so. Other sub-sectors would be different as well: a strategy for reform in the liquid fuels industry may entail a national-, regional- or sub-regional level focus, depending on which point of the distribution network is being targeted.

Also, policy measures vary in terms of the *degree* of government involvement, from market regulations such as price ceilings, to subsidisation or taxation of certain energy users, to physical provision of energy sources by a government-owned agency. The policy instruments available to energy planners are many, as indicated in section 2.2.3, and each entails a different type and degree of government intervention. It is usually the case that in most developing countries, government is already involved in most of the energy sub-sectors. Partial or total government ownership of electricity utilities and major petroleum-based organisations is common, and woodlots and land which presents possibilities for wood redistribution are often government owned. The extent and nature of government involvement needs to be understood in order to formulate realistic policy.

The reluctance of government to intervene in markets is understandable in the context of trends towards privatisation among industrialised countries. However, in the energy sector of developing countries, especially in their rural areas, markets have frequently failed to bring about effective distribution of services. At the same time, state involvement in many developing countries has clearly been ineffective as well. The best approach would seem to be a balance: neither is complete state control advisable, nor is complete reliance on the market. Eberhard and Van Horen (1995, p5) recommend that 'the state intervenes sometimes deeply, but always selectively.' They describe this approach as 'governed markets', and advise that 'the minimum function of the state is to ensure that markets operate efficiently, equitably and sustainably.' The energy markets have frequently not met these minimum requirements, and therefore justify state intervention.

It is important that energy interventions are adequately informed by a carefully devised energy policy. In countries where a guiding energy policy has been lacking, rural energy programmes have benefitted only a small section of the population, and have often affected other people negatively. A rational energy policy must be devised, and, as far as possible, the institutional framework should ensure that the energy policy is updated and improved on a regular basis and in a democratic way, despite many conflicting interests.

2.3.7 IEP methods for IREP: Impact analysis

Crucial to maximising the possibility for success of IREP is an attitude of 'follow-through'. Social, economic and environmental consequences of energy interventions need to be assessed. In particular, questions as to whether or not the targeted beneficiaries are benefiting, what side-effects of interventions have resulted, what the perceptions of interventions by various local people are, as well as the monitoring of specific issues such as the degree of success of a pricing regulation or the efficiency of a decentralised administrative mechanism should be investigated. Success of interventions cannot be measured simply by installation of a technology; one must also assess whether or not the new technology will be incorporated into the local habits of production and lifestyle.

IREP will not be effective if the process ends with the employment of policy instruments designed to create certain effects on the rural energy system. An explicit intention to monitor the communities and sectors where effects are anticipated and to evaluate whether or not such effects occur in the way that was intended is an essential aspect of the planning process. Were the impacts of policy instruments effective? What obstacles were experienced? What lessons can be extracted for future planning processes?

In order for such crucial questions to be answered adequately, sufficient resources need to be allocated specifically to this aspect of the planning process during the preliminary design of the process in step 1. The feedback that an evaluative process provides to the energy planners is

crucial to maximising the success of the process in the long term. Errors need to be learnt from, and reasons for success need to be identified. How else can defective rural energy systems be transformed?

2.3.8 IEP methods for IREP: Iterative process

Further to the necessity for an attitude of 'follow-through' in order to establish to what extent an IREP process would be worthwhile and possible, it is important that the process becomes an iterative one through the implementation of on-going IREP exercises. The continuity that would result from an iterative process would be valuable in stimulating rational and intelligent contributions to the otherwise neglected debate of improving conditions in the rural energy system. The various theoretical anomalies and conflicting goals in the energy sector necessitates an iterative process so that these tensions can be ironed out through experience, evaluation and debate.

It is important to point out here that IREP, or IEP in general for that matter, is not a once-off rural or national energy master plan, and the production of such a document may or may not be an output of the process. If one does constitute an output, then it should necessarily be regarded as a transitional one, as the focus on IREP as an on-going process that continuously builds on itself and learns from its experience is more important than the single policy documents it produces and disseminates. IREP and IEP are sustained efforts constituting steps toward the ideal goal in the distant future of a completely rational, efficient, equitable and sustainable system of rural energy use. Also, not only are iteration and feedback of successive IREP attempts relevant, but so too is iterative feedback between successive steps of each IREP attempt.

Clearly, the various potential problems associated with the implementation of IREP as mentioned in the preceding subsections of 2.3 must not be taken to mean that they cannot be overcome. At the same time, the possibility of problems being overcome does not extinguish them. An iterative IREP process entails a sustained investigation into what should be done, and then doing it.

2.3.9 IEP methods for IREP: What's missing

From the above discussions, the IEP methodology designed for the entire energy sector appears to be very suitable for rural areas. However, certain aspects of this methodology such as complex computer-based modelling of the energy sector are inappropriate for the rural context, and have consequently not been considered in depth in this paper.

There also seem to be gaps in the methodology for rural energy planning. One significant improvement would be an analysis of the decision mechanisms in the energy sector. Who makes and controls decisions? At national and provincial levels this may be obvious, being well administrated through a formal institutional framework and defined structures. In poor rural areas, no such formality exists. The inaccessibility to the reasons behind closed-door national-level decisions is analogous to the limited access government has to the reasoning behind decisions made at local levels. This applies especially to energy decisions made by poor rural people, since such decisions depend on factors which are particularly decentralised and unstable.

Also, rural energy planners are faced with the dilemma that all energy institutions and departments are generally urban- and industry-based, whereas agencies involved in rural areas are generally unaware of energy (Hurst and Barnett 1990, p14). It is consequently unclear who is responsible for tackling conditions in the rural energy sub-sector, and where decisions are made where no formal responsibility exists. It would clearly benefit an IREP process considerably if an analysis of *decision nodes* at all levels, household and village through the various tiers of government to national level, is recognised as an explicit step in the above planning methodology. The need to design a strategy where decision-makers are targeted and influenced should be emphasised (Tingsabadh 1988, p24). Such a strategy would entail considering the different types of decisions (such as policy- or project-oriented decisions, decisions regarding the consuming sector or technical decisions) and what mechanisms are available to influence

decisions being made (which obviously includes the analysis of policy instruments but also considers the influence of the planning processes at different government levels).

Also absent in the IEP methodology is the specific analysis of environmental impacts of energy problems and of the interventions that seek to address them. Environmental impact assessment seems to be lacking in the general IEP methodology, but at the same time environmental problems in rural areas differ significantly from those in the industrialised urban areas. Rural areas experience problems both in the natural environment, including biomass use contributing to deforestation and reduced soil fertility, and probably more significantly, in human health, including energy-related respiratory problems. In the IEP methodology environmental issues are mentioned only in passing, and this attitude is reflected in energy planning exercises where analyses ignore environmental issues, making conclusions oblivious of them. Environmental analyses are often superficial, merely fulfilling the need of the public to hear that the plan is environmentally safe. Reddy (1994, p10) points out that

'what is done by most planners is to do the demand projection followed by a scheme for supply increases and then, after the whole exercise is over and all the budgets are drawn up, they write a chapter on conservation stating powerfully how important it is to use energy efficiently and another chapter on environmental impacts saying eloquently that we must be very careful about the only earth that we have, etc. But, conservation and environmental protection do not come into the budget. They are afterthoughts and retrofits.'

This attitude needs to be averted by the identification of environmental impact assessment as a specific procedure.

Another gap in the IEP methodology for rural areas is the neglect of gender as a factor in the analyses. Referring specifically to rural electrification (but it has equal relevance to rural energy planning in general), James (1995, p6) observes from a literature review that 'professionals, from funders to evaluators, have yet to view their development interventions from a gender perspective.' James affirms that if a people-centred development approach is to be adopted in a genuine way, it is necessary that a gender perspective is incorporated. This is sensible if one considers the very different roles played by men and women in rural areas. In the past, the lack of an awareness of gender issues have resulted in men participating in the planning processes – where local participation has occurred at all. It is important, especially in the case of the rural energy system where women are the primary energy users, that women participate in identifying the problems, as well as planning the design of interventions to address them – not just superficially in the sense of allowing women to attend meetings, but empowering them to participate by specifically inviting them in a safe environment for their opinions.

Cultural norms in rural areas can easily result in a planning process that ignores the perspective of women. Bradley *et al* (1985) provide a vivid illustration of this in their account of an energy planning initiative in rural Kenya. Past assumptions of a homogeneous society in this area had resulted in afforestation initiatives always failing. Investigation finally exposed that a lack of a gender perspective had disguised the cause of these failures: in the local culture, Bradley *et al* (1985, p235) note, 'Collecting fuelwood is a woman's responsibility and therefore of no interest to the men; while at the same time, men retain the sole right to plant and harvest trees.' A local woman is quoted to have said, 'I would be regarded as a thief if I cut down a tree on the farm without my husband's consent.' While this creates a significant dilemma for outsiders attempting to establish a successful afforestation initiative, it is wholly impossible if they are not aware of the gender-based problem in the first place, as has often been the case with previous interventions.

2.4 Institutional issues

'Men pass away; others will take our place. We cannot bequeath them our personal experience. But we can leave them institutions. The life of institutions is longer than that of men; if they are well built, they can accumulate and hand on the wisdom of succeeding generations.'

So said Jean Monnet, founder of the European Community, in 1952 (Branegan 1994, p31) – words to be born in mind by designers of an energy planning process of a country. The long horizons of energy planning in comparison with economic planning, and the complexity of the sector, make a well-structured institutional framework imperative. While it has been noted in

section 2.3.6 that it is important that institutional requirements of the policy interventions *themselves* be considered, it is obviously also necessary to consider what institutional arrangements are necessary for the implementation of the IREP process as a whole.

2.4.1 Some considerations

A recurrent theme throughout IREP methodology is a decentralised focus. This is reasonable since rural energy problems are invariably of a decentralised nature. Rural energy analysis and the consequent interventions must be oriented toward the decentralised energy user (but note that well-placed central interventions may be necessary to achieve desired effects at the decentralised level). Most relevant questions are of a necessarily decentralised orientation: energy for what? energy for whom? how much energy?

However, a decentralised focus can be overemphasised. Any long-term improvements in rural energy conditions nation-wide will require a strong impetus and sustained coordination from the centralised government framework, for while some rural energy projects can be successfully designed and implemented at local level, a programme that reaches all rural areas necessitates the involvement of national and/or regional government. Although more justification is not necessary, central government involvement would allow the full spectrum of possible interventions (centralised and decentralised) to be considered, it would avoid the common problems that result from a lack of coordination with the overall development process. Furthermore, without central government involvement, the few decentralised initiatives that are implemented will be isolated from each other, inhibiting the sharing of experience gained and lessons learnt. Although energy departments and other government agencies in the energy sector are certainly important, they are usually relatively weak compared to the sub-sectoral suppliers of electricity and petroleum products. Support from the higher-level planning machinery of central government is thus called for to enable mediation in the process and thus balance the variety of conflicting interests effectively (Pereira 1988, p413).

Theoretically, one could conceive of an alternative to energy planning whereby the national energy model is not planned but simply constructed through an aggregation of small energy plans decided at local level (Pereira 1988, p425). This process would allow for a high degree of local acceptance and accuracy. However, for practical reasons, both political and economic, this has not been achieved in any developing country. Even in countries where decentralised governments have been in place for a long time, there has always been insufficient capacity to warrant granting such structures carte blanche in energy planning. Therefore, what is necessary is a balance of ownership of the process between central and decentralised levels. In order for the planning process to draw constantly closer to this ideal balance, a necessary requirement is that the implementation of IEP methodology be carried out iteratively.

It is important to note that projects fail because planning and implementation processes have neglected to consider either local economic conditions and how technologies would perform in practice, or, importantly, what institutional arrangements are necessary to maximise the chances of success of the project. The institutional framework can be the primary factor inhibiting the implementation of an integrated energy strategy even when planning exercises provide strong evidence that such an approach is desirable. What ultimately matters is that people on a wide scale receive the services that were intended for them. This can only be realised if the institutional barriers are removed, as Baidya (quoted in McClintock 1988, p98) affirms, with reference to afforestation strategies, 'Decisions as to whether one plants *Eucalyptus* or *Leucocephala* are quite trivial in the long run. This does not mean that we should not suggest planting of suitable species. But the planting of suitable trees should be seen as an adjunct to the institutional change, rather than the main activity.'

Too often energy problems are seen as technical problems, therefore requiring technical solutions. It is imperative to recognise, however, as Pereira (1988, p404) notes, that

'rational solutions from an expert's drawing board are far easier to produce than to implement and make them work, particularly when recommendations proposed are likely to involve changes in institutional roles and power structures. Thus, even country studies of institutional and organisational problems in energy planning can only produce results if, apart from sound research, they are carried out under a conscious effort and commitment of central (and powerful) government institutions to reach an optimal compromise between (a)

economic/ administrative rationality and (b) political, socio-cultural, and resource-related contingencies.'

Perhaps the most significant institutional requirement of resolving rural energy problems in a coordinated manner is the existence of an institutional home from which energy planning lessons can be learnt – observing both positive aspects and errors, and in terms of both projects and analysis processes. Only if an institutional home exists will an iterative process be possible. The alternative – an informal IREP or IEP committee or forum – would probably serve as a casual 'get-together' of players in the energy sector rather than a predetermined, deliberate strategy of eliminating its anomalies. An informal arrangement will result in an absence of one agency taking the initiative regarding the question of integrated energy planning, and the premature death of the process will be likely. Although it remains unclear whether an IREP process can be effective or not, an absence of an institutional home will mean the process is doomed to fail without a fair chance to prove itself.

The institutional arrangements associated with such a body may take a variety of forms. It may be an agency specifically allocated the responsibility of rural, domestic or development-oriented energy issues, or perhaps it would be a body responsible for more general rural development planning. Besides the planning functions allocated to the body, it may also be required to oversee certain organisational relationships. These may be formal associations between public and private sector, such as government and banking partnerships that would support an implementation of a particular energy programme. These relationships may also be informal associations between potential users and producers of energy technologies and between government and private sector or community organisations. The mobilisation of village resources to assess household energy needs and resources is an example, as is a financial donation from a lumber industry cooperative to a research centre to develop a suitable technology to burn lumber residues for domestic heat generation.

The existence of such an agency at national level would improve intersectoral communication and coordination between the different energy sub-sectors as well as between the energy sector and agencies involved in rural areas through other sectors of the economy. However, if such a national level unit is formed, there needs to be a conscious attempt to guard against institutional rigidity that would inhibit policy making procedures and on-going programmes from responding to external conditions. If the economic and political environment of a large-scale energy programme changes during its implementation, the programme should be sufficiently flexible in order to adapt to these changes. For example, reduced earnings of a domestic off-grid electrification programme may result from a sudden increase in grid electrification subsidies or a fall in international oil prices; the programme should be able to respond to changes in external conditions such as these timeously and efficiently. Flexibility built into the institutional framework is necessary to achieve this.

On the other hand, there is a danger that institutional flexibility of an IREP process may result in its premature demise since expectations of positive results are likely to exist, and clear justification will be needed to receive regular, and probably increasing, financial sponsorship. Certain short-term results will be necessary, and these can be potentially gained through the carefully planned and well targeted implementation of integrated energy projects at local level. However, it is possible that large scale positive results will only be visible in the medium term after a retrospective look will enable impacts of interventions to be viewed.

The existence of an institutional home for IREP at national level also means that one needs to guard against a 'top-down' approach to energy planning. Too often specific energy technologies are 'promoted' by arrogant, Westerners that are unaware of the local conditions or the feelings and preferences of local men and women. Examples are many: grid electrification programmes frequently not meeting planners' expectations of economic growth; afforestation initiatives failing because of a fixation on numbers of trees; and large-scale dissemination of renewable energy technologies resulting in developing countries being 'littered with abandoned technologies that were intended as the solution to rural energy constraints' (Hurst and Barnett 1990, p8). Certainly, lack of awareness of this issue can bring failure to interventions. International aid organisations have frequently been denounced as working from this technocratic perspective, and failures have indeed been common world-wide.

It is important to recognise that a multi-level strategy is necessary. An IREP/IEP institutional framework would need to involve both centralised and decentralised tiers of government, because each is only able to perform certain requirements: the decentralised level is capable of establishing effective communication links with local communities and is well-placed to investigate local conditions and needs, while the centralised level is necessary to champion a coordinated IREP initiative that would reach all rural areas of a country or region.

At all tiers of government, it is essential that sufficient capacity – in terms of skills and financial resources – exists to implement the required task. At decentralised levels, lack of capacity is usually a problem. The conditions of poverty which IREP would endeavour to address from an energy perspective will inherently mean that communities in these areas will lack people who have adequate technical, financial and administrative skills, diminishing the scope to which an end-use oriented planning process can be driven from the decentralised level. These problems have also meant that authorities find it difficult to allocate financial resources to decentralised levels because they fear accountability, whether legitimately or not. The process of building capacity in poor areas will be an arduous, slow process, but an important one. Meanwhile, end-use oriented tasks can be implemented by a more centralised tier combined with a suitable involvement of the decentralised tier so that experience is gained at these levels for subsequent IREP iterations.

At centralised tiers too, capacity can be lacking. Appropriately skilled staff in the Energy Ministry and other agencies which would need to be drawn into an integrated energy planning process are invariably insufficient, with educational backgrounds usually dominated by technical degrees such as engineering and financial disciplines. The much needed training in the human sciences are usually lacking: these include sociology, anthropology, development-oriented economics as well as training in institutional administration and organisational politics. Also, sub-sectoral energy supply agencies often implement their own private planning, and these are inherently supply-driven technocratic exercises. Capacity- and awareness- building is necessary within these centralised organisations to align them with the planning needs of IREP – guide them towards a more qualitative, demand-driven, people-centred orientation. The extent and speed with which this can occur is limited by the additional capacity problem of insufficient financial resources normally available to the Energy Ministry. An IREP process will inevitably be financially taxing. Especially with the need for the development of a decentralised, participatory energy database, IREP will require strong financial support.

An end-use perspective needs to be built into the institutional framework of IREP. Whatever government tiers are involved and whatever procedures are followed, it needs to be emphasised that planning begins from the point of view of the final energy user, and, after analysis and design of interventions and policies and scenarios, the point of view of the final energy user must be returned to for affirmation and feedback.

Care should be taken not to underestimate capacity, for the advantages that could be gained from access to the very decentralised levels can be considerable. Local agencies enjoy support and familiarity with the people, making participation in the planning process and dissemination of less popular interventions, such as the option of off-grid electricity, or unsought after interventions, such as the energy conservation measures, that much easier. Also, local agencies are more aware of the dynamics within and between the communities since members are familiar with residents of the targeted villages or are even residents themselves; the ability to monitor the impacts of energy interventions can be thereby fed back to the agency driving the process (at provincial level, for example) with an efficiency and depth unlikely to be possible with the use of consultants. Moreover, expenses are reduced as well.

A necessary requirement for a successful IREP process is the appropriate political and administrative orientation of both the institutional environment in which IREP occurs and the staff involved in implementing the planning process. Government ministries, supply organisations and other agencies invariably operate from a particular orientation. The orientation of such organisations can be the result of that of their leadership, their history, or the recent injection of new staff. In order for a successful implementation of an IREP process, it is necessary that both the orientation the institutions convey to the public and the attitude of their staff are aligned

with general IREP principles. In particular, with its support of end-use driven planning, IREP necessarily requires a democratic orientation. Both IREP staff and the agency housing the IREP process should, therefore, understand and be in support of democratic principles.

Obviously, the formation of suitable institutional arrangements is not enough. A methodological framework is necessary to support the establishment of a suitable institutional framework. The support a useful methodological framework and an appropriate institutional framework provide for each other is perhaps paradoxical: each requires the other to be created. In practice, it is just this dialectic link between process and structure that is necessary for success of IREP – if success is indeed possible, which depends on conditions in the country in question. Process and structure feed on each other: in this way, IREP can grow.

In summary, there are certain characteristics which an IREP institutional framework should, ideally, exhibit. They are:

IREP home

- existence of an institutional home to drive the IREP process
- adequate stability so that a lasting, iterative energy planning process is possible
- adequate flexibility so that adaptation to external conditions is possible
- an understanding of what an end-use driven planning process entails, and a commitment to implement one

Capacity

- sufficient and appropriately skilled planning staff
- sufficient financial resources to implement the required tasks on a sustainable basis

Access

- access to centralised political debates and policy-making processes at national level
- access to decentralised developing communities and decision-making processes at local level

Linkages

- good linkages between different energy sub-sectors
- good linkages between the energy sector and agencies involved in rural areas through other economic sectors
- good linkages between government tiers

2.4.2 Requirements at different government levels

This section considers various possible tasks that would be required at the different institutional levels. It needs to be noted that terms used may have differing meanings in different countries, with specific reference to the overlapping meanings of state, province and region, as well as region, district and local area. It is also noted that words used necessarily convey a certain bias to a particular point of view. It is however often cumbersome to do otherwise. For example, 'centralised' and 'decentralised' government tiers imply that the former is more important than the latter, and this conflicts with the end-use, people-centred orientation of IREP. The same can be said for the use of the words 'higher' or 'lower' tiers. For convenience, but at the expense of the underlying perspective conveyed, these and other weighted words are nevertheless employed (Thom et al 1995).

From 'lower' levels: the target and focus of IREP

As the FAO affirms, IREP should 'originate and crystallise' at the local level (FAO 1990, p17). This will entail that much of the planning activity occurs at the decentralised levels, out of the planner's office and in the local rural communities and their respective local authorities. Consequently, some of the tasks that would need to be implemented at this level would be the following:

- participatory database development and needs assessment
- data collation and preliminary analysis
- mechanisms to build local capacity
- evaluation and feedback of impact and performance of interventions

These tasks should be carried out both by local authorities and by village members themselves. Local authorities would be called upon to assess the energy needs of different categories of energy users, but involvement of higher government tiers would likely be required to ensure accountability and unbiased assessment. Supported from higher government tiers would depend on the existing capacity in the area in question. Flexibility is essential so that areas with sufficient capacity are enabled to take on responsibilities, whereas areas lacking in skills are supported by outside agencies. A mechanism at the 'grassroots level' would need to be established that would encourage the participation of all local energy users in the planning process, so that it can be 'truly a people's programme' (FAO 1990, p23). The mechanism may entail the creation of a planning 'cell' as part of a larger administrative structure, which would cover a cluster of villages or some very decentralised administrative unit at a similar level. This cell would need to be staffed with personnel with an awareness of energy planning, knowledge of project preparation procedures, and would receive support from local voluntary organisations, research institutes, as well as an agency at a 'higher' government tier. It would implement the database development process and instigate, through local participation, preparation of localised energy plans. The grassroots mechanism would be responsible for seeking feedback from projects that have been implemented, so that subsequent projects could learn from past mistakes. All activities at this level should follow a policy of building local capacity wherever possible, and this entails drawing local people into the surveying, planning and evaluating processes – attempting to 'hand over the stick' as Chambers (1994, p1255) recommends – as often as is practical.

Capacity building may take on a variety of forms. The employment of extension officers or the establishment of decentralised resource centres are attractive options if financial conditions are suitable. Both the extension officers and the resource centres can either be responsible for energy issues specifically or with issues relating to more general economic development. The best solution is site-specific, depending on conditions of the country, the region, and the local area in question.

Government-employed extension officers are important in facilitating local level energy planning activities, but involving existing NGOs is an important requirement too. Many NGOs have experience with local conditions, are familiar with the local people, and are effective in implementing development projects often of an intersectoral nature, and are therefore valuable structures in the decentralised planning process. Pereira (1988, p424) advises that successful NGOs be integrated into state planning activities, and that the State should provide capacity building to such NGOs to fulfill various development roles. Steps to involve NGOs should be made with caution as there is the danger of NGOs losing their independence, their broad intersectoral perspective, and the usual idealism of their staff – useful qualities to foster. Also recommended is the establishment of 'networks' between government structures, NGOs, manufacturers and research institutions. The networks would serve as an information resource for the members, and would help build awareness of what is involved beyond the horizon of any one organisation.

It is important that in the endeavour to build local capacity, an existing institutional structure should be utilised rather than creating a new one. The latter will inevitably have an artificial nature because it would not arise naturally out of the local community itself. Existing structures, on the other hand, have arisen in response to a recognised need: development fora and school committees are common examples. Particularly with regard to energy issues, needs are often not recognised as such. The expressed demand may be for electricity, for example, even though the need is energy for cooking. Consequently, an energy-specific initiative may well be regarded by local people as an imposition on the development process; the process should rather occur naturally and thereby enjoy the support of local people. Because energy problems often most significantly affect those who do not enjoy influence in the local political arena, it often seems more appropriate to address energy problems through interventions in other sectors, such as agriculture, transportation or business development.

A government tier which balances the need for access to decentralised levels with the importance of capacity in terms of the skills and extent of its human resources will be appropriate for supporting the decentralised tasks. Obviously, it would be preferable that

capacity building is driven by an agency that is as decentralised as possible, but the lack of suitably skilled people at these decentralised levels is usually the main constraint.

From 'upper levels': driving the process

While tasks at decentralised levels for IREP are essential, there is much effort necessary at more centralised government tiers. Of paramount significance, an institutional home driving an IREP process is necessary. Without one, there will be no impetus to give the planning process momentum through successive iterations. It would therefore be useful to consider what characteristics are necessary of an such a unit. They include the following.

- An IREP unit would need a clear, unambiguous obligation and mandate to implement an energy planning process according to certain specific principles.
- The unit should be housed in an agency of sufficient political power to bring about real changes in the different energy sub-sectors, as well as other economic sectors, which often enjoy powerful yet conflicting vested interests.
- It should have adequate financial resources available to it and suitably skilled human resources to implement IREP principles properly, including a genuine process of participatory database development.
- It should be housed in a suitably stable institution so that unreasonably short-term results will not be necessary for it to prove itself in order for subsequent iterations to be sanctioned.

Ideally, an IREP unit should be subordinate to the overall development planning process, and the separate established energy sub-sectors such as the grid electricity and petroleum sectors, along with non-conventional and traditional energy sources, should be made subordinate to this unit. This would be in accordance with the IREP principles A, B and C (section 2.2.2). This may not be possible in practice, so an attempt to achieve this framework as closely as possible is then preferable.

The most obvious option is to establish such a unit at national level. The unit would set broad goals, horizons and boundaries for the planning process. It would coordinate planning activities at regional levels, and provide guidance and technical assistance to them. It should be able to exert pressure over energy suppliers and non energy-specific agencies involved in rural areas, and it should have the political clout to influence government policy, and to oblige sub-sectoral energy suppliers to cooperate with each other (without pressure they are unlikely to do so voluntarily because each party has little to gain from working together). Also, it will be responsible for the provision of finances and financial management of the planning process as a whole. This unit, called a 'National Energy Commission' (NEC) by Pereira (1988, p417), would need to be housed in an inter-ministerial department, preferably one which carries out a development planning function already, in which case energy planning would profitably serve a subordinate role. The NEC would provide a useful voice for the energy sector, considering it as a whole in contrast to the usual situation where certain energy sub-sectors enjoy disproportionate power. The relationship between the NEC and the Energy Ministry would need to be firmly clarified.

FAO (1988, p25) envisages three separate units at national level: (a) a political inter-ministerial body that would coordinate the rural energy programmes in the different ministries and agencies and would provide *overall* political direction and support; (b) a policy and planning rural energy unit housed in the Planning Ministry or Energy Ministry that would prepare *comprehensive energy plans* at regular intervals, and would determine the suitable allocation of resources to various energy sub-sectors' activities and programmes at all institutional levels on the basis of these plans; and (c) a nodal agency within a central ministry or department, such as Agriculture, Planning, or Energy, that would coordinate and support the *implementation* of rural energy programmes. In addition, FAO recommends that rural energy units should be established in agencies responsible for the supply of major energy carriers at national level, namely Electricity, Petroleum, Forestry, and Renewable Energy Sources.

However, the concentration of IREP activity at national level is not necessarily the best option. An alternative is the establishment of an IREP unit at provincial level that would perform much of the analysis, financial management, administration and evaluation itself. Scope for

intersectoral communication and participatory database development from this level has considerable potential. As far as possible, such a unit should implement tasks that would otherwise be carried out by a unit at national level, leaving only tasks which are naturally of a national nature, such as coordination between provinces, aggregate data collation and analysis, guidance, and political influence and direction. The iterative preparation of comprehensive energy plans and the coordinated implementation of energy programmes are appropriate provincial responsibilities, especially for a large, diverse country.

Even if the emphasis of IREP is positioned at national level, there will still be many planning requirements at provincial level, especially in a large developing country. This is simply because national government is usually too removed from the decentralised rural communities to be capable of understanding their energy problems, implementing a genuinely demand-driven planning process, or designing suitable energy interventions and policy changes. Because of this, and since government structures below the provincial level in developing countries usually require technical support in administration and planning, provincial government is in a primary position to implement specific IREP tasks. This level is well placed to provide a crucial link between national and local levels.

IREP functions that provincial government would need to serve would include the various IREP analytical procedures mentioned above, such as demand and supply analyses, investigation of alternative policy interventions, and impact assessments. Environmental assessments and the participatory database development process will have to be driven from this level. Also, coordination between the different energy suppliers would be necessary, as well as links to other rural development agencies and to other government tiers. Furthermore, it would need to carry out general administrative tasks of the planning process for its respective province, including resource allocation to different aspects and phases of the process.

If appropriate and possible, a regional energy agency could be created, with the responsibility for overall energy planning in subordination to the general development planning agency (Pereira 1988, p419). Defined communications channels between such an agency and its sister electricity board and other agencies involved in rural areas, such as those in agriculture and transport, would be required. Alternatively, if the political context and resources negate this option, the activities of the agency responsible for regional development planning can be expanded and technically strengthened so as to implement the same functions that would be expected of a separate regional energy planning unit, including implementing demand and supply analyses, seeking feedback from projects and programmes, and supporting local organisations in evaluating their own energy needs and possible options in meeting them.

Where capacity building of the more decentralised levels are necessary, provincial government will be called upon to provide extension services to these levels. This may include building capacity during data 'collection', improving awareness of certain issues such as the concept of 'energy' and the need for woodland management, as well as the task of supporting locally driven implementation of energy projects.

At both national and provincial levels, there is a likelihood that government will lack an awareness of the possibility of integrated energy planning. A publicity campaign of some kind is necessary in order to advertise the potential benefits such a process can provide. This campaign may entail the holding of national or provincial workshops, the establishment of energy posts in rural-oriented departments such as those responsible for agriculture, environmental management and forestry, and perhaps the employment of an energy officer or team in a provincial department with strong interdepartmental links that would serve an educative role to agencies responsible for development in other sectors.

However, political conditions may prevent all options for establishing an IREP within a formal institutional framework. In this case, a special ad-hoc committee could be employed to analyse the needs of energy planning. Especially where specific problems are focused upon, this may be a worthwhile endeavour (Pereira 1988, p423). The sustainability of such an initiative is normally threatened with a lack of an agency driving the process and weak commitment from participating players. A committee is nevertheless appropriate where there exist serious structural obstacles that cannot be changed in the short term.

2.5 Conclusion

Clearly, there is strong motivation for implementing IREP in developing countries. Serious shortages of rural energy supplies constrain people's ability to meet their basic needs, and improve their economic circumstances. The domestic use of certain fuels is often unsafe, unhealthy, and wasteful. The considerable time spent in collecting woodfuel impinges on other necessary tasks, both domestic and productive. Various community services are not available or of a poor quality because of a lack of energy services. Social problems such as disparities between men and women and between the poor and relatively wealthy, are exacerbated by energy shortages. Unarguably, these problems must be addressed; an energy planning process refers to the endeavour to do so, to seek solutions to these problems. Furthermore, their interrelatedness suggests that they should be addressed in an integrated fashion, so that an integrated rural energy strategy is devised rather than a multiple array of unconnected sub-sectoral strategies. Also, the decentralised nature of rural energy problems indicates that a rural energy strategy must necessarily be run from an end-use, or people-centred perspective, focusing on the services that the energy carrier is providing. In countries where rural energy problems exist, an initiative is called for that will address such problems directly, and will endeavour to resolve them as effectively as possible.

As discussed in this chapter, IEP methodology certainly appears applicable in rural areas. The procedural framework laid out is a useful one: goals and scope must be predefined, the ongoing development of a database is essential, analysis of demand and supply is a component of any planning process, and the balancing of the two analyses is imperative in order to provide rational future scenarios (steps 1-5). Conclusions of the analytical process would be meaningless unless actual energy policies and interventions resulted, interventions would be wasted unless careful impact assessments were implemented, and the process as a whole would be ineffective if it is a once-off experiment – many iterations are necessary before conclusions as to the worth of the process are made (steps 6-8). In addition to IEP steps, IREP methodology would do well to emphasise local involvement, and include an additional step of identification of decision nodes of the rural energy system, particularly at decentralised levels, whereas it could de-emphasise complex energy modelling and the categorisation of different energy demand sectors. Also absent in IEP methodology but important for an IREP process are environmental impact assessments of both energy problems and prospective interventions, and the incorporation of a gender perspective in all the analytical procedures.

Whether or not such an initiative would entail the full implementation of IEP methodology is arguable. Factors that would need to be taken into account in answering this question include characteristics of existing initiatives in addressing rural energy needs, the institutional contexts in which rural development and rural energy interventions occur, as well as the ability of poor rural people to make their needs heard.

Institutional arrangements were also considered in this chapter. While definite general recommendations were not possible, certain guidelines exist. An IREP/IEP home is necessary to ensure that the process will be implemented proactively, subsequent iterations will be carried out, and lessons will be collated and will inform future iterations. It would be important that such an institution is well-located: that is, housed within a structure that has adequate influence in the political arena, and that it has adequate access to local communities and decentralised development processes, as well as access to centralised political debates and policy discussions in various economy sectors. It is necessary that such a unit is appropriately staffed by a multi-disciplinary team, and enjoys sufficient financial resources to carry out its tasks effectively.

Questions are many. In any particular country, is IREP relevant? To what extent can IREP methodology be followed? If IREP is implemented, to what degree will results be successful? How long will it be before results are noticeable? What degree of integration is appropriate? Will IREP become merely a scheme that supervises various energy interventions in different sub-sectors, or will it be a concerted process of planning the resolution of problems with rural energy flows into the distant future? From the above discussions it appears that IREP has much potential for improving the lot of the rural energy user, and for reducing anomalies in the rural

energy system. If implemented, it promises to provide a view on the rural energy system as a whole, where at present suppliers of individual fuels are pursuing their markets in isolation. IREP has the potential for shedding light on a vast network of linkages between separate energy sub-sectors and between energy and other economic sectors.

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CHAPTER THREE

IREP in practice: case studies

Energy planning has certainly improved significantly over the past two decades. In a World Bank publication *India: The Energy Sector* (Henderson 1975), a supply-oriented perspective is evident throughout, with an over-abundance of targets and figures at the expense of qualitative end-use information. 67 tables are provided, for example, and it is possible that the word 'people' is not mentioned once. In the paper's fleeting consideration of rural areas, a supply-oriented mindset is exposed by the absence of any mention of involving local people in the planning process as well as the employment of phrases such as 'to try to restrict the extent of...' and 'to increase the supply of...' (ibid, p166). The attitude reflected here seems to assume that the end-goal is known, that it is the responsibility of national-level planners to achieve it, and seems to even regard the existence of end-users as being merely coincidental, if not actually a hindrance. Since then, the developments in energy planning methodology have been significant: Hills (1988, p32) points out that the oil shocks of the 1970s 'fundamentally transformed the context for energy planning and policy making.' Energy pricing policy became increasingly central to any energy planning activity, and awareness that there was no easy 'technical fix' in reconstituting energy systems. The need to take into account multiple fuel use and the importance of considering energy efficiencies also gained exposure, as well as the weaknesses of disaggregated energy planning on a sub-sectoral basis (ibid, p33). Comparing this new awareness with the previous paradigm, we can take to heart that we are indeed learning, albeit slowly, more integrated and sustainable ways of resolving dilemmas of the rural energy sector.

In order to investigate whether or not IREP is appropriate for South Africa, the experience abroad needs to be reviewed. From such a review, lessons for this country can be gleaned, both in terms of what would be worthy of emulation and what should best be avoided. This section includes case studies of countries exhibiting a wide variety of characteristics in terms of size, location, and diversity as well as the planning methodologies that have been employed. Each of these countries shares some of these characteristics with South Africa, but no country is a perfect role model. South Africa will need to devise its own answers to the rural energy question.

One problem of assessing the success of rural development planning processes is that it is inevitably impossible to show whether or not 'success' has been achieved. Particularly in the energy sector this is true: with a hornet's nest of conflicting issues to juggle, no particular goal could be justifiably singled out as being the key criterion which determines success. Indeed, 'success' is merely a relative term. Only in comparison to the past and to other countries or regions, can success be evaluated.

3.1 Experience abroad

3.1.1 India

India's experience in rural energy projects has a fairly long history of more than 20 years. Afforestation initiatives and domestic biogas digester installation programmes have been very ambitious, and large-scale electrification is an integral part of its on-going 'Minimum Needs Programme'. Energy for meeting basic needs has long been a focus. Subsistence services such as cooking and lighting as well as productive services like energy irrigation have been given attention. Because of this experience, and a diversity of conditions even greater than South Africa's, India is a useful yardstick against which the possibility of IREP in this country can be measured.

The idea of IREP has been investigated in India since the formation of the Working Group on Energy Policy in 1974 (Sharma 1988a, p43), but from the literature it is apparent that no integrated rural energy planning process has yet been implemented on any significant scale. Although successive five year plans have been produced for the energy sector at national level,

the planning process has contradicted many aspects of IREP philosophy. Even though plans have recognised the significance of rural energy problems and have allocated considerable resources towards their resolution, there have been serious weaknesses in the way these resources have been invested. The strategy has mainly been to promote the installation of specific energy technologies on a large scale (Sharma 1988b, p427). Demand assessment and attention to local variations in rural areas, particularly with regard to biomass fuels, have mostly been inadequate (Sharma 1988a, p44), as has the degree of local participation in the planning and implementation processes (Sinha *et al* 1994, p403). Furthermore, there has been little coordination between the planning of different energy sub-sectors, and even less coordination with the broader rural development planning processes (*ibid*, p410). Although these projects have certainly had significant impacts in rural areas, the predominantly supply-oriented, centralised, top-down, and technology-focused methodology has diminished their potential effectiveness, resulting in less benefits being enjoyed by less people. Sinha *et al* (*ibid*, p405) mention that the combination of the two main programmes in India aimed at the non-commercial rural energy sector, the National Programme on Improved Cookstoves and the National Programme on Biogas Development, have benefited only 10-15% of rural households. Pereira (1988, p407) notes that the indiscriminating and highly subsidised installation of family bio-digestors have resulted in a large portion of them not meeting predetermined standards, resulting in serious operation and maintenance problems, as well as many systems remaining completely idle.

These shortcomings have largely been the result of certain institutional anomalies in the energy sector of India. Theoretically, the national Ministry of Energy is responsible for formulating energy policy, but it finds it difficult to influence the petroleum or electricity industries, both of which are themselves politically powerful, the former lying in private hands and the latter being run as a separate government department. The most influential agency involved with rural energy issues is a subsidiary agency within the Ministry, called the Department of Non-conventional Energy Sources (DNES). Although DNES owes its existence to the separate planning and implementation processes of the electricity and oil sectors, it has been considerably successful in accessing funds and implementing large-scale programmes of installing renewable energy technologies in rural areas (Pereira 1988, p419). Naturally, this has resulted in interventions involving renewable energy technologies receiving more support than interventions in other sub-sectors. An Advisory Board on Energy (ABE) is also positioned at national level, but does not hold much political weight and it relies on DNES for political support. If rationality prevailed, ABE would enjoy stronger political power in order to exert influence over the entire energy sector, and DNES would be made subordinate to it rather than the other way round (*ibid*, p419). Unfortunately, political constraints such as powerful vested interests in the sub-sectors have prevented this from being achieved – it is apparent that, in general, the energy sector is inherently riddled with conflicting interests. A degree of integrated planning is implemented at state (provincial) level with the establishment of Energy Development Agencies that cooperate with State Electricity Boards, but this cooperation is not substantial (Andersen, pers. comm.).

Also, energy database development is weak. Data of the predominant biomass fuels is grossly inadequate, and consists mostly of estimates inferred from population censuses, forestry surveys and various assumptions such as the average number of cattle in an area and the proportion of crop residues used as fuel (Sharma 1988a, p44). Planners are forced to design rural energy strategies based on such data. Although, in contrast, data of commercial energy patterns in rural areas are better because of the specific interest of the petroleum and electricity industries in this information, energy planning of rural areas is significantly stunted by a general lack of suitable information.

There have been several other factors hindering the potential benefit of the programmes. Funding has often been inadequate and ill-designed, while targets have frequently been over-ambitious. National support policies such as pricing strategies or financial incentives have often been lacking or inappropriate, and planners have tended to make unrealistic assumptions about the availability of existing infrastructure facilities (Sharma 1988b, p427).

In addition, the highly decentralised nature of rural energy programmes does not fit well with the large-scale, centralised nature of the Indian energy initiatives (Sharma 1988b, p427). Installing 150 000 domestic biogas units per year, for example, is obviously an arduous task when each unit constitutes a separate project requiring efforts in organisation and coordination. With the planning processes being centralised, with little involvement of state governments, field agencies, voluntary organisations, or the local communities themselves, the limited successes are understandable. Decisions were made at national level as to which energy technologies should be installed in which types of rural communities. Therefore, it was unavoidable that the applicability of technologies to varying conditions in communities was not confirmed satisfactorily, resulting in impressive statistical results but few successes in practice. Sharma (1988b, p432) notes that even an intervention organised perfectly would surely fail if the project is not viable and attractive enough for the people themselves.

The national policy in India of treating electricity as an instrument for achieving social welfare with considerable subsidisation has had serious negative consequences. The financial health of the electricity supply industry has been eroded, which has led to poorer and less reliable power supply for grid-connected consumers. In fact, many major Indian industries have chosen to relinquish their access to the grid in favour of generating electricity themselves (Andersen, pers. comm.). Since industries constitute the most reliable contributors to ESI revenue, a vicious circle has been created. It would be unfortunate if the South African ESI were to follow a similar route.

The fairly rigid, centralised institutional framework in which the rural energy projects have been implemented in India has prevented these projects from adapting easily to external conditions, both within the energy sector and in the broader economy. A notable example is in the biogas digester programme. The decreasing oil prices towards the late 1980s caused a decrease in the profitability of the utilisation of biogas as an energy source. Despite this, the installation of family biogas plants did not decrease or even remain constant, but increased significantly from 580 000 units in 1986 to 740 000 units in 1987 being installed. Even the relatively stable economy did not explain this considerable increase in the context of falling oil prices. It is doubtful that the units were sufficiently cost-effective to justify an increase in installation. The explanation must be, at least in part, the political and administrative rigidity of the planning processes (Pereira 1988, p418).

On the other hand, this institutional 'rigidity' had advantages. If planning had been more flexible and the biogas programme had been scaled down, it may have been too costly to reestablish the institutional infrastructure if the programme needed to be increased again. There seems to be a fine line between rigidity and stability. Pereira suggests a compromise. Countries that are faced with general economic problems like shortages of capital and an unstable world energy market should 'support basic infrastructure to keep long-term R&D and planning capabilities, but should avoid establishing elaborate and/or rigid institutional arrangements with a permanent face' (ibid). The best institutional arrangement from a political point of view is often not the rationally optimal one.

Despite many problems with specific programmes, the rural extension services and activities of voluntary NGOs have been 'remarkable' (Pereira 1988, p423), mainly in the decentralised energy programmes of improved cookstove dissemination, installation of biogas digestors, and implementation of social forestry projects. The abundance of such programmes has strong relevance for South Africa, since up to now rural development resources and skills in this country has been dominated by extra-governmental agencies. Pereira emphasises the importance for India to bridge effective NGO programmes into the government-led development process. A danger with relying on NGOs is that failure tends to create permanent disillusionment, whereas a government-run programme may have more momentum to overcome individual project failures in order to implement a longer-term initiative (ibid, p424). Also, especially relevant for the new government structures of South Africa, a reliance on NGO work would undermine the provincial or lower level government structures that urgently require support from local people. A balance will need to be struck between continued support

for effective NGO activities and the implementation of extensive government-led development programmes.

Although India has not been particularly successful in implementing an integrated rural energy planning process, it has produced some of the more valuable research in the methodological theory. The International Energy Initiative (IEI) is a case in point, with its DEFENDUS methodology. Its support for a development-focused, end-use-oriented, service-directed approach to energy planning provide useful principles from which to tackle rural energy problems (section 2.2.2). Although the methodological procedures would need to be modified so that it is applicable specifically for the rural energy planning context, it provides a fresh perspective to these issues, confronting our attitudes and perceptions regarding the way we wastefully supply and use energy.

The article 'Rural energy planning in India' (Sinha *et al* 1994) makes some far-reaching recommendations for the rural application of IEP, with reference to the preceding decade's experience in India. Although recommendations are directed at the Indian situation, a strong relevance to South Africa is apparent. The article describes the past treatment of rural energy in India as 'essentially a rural electrification issue with a bit of kerosene thrown in.' Looking towards a strategy to correct these past biases, two different approaches of rural energy planning are distinguished. The one attempts 'a total redesign of the existing energy system based on a well-defined, logical sequence of steps to fulfill a predetermined objective subject to local constraints' (ibid, p405). Such plans inevitably focus on extreme objectives: maximising returns from agriculture, minimising total annual cost, maximising efficiency, and so on. The authors consider such large-scale rigorous redesigning of rural energy systems to be 'formidable, if not impossible.' The alternative they propose is the application of a participatory planning approach. Highlighting the techniques of RRA (section 2.3.2), the paper advises that participatory planning could be readily adapted to rural energy planning in India. The increased disaggregated, decentralised and participatory nature of these planning techniques would allow interventions to meet the more immediate energy needs of a greater portion of the people. Specific villages or clusters of villages where the availability of energy is perceived to be a particular constraint in well-being and economic development should be given priority (Sinha *et al* 1994, p405).

Interestingly, despite the necessary increase in collection of decentralised, qualitative data, Sinha *et al* suggest that the time and financial requirements will in fact be significantly lower than the methods that have been practiced in India in the past. (Chambers, to whom the design of RRA techniques is attributed, concurs here, as mentioned in section 2.3.2). The reason is that the extraordinary resources in both time and staff needed to carry out large-scale quantitative surveys would not be required. The involvement of the local people allows them to carry out certain tasks themselves, analysing their own behaviour relating to energy use and discussing alternative interventions that they prefer. Instead of employing several researchers to interrogate people, participatory planning would require a facilitator to provide guidance and stimulation. On the other hand, Sinha *et al* do point out that the competence of staff would need to be higher. Yet not only would RRA-type techniques reduce the overall cost of the process, it would increase the quality of the information: whereas local people may lack quantitative information, the planner lacks the more important knowledge of what information is relevant and what is not. Keynes's motto deserves reiteration: 'It is better to be approximately right than precisely wrong.' Planners should be wary of the error of underestimating the ability of local people to feed back information with the underlying overestimation of their own ability.

In addition, Sinha *et al* (p405-406) note that since, from India's experience, rural energy programmes tend to benefit minorities, it would make sense to target interventions at specific minority groups. Government-sponsored interventions in the rural energy sector have attempted too much with their limited resources. Neglecting 'enormous variations' in local conditions, they have sacrificed actual impact for coverage, or in other words, quality for quantity. The authors advise that 'all rural energy programmes should be directed where the chances of success are the highest rather than being spread out too thinly, particularly in the context of the severe financial resource constraints in India'. Intensive rather than extensive

interventions are proposed, targeting interventions at areas where energy is the 'felt need of the people'. This would optimise the investment of financial resources, as funds saved from a reduced target population could then be better spent elsewhere. Also, installed technologies would be less dispersed, thus enabling a more effective post-installation service, an aspect of past energy programmes that has been a frequent problem. By clarifying the *purpose* of a programme, the *extent* of intervention can be restricted and aimed at a specific target group or locality. Indeed, the authors observe that where no specific target group exists, the wrong group usually benefits the most (ibid, p407).

While it is laudable that energy programmes in India have aimed at ambitious targets, these targets have unfortunately focused on quantitative rather than the qualitative achievements. Quantitative targets are justified in providing a degree of accountability and motivation to the initiatives – since qualitative achievements are, by definition, 'difficult to measure and monitor and, therefore undesirable from an administrator's perspective in spite of being easy to discern' (ibid, p411). However, targets need to be modified so that they are more conducive to genuine improvements to people's lives.

Of particular interest is the article's discussion regarding the *relative* importance of IEP principles B and C (see section 2.2.2). In the past, the mandate of Indian IEP initiatives has usually been the integrated planning of energy sources (Principle B) in the endeavour to meet subsistence requirements for all, rather than integrating energy with economic development planning processes (Principle C). Sinha *et al* suggest that the reverse should be the case. They propose it is more important that an energy intervention constitutes 'a component of the economic development plans of the area for which it is formulated – integrating energy sources and technologies should not be the compelling factor' (Sinha *et al*, p403). The explanation is sensible: while meeting subsistence requirements is unarguably more beneficial to communities, the intangible nature of these benefits means that an energy strategy should be sold on the grounds of quantitative economic productivity (ibid, p410). The implication is that while Principle B is important in attitude, a rural energy strategy that supports Principle C is more important in practice.

Sinha *et al* also give useful comments regarding the institutional framework of rural energy planning. Although they affirm that for India it is 'almost unanimously agreed' that firstly, rural energy planning must take place at a decentralised level, and secondly, an integrated rural energy strategy should be based on local energy resources, the mechanisms needed to operationalise these requirements remain unclear (ibid, p406). The authors advise that the boundaries within the planning process correspond to the boundaries of the biomass system because it is these fuels that dominate rural energy use. These boundaries would depend on extent of biomass supplies, land-use, climate, and availability and affordability of energy alternatives. The programmes can subsequently be translated into the existing district boundaries of the area, thereby enabling appropriate policies to be implemented by appropriate government structures.

In addition, a strategy for the Indian context is recommended that implements intensive, well-targeted energy interventions 'at the cluster of villages level preferably by local institutions and with participation of the local people, supervised from the block, coordinated from the district, monitored at the state level, and supported nationally' (ibid, p412). A block consists of approximately 100 villages, a district of approximately eight blocks. The emphasis on the cluster of villages level is an underlying principle. This level may correspond to the fairly new institutions at local level called *panchayats*. Elected locally and representing one to five villages depending on their population, it is possible that implementation of projects is entrusted to them. Experience in this regard has been positive, but 'attempts to divest political and financial powers from the traditionally centralised political structure is neither a natural nor a quick process' (ibid, p411). There are close parallels between recent measures to strengthen the Indian panchayats and the capacity building process of South African village-level RDP structures (see section 4.3.2). Each could learn from the other.

3.1.2 Botswana

In contrast to India's policy of meeting basic needs on a wide scale, Botswana's policy has focused on national economic growth through reliance on the free market. Government has given a strong commitment to 'minimising its own intervention in economic activities including energy supply' (EAD 1993, p6), according to the latest publication of the Botswana Energy Master Plan (BEMP) process, implemented under the auspices of the Energy Affairs Division (EAD) of the Ministry of Mineral Resources and Water Affairs. As examples, intervention in the petroleum sub-sector is limited to the monitoring of private sector profit margins and strategic financing of fuel reserves; the coal industry is completely privately owned; and the Botswana Power Corporation (BPC) has provided no subsidies or tariff policies to assist new electricity consumers in paying for connection costs. Although the objective of economic growth has been achieved in comparison with most other sub-Saharan countries, this has largely been the result of revenue from diamond extraction (EDG 1995, p11) rather than a strategy that seeks self-sufficiency sustainably through developing skills and building local economic capacity.

Botswana finds itself in a similar situation to South Africa in that while there is significant industrialisation and a growing economy at an aggregate level, widespread disparities in access to goods and services remain. In the context of Botswana's national policy that focuses on growth of the national economy, it is understandable that national development planning has traditionally focused on macroeconomic issues. In the energy sector, these have included the consolidation of the electricity supply industry, the rapid growth in distribution of petroleum products, and the reduction of energy imports in order to secure self-sufficiency. This approach has resulted in a supply-side approach in energy planning. Planning has concentrated on changes to the energy supply industry, instead of looking at energy demand: what fuels are being consumed, what energy services are lacking, and to what extent energy demand is being suppressed as a result.

BEMP asserts that, compared to other sub-Saharan countries, the energy sector of Botswana has been successful in matching supply and demand, quoting statistics of GNP per capita and per capita consumption of energy (EAD 1993, p6). From the viewpoint of the national economy, this is reasonable. In the same paragraph, however, it notes that despite considerable economic growth in Botswana over 25 years, 'the bulk of its population is still poor and relies on traditional energy resources.' From an end-use perspective, this places doubt on the supposed successes of the energy sector. Considering that the majority of the rural population relies on woodfuel as its main energy source, the focus of energy planning being entirely on the supply of commercial energy sources is inappropriate.

BEMP advises that only a minimum of energy planning is called for, focusing only on the areas where 'market mechanisms have not worked properly and government intervention is necessary in order to ensure economically efficient resource allocation' (ibid, p9). Unfortunately, BEMP does not elucidate what criteria may be used to determine when the market is 'not working properly,' but the implication is that only quantitative economic factors will be taken into account. Unquantifiable 'externalities' like the social cost of inadequate services utilised by the poor are ignored by the document. In this respect, the first objective of the energy sector as defined by BEMP is enlightening: 'to ensure a cost-effective supply of energy by choosing, least-cost mix of energy sources to meet future energy demand' (ibid, p1). This objective manages to expose the authors' ignorance of the need for a demand-oriented, end-use perspective. Firstly, there is no mention of *to whom* 'a cost-effective supply of energy' would be aimed at, or of which energy *services* will this strategy consist. Secondly, this statement implies that it is the planners' sole responsibility to 'choose' a mix of energy sources, and it is their criteria of how 'least-cost' is defined that counts. Thirdly, it is assumed that 'future energy demand' is fixed and inevitable, so that planners need to consider ways of meeting this demand by augmenting the supply, just as so many ill-fated energy strategies have done in the past. Especially from a macroeconomic point of view, it is unwise to neglect demand side management in energy planning, as substantial amounts of scarce energy resources are squandered and, if implemented, demand side management can produce benefits with a minimum of opportunity costs being incurred.

BEMP did not consider IEP to have much scope for application in Botswana. 'During the last three years it became clear that there is not much point in developing integrated supply/demand models for the entire sector', asserts BEMP (ibid, p9), explaining that Botswana economic policy is to rely almost exclusively on market forces to regulate supply and demand. What about conditions in poor communities where markets have failed in this task, one may wonder? A strategy for these people is not described. It is assumed that policies that benefit the economy at the cost of individuals should continue, such as the promotion of domestic coal use, even though this creates serious air pollution within a domestic home (Trollip, pers. comm.). Instead, BEMP emphasises the task of developing a suitable energy database – certainly an insightful proposition, for the potential benefits of such a process are considerable. Unfortunately, however, neither the need for end-user participation in the data development process nor the application of a demand-side focus is recognised.

This attitude has been neglected by the overall development process in Botswana, and a situation has arisen where people feel dependent and powerless; a lack of confidence has resulted which 'forms a barrier for people to take their development in their own hands' (CDRC 1989, p15). To an extent, the Chobe District has been different in this regard, and district level plans have been drawn up with the use of 'village consultation exercises' (ibid, p190). These involved questionnaires and village meetings and 'seminars' in which progress of projects was evaluated, government policies explained, villagers identified problems and constraints they faced. Also, the national development plans were made accessible to local level. The original planning period of six years is broken into Annual Plans and translated into Setswana. During the village consultation exercises, villagers were also encouraged to respond to these plans and make proposals for projects in the next planning period. Village structures were requested to monitor the progress of projects defined by the Annual Plans biannually, giving feedback to a district level management committee. In parallel, heads of departments at district level are required to report biannually to the management committee as well, in addition to on-going monitoring of projects' progress.

Many rural sectors have been differentiated in Chobe's district development plans, but energy has not been identified explicitly. Nevertheless development planning followed an integrated approach. This was largely the result of the existence of a District Extension Team which organised and coordinated the village consultation process. CDRC (1989, p191) admits, however, that this was a first attempt to practice integrated planning in Botswana; integrated planning is 'not yet a common principle on district and national level.' Other constraints included the lack of a clear link between national level budgeting and the implementation of local level projects, limited political weight to ensure central government departments implement the planned projects, and a limited ability for the district-level planning staff to monitor the progress of projects, mainly because of an inaccessibility of information from the centrally run projects (ibid, p193). A thread running through these problems is the arrangement that planning is performed from district level while implementation is performed from national level. Conclusions from a seminar in 1988 pointed to the need for a more transparent approach to development planning that improves cooperation between government tiers.

The Chobe District notwithstanding, the incorporation of an integrated and end-use perspective into development planning has generally been very limited in Botswana. An example is the supply-orientation of the electricity utility BPC. In the interests of stimulating economic growth in rural areas, BPC has been heavily subsidised. BPC has sometimes been allowed to claim full capital cost recovery from government rather than being funded through a more accountable subsidisation scheme; despite this support from the fiscus, these benefits have not been passed onto the consumers, who have been forced to pay the full capital cost of connection up front. Furthermore, there has been no incentive for BPC to minimise the cost of rural electrification schemes, for whenever errors in planning electrification projects have been made, BPC has successfully claimed additional funds from the Government (EAD 1993, p61). The rationale behind this is the common perception that electricity is a 'development trigger', bringing about an increase in agricultural production, rural employment, standards of living in rural areas, thereby halting migration of people from rural areas (ibid, p28). These expectations have not been satisfied. Less than 10% of the population of electrified villages actually benefit from electricity services (ibid, p56). BEMP recognises the need for considering other energy carriers

as alternatives to rural electrification, noting that economic development is unlikely to result, especially where more basic needs such as safe water, health care, education, housing and transport infrastructure are lacking. One reason given for such gratuitous subsidies is that they have been channeled through a 'rural agency' within the Ministry of Mineral and Water Affairs. This agency has had vague guidelines as to how to finance BPC's electrification schemes. BEMP recommends that the institutional framework must be restructured, including making the rural agency 'clearly and visibly separate' from the financing of BPC's commercial operations.

The attitude underlying the BEMP study illustrates a bias towards a reliance on the free market even if it is at the expense of equitable access to basic services. With these perceptions in mind it can be expected that IEP will not gain support. It may be true that a sizeable IEP process is possible only in a country where equity is a national priority, because it is in poor (and often rural) communities, who invariably lack basic energy services, where the market has failed and interventions are necessary. Despite Botswana being a democracy, equity does not enjoy more priority.

It is noteworthy that while BEMP was compiled already in July 1993, it has yet to be published. Not only do delays postpone the time when interventions can be implemented, they weaken the accuracy of the analyses because of the continually changing conditions in the various sub-sector. EDG (1995, p2) confirms that the data produced is dated. This either results in less possibility that government agencies will obey the proposals made or in greater possibility of unexpected consequences of interventions. Furthermore, delays hinder the possibility of energy plans being performed iteratively. Efficient editing and timeous publication of energy planning material is essential to minimise recommendations becoming dated and maximise the chances of an on-going, improving energy planning process.

Many of these weaknesses are caused by problems in the process by which energy planning has been implemented. The Deutsche Gesellschaft fuer Technische Zusammenarbeit (GTZ) has assisted the Botswana government in various sectors for a number of years. Unfortunately, GTZ's efforts have created a situation of dependency on GTZ – an expectation that it would perform planning on an on-going basis. The energy sector is a case in point, where GTZ essentially designed policy for Botswana without meaningful participation by the various stakeholders – the users, the suppliers and the government. It is illustrative that an electricity power station was built despite the far more economic alternative of importing electricity (EDG 1995, p14). In effect, the Botswana Government has *received* energy policy rather than *made* it, and this prevented a sense of ownership for the policy (Trollip, pers. comm.). A culture of accountability was lacking, and government was therefore not pressured into implementing the policy recommendations. This situation was worsened by the absence of stakeholders from the policy-making process. This is evident from an informal count at a recent workshop at which most formal stakeholders interested or affected by energy policy were present: only half had seen the major BEMP report (EAD 1993), and less than a quarter claimed to have read it (EDG 1995, p2). These characteristics are not acceptable from an IEP point of view: in order for energy policy to be effective, there are two requirements: (a) a domestic institution (in this case the Ministry of Mineral Resources and Water Affairs) needs it to take ownership of the policy-making process so that decisions rather than recommendations are made; and (b) the process needs to draw in as many affected parties as possible – only in this way can knowledge of the dynamics of the energy sector be gained and policy be designed to meet the energy needs of as many people in the most effective way as possible.

The most recent energy policy making process in Botswana – a project of which the above-mentioned workshop was a component – is a significant improvement on the previous BEMP studies. The Energy & Development Group (EDG), with advisory support from Energy and Development Research Centre (EDRC) staff, was commissioned as consultants. The consultants have also been involved in designing the process by which South African energy policy is to be determined. This experience enabled the consultants to be aware of the danger of merely 'handing out' policy recommendations; they therefore insisted that their role should be a facilitating one, and that the Botswana government needs to establish its own process by which energy policy can be made. A participatory process was initiated in an unprecedented way,

enabling the full variety of interested parties to come together and express their needs and views, thereby contributing to the formulation of a more rational, more representative energy policy for the country. In this way, the Botswana government was empowered to 'take effective ownership of the project outputs' (EDG 1995, p2). Policies that are substantially more aligned with contemporary thinking in energy planning than those of the earlier BEMP proposals seem to be arising out of this process, such as the support for social equity, environmental sustainability, and need to balance options for national self-sufficiency against the costs to the economy (ibid, p15).

The involvement of the energy users is unarguably beneficial. Their representation in the policy-making process places pressure on the government and energy suppliers to meet their needs more effectively. It was unfortunate that at the workshops of this recent project, small- and medium-scale consumers were not represented (ibid, p18). Nevertheless, it appears that the process was successful. Also, after an ongoing process over some years, BPC announced a significant concession to their low-income customer base – rural customers will be able to pay 90% (75% in urban areas) of the capital cost of electricity connections through the monthly tariff, whereas previously the full capital cost was payable immediately (Trollip, pers. comm.).

Institutional arrangements are often not ideal for the implementation of an IEP process, and the mechanics by which energy policies are formulated are often hidden behind various sub-sectoral doors. Yet the mere existence of a policy making forum at which energy issues are heard and discussed is an invaluable tool in exerting pressure on the decisions made behind those closed doors. Of course, it would be infinitely more preferable – but, as usual, somewhat unrealistic – to have all doors open with sub-sectoral policy discussions being made available to public review.

3.1.3 Ghana

Ghana's energy sector has been subject to similar problems that inhibit an integrated energy planning process in many developing countries. As was the case in most countries before the oil price shocks of the 1970s, imbalances between demand and supply of energy were dealt with by augmenting the supply. The emphasis was usually on engineering and technological aspects, and energy planning was implemented sub-sectorally, confined only to grid electricity, gas, coal and oil. With the oil price shocks, the government became more aware of the need for being cautious in energy supplies. Consequently, this awareness exposed other previously neglected tasks, such as the coordination between different energy carriers, analysis of the interaction between energy and economy, the use of demand management, and the implementation of disaggregate analysis of both supply and demand conditions of the energy sector (Turkson 1990, p703).

However, although awareness has improved, the extent to which it has brought about actual improvements is small. Rather than consider equitable access to energy services, government planning has concentrated on economic growth, especially with the requirements of the country's Structural Adjustment Programme. The energy sector remains dominated by monolithic parastatals, particularly the Ghana National Petroleum Corporation and the Electricity Corporation of Ghana. An energy strategy or plan has yet to be prepared, and no contingency plans have been formulated in the event of events that would affect the energy sector, such as international oil price increases or drought.

This notwithstanding, a National Energy Board (NEB) was established and developed since 1986 with the intention of providing overall energy coordination and energy policy analysis. A version of integrated energy planning has been implemented, with the main objectives of improving the reliability and equitable distribution of energy supplies. More specifically, NEB has three focal responsibilities: energy planning and policy analysis; appraisal of energy investment proposals; and the preparation and implementation of renewable energy projects. Structurally, NEB is divided into an 'Energy Planning and Policy Analysis' team that performs coordinating and analytical functions; a 'Monitoring and Operations' team that monitors the electricity and petroleum sub-sectors; and a 'Special Programme Unit' that is responsible for renewable energy and conservation. In the pursuit of these objectives it endeavours to

coordinate and facilitate the work of relevant ministries, prevent duplication of efforts, avoid policy conflicts, and provide advisory support for those energy sub-sectors that need it (Turkson 1990, p707).

These are its intentions. In practice, it is only partially effective. It is confronted with two fundamental issues: difficulty in performing its responsibilities effectively, and reluctance by other agencies to accept it as a body which is capable of coordinating the energy sector acceptably. The first issue relates to the performance of its tasks internally, whereas the second relates to its public reputation, but both are largely dependent on the 'calibre and competence' of its personnel to perform the functions assigned to it. NEB is at a disadvantage to the line agencies which have been in existence for a long time and have evolved their own planning models and accumulated considerable experience in doing so, even though they may focus on supply-oriented technological and financial criteria. NEB has little experience in energy policy formulation and planning and is therefore overshadowed by the sophisticated planning systems of the separate sub-sectors. In its defence, NEB's qualified staff 'learnt a lot' over the four years from inception to the publication of Turkson's paper, and are likely to be increasingly useful to the designing of a more effective national energy strategy (ibid, p708). On the other hand, NEB still lacks suitably qualified and experienced personnel in some of its sub-units. Also, from reviewing the Ghanaian experience, Turkson warns against underestimating the size of the task of producing a suitable national Energy Master Plan. Nevertheless, Turkson is positive: since its inception, NEB has been 'slowly but surely' achieving its goal of doing away with the 'confusion which has characterised the management of the energy sector.'

It is apparent that even though there existed laudable intentions of addressing the inappropriate supply-oriented energy strategies of the past, planners easily fall into similar traps. Although Turkson's paper makes many recommendations that correspond to the IREP paradigm (such as the need for increasing efficiency of energy use, intersectoral coordination, consideration of environmental impacts, and the importance of a suitable institutional framework), it errs in ways which, although small, can result in the continuation of inappropriate supply-oriented and technocratic attitudes and perceptions. For instance, it is argued that in order to increase the efficiency of fuelwood usage, the national programme for installing improved cooking stoves 'must be expanded rapidly and pursued vigorously' (Turkson 1990, p709, emphasis added). Turkson assumes – implicitly – that improved cooking stoves will automatically contribute to improved efficiency, which need not be the case. There has been an on-going debate for several years as to whether or not the dissemination of improved woodstoves reduce energy consumption in practice. Although in laboratory conditions efficiency improvements are definitely possible, in practice considerable effort is necessary to achieve widespread dissemination and utilisation of the stoves, and large amounts of funds to implement such an effort properly are required (Dickson and Baldwin 1990, p278-279). Moreover, in a study of the use of woodstoves in Zimbabwe, Gill (1983, p242) observes that factors such as convenience, 'image' and provision of space heating are more important than fuel efficiency in determining the choice of cooking method; the 'rapid and vigorous pursuit' of cookstove dissemination would undoubtedly neglect these factors. Turkson neglects to consider these issues, as well as ignoring the possibility of alternative interventions altogether, such as afforestation initiatives, better woodland management, and enabling energy users to switch to other fuels. Another example of Turkson's supply-orientation is his recommendation of developing an energy database: participation in this process by local energy users is ignored. In implementing this task, the first step is said to be 'to identify the data required, which depends on the energy policy objectives and issues addressed...' Supposedly, the urban-based planner is capable of identifying the data required on the basis solely on the nationally-defined objectives, without confirmation from the people about whom the data is concerned.

It is likely that South Africa would benefit from the establishment of an equivalent NEB, on condition it has sufficient commitment by national government to support it. Nevertheless, the experience of Ghana illustrates that even with the existence of such a body, a demand-oriented end-use focused attitude may continue to be neglected.

Besides the experience of the energy sector, also interesting and relevant for the South African situation is Ghanaian experience in rural development planning. A planning approach that was initiated in 1989 and formalised in mid-1992 as 'Village Level Planning' (VLP) methodology, is a useful methodology from which rural energy planning can learn. In contrast to planning in Botswana where local responsibility and participation has been neglected in the past, this approach focuses on promoting self-help and participatory decision-making in rural development. Although it is obviously difficult to quantify the benefits of such a methodology, its continued employment in an on-going development planning processes in Ghana has produced results which have gained international attention and therefore merit investigation into whether or not the methodology can be adapted for South Africa. A workshop led by the creator of VLP, Mr John Nkum, was held at the beginning of 1995 in Pietermaritzburg to explore the applicability VLP may have for the South African context. The information below is taken from the workshop proceedings (Midnet 1995) as well as a document that describes the conceptual framework and methodology of VLP (Nkum 1993). This is a fairly extensive review, but it is felt one is justified since IREP needs to incorporate itself firmly within the rural development planning context, and because VLP represents recent progress in rural development methodology. The discussion below illustrates how participatory rural development planning can operate, and considers how energy may fit in.

Although VLP notes the importance of a high degree of community-driven decision making, an approach is recommended that balances participation with a sound regional or district planning process. 'Optimise, don't maximise participation,' suggests Nkum (Midnet 1995, p13). Local participation is employed with issues that are directly relevant to the local community's sphere of influence. Only where people have something to gain out of working together will cooperation succeed. Nkum also mentions that there are dangers of 'involving people in inappropriate ways, where they are out of depth and cannot contribute' (ibid, p12). This is particularly relevant for South Africa in which representatives of previously marginalised sectors are frequently being invited to fora that deal with issues beyond their comprehension, resulting in a situation of 'picture-book democracy', where a false sense of legitimacy is attained. Genuine local involvement does not mean attendance at such fora by local people; it means the establishment of an extensive institutional framework at local levels through which people express their needs.

Conceptually, VLP involves the parallel implementation of two planning processes, with a participatory dialogue in between: (a) a 'people's planning cycle', a procedure of facilitated planning at village level, and (b) a 'support agency planning cycle', a more formalised planning process at district level. With two-way feedback between the two cycles, VLP endeavours to implement a 'bottom-up' planning process that 'would forge these seemingly polarised ends of the planning machinery in the district into a coherent working whole (Nkum 1993, p4). Although each cycle includes similar aspects of the planning process, the conscious division of the two allows the funders' planning process to be implemented with genuine yet controlled input from local people. Since local communities make plans without the involvement of support agencies anyway, it is reasonable that these local processes should be supported in a way that will facilitate dialogue between them and outside plans. Nkum explains it better,

'Communities with or without outsiders have [long] been doing their own planning and decision making ... they take decisions and live their lives and did so before our agencies even existed. This process is there, but they don't do it in a formal way ... their planning is unstructured. When we get into the community, we interrupt their planning cycle - whether we do it right or wrong, I don't want to say...' (ibid, p4).

VLP emphasises low profile yet guided facilitation of bottom-up planning. It is inappropriate for a planning process to prescribe a community to perform a number of specific steps in a specific sequence. If this conflicts with their other activities the process will fail. 'Don't stop people from doing what they have started - join them where they are' (ibid, p5). Flexibility is necessary.

The use of the term planning '*cycle*' recognises the importance of an iterative planning process. VLP calls it 're-planning', where the initial planning process is reviewed and improved upon at regular intervals, both at community and district levels (ibid, p15). In addition, district level

plans will be fed into the planning process of the next government tier, which in turn would be coordinated nationally, thus contributing to a rational and well-coordinated development planning.

An important principle here is the linking of community-generated decisions and priorities that arise from VLP with the district level planning process (Midnet 1995, p10). This need is evident if one considers that the district level would inevitably enjoy a broader perspective as well as being endowed with better technical expertise than the community level, whereas the latter would have a better knowledge of local conditions. It was noted at the workshop that while connecting district and community level process may appear simple in theory, various obstacles will surely present themselves in practice. In Ghana, district level capacity has generally been lacking, and skilled facilitators from 'higher' levels have been necessary in order to perform intersectoral planning activities. While decentralised capacity must be developed, VLP emphasises that existing institutional structures and procedures at both the community and district levels be employed rather than new ones created (Nkum 1993, p4).

Since a multi-sectoral planning process is usually over-ambitious while a sectoral focus at community level is usually limiting, VLP proposes a useful compromise. *Community-level* plans are performed multi-sectorally with full participation by all interested groups, the conclusions of which are communicated to the various supply agencies. *District level* planning, on the other hand, acquires a sectoral focus, albeit in conjunction with guidance from a multi-sectoral planning forum (Midnet 1995, p10). The implication for energy planning is clear: being a sectoral issue, energy planning is not appropriate at community level, but it is certainly relevant at the district level. The outputs of the multi-sectoral community level planning processes could be used to infer energy needs, thereby serving as an input to the district level energy planning process. In addition, energy being an element of many diverse sectors, the multi-sectoral forum at district level could lobby for energy planning to be incorporated into the various other sectoral plans.

The multi-sectoral district level forum that would provide guidance and coordination is necessary so that the invested time and funds are optimised, and that human resources are not overburdened by attempting to implement too much simultaneously. Such coordination should prevent 'island solutions' (Midnet 1995, p1) being adopted where only a specific minority benefit from a once-off intervention in a specific sector. In order to reach the majority of poor rural people, VLP emphasises that sustainable and well structured institutionalised mechanisms are necessary.

At the same time, the Ghanaian policy of self-help is regarded as an essential aspect of the process (ibid, p3). From the outset it is communicated to local communities that they should not expect hand-outs. They have to be willing to contribute to a development project, not only in terms of predetermined sums of money, labour or materials towards the project, but also with regard to the community participating in project selection, project planning, and implementation design. Although there is a long tradition of self-help in Ghana, prior to the implementation of VLP only the material type of contribution was employed. The result was that planners considered it sufficient

'for communities to provide money, communal labour and building materials towards the construction of boreholes, schools and clinics. It did not matter as much [to the planners] whether the project was selected by the community itself; whether it was their conviction that the project would address their priority needs; and whether they were willing to maintain it from their own resources' (Nkum 1993, p7).

Consequently, even though local people were contributing materially to the projects, they became increasingly dependent on government planners, expecting them to select and supervise projects for them and mobilise the required contributions from the community. A 'culture of dependence' arose.

Only through genuine self-help can upliftment occur. Nkum (ibid, p13) notes that

'for development to be meaningful and sustainable it must rise from the grassroots up as a process in which people develop a "critical awareness" of the causes of their present state of

being, and develop systematic ways of overcoming the constraints to their development. In this context external support is only relevant in its being a means towards enhancing the attainment of that "critical awareness" and in mobilising resources for implementing activities defined by the people themselves as their perceived means of overcoming the identified bottlenecks. In other words development means transformation, and *is not something that any person can do for somebody else* (original emphasis).

South Africa can learn much from the Ghanaian experience, and this includes rural energy planning processes. In some respects, South Africa is worse off. There is no tradition of self-help, both materially and in the actual involvement in the planning process. Understandably then, communities expect the new government to bring in infrastructure and services at no charge and with no local involvement. There are strong political forces that encourage this attitude, demanding urgent reparations for past neglect. Reversing this perception is crucial for an effective process of development in South Africa. Local communities need to be obliged to contribute meaningfully to the development projects that affect them.

What scope is there for VLP to be implemented in South Africa? The history of decentralised planning in South Africa is certainly barren. Both the previous South African institutions and homeland governments planned development in a very 'top-down', autocratic way, invariably ignoring democratic principles that base themselves 'on the willing assent of the people and not the coercive power of the state' (Rao, in Sinha *et al* 1994, p407). The new government has an arduous task ahead of it in establishing district and local level government structures that are sufficiently competent to implement development planning competently. There are unlikely to be strong decentralised structures in rural areas for a considerable time. Provincial governments will be called upon to achieve the elusive balance of meeting the physical needs of the people as well as playing a capacity building role to more decentralised government tiers. Nevertheless, efforts are being made in this regard, and their support of a self-help paradigm is encouraging. The relative economic stability and international support South Africa is receiving in its cautious strategies to eliminate poverty holds much promise for the future. VLP may indeed have a significant role to play in the future of rural development planning in South Africa.

3.1.4 Mexico

Energy policy in Mexico has focused predominantly on electrification, subsidisation of domestic kerosene supplies, and management of fuel prices. As part of an Energy Programme introduced in 1980, the objective of extending energy supplies to isolated and marginalised parts of the country was identified. The emphasis was on the reliable and economic provision of electricity. Because extension of the electricity grid to isolated communities exceeded the reasonable costs and involved technical inefficiencies, the policy was to concentrate on installing decentralised systems such as gasoline and small hydroelectric generators (Guzman 1982, p62).

Good intentions certainly existed. However, the orientation was misguided, being prone to the same supply-oriented narrow-mindedness. Although the Energy Programme promised to address the energy needs of the weakest sectors, it neglected to consider biomass in its strategy, even though biomass constituted roughly 84% of energy consumed in rural areas (*ibid*, p55). The perception was that, since Mexico has abundant supplies of commercial energy resources, it would make sense to encourage their penetration into rural markets. This perception exists in South Africa as well. The problem is that this is a supply-oriented perspective: strategies devised nationally may be based on invalid assumptions about local conditions and local preferences. Even worse, these assumptions are often not explicitly expressed. Supply-oriented strategies can sometimes be supported by laughable justifications, such as investigating what could be achieved 'for' poor areas, or analysing how small a proportion of the national oil production that would be 'needed' to replace biomass fuels (*ibid*, p62).

It is unfortunate that although Mexico has enjoyed self-sufficiency in oil supplies for several decades, with abundant supplies and low prices, the rural poor continue to use other fuels to meet their energy needs. It is apparent that, in general, Mexican national energy strategy neglected to specify definite steps to improve supplies of energy in rural areas; the absence of steps resulted in the continuation of the problems, even though broad policy promised their

resolution (ibid, p62). The proverb warns, 'The road to hell is paved with good intentions.' Indeed, good intentions embodied by national energy policies exist worldwide, but actual positive impacts to people's lives have generally been insignificant.

3.1.5 Argentina

Since Argentina consists of highly skewed income distribution patterns, it is a useful parallel for the South African energy situation. There have been many successes and failures in the energy planning strategies over the past five decades. Just like South Africa today, Argentina in the 1940s was cursed with radical disparities in access to energy services. Biomass consumption was common and widespread, gas usage was minimal, and while most of the central urban areas were electrified, only 12% of the rural population had access to electricity. Also, more than half the commercial energy consumed in Argentina in 1950 was imported. In contrast, 1985 figures show that conditions improved considerably: biomass consumption had reduced substantially, gas networks had been developed on a significant scale both through gas pipelines and portable LPG, and rural access to electricity had risen to 34%. Also, by this time Argentina was largely self-sufficient in terms of energy (Bouille 1992, p53).

These successes were the result of long struggle to get energy planning onto the government agenda. Energy planning began already in 1947 with the establishment of the National Energy and Fuels Directorate, which initiated a systematic, integrated and on-going compilation of energy information; this proved highly profitable, providing a firm foundation for two five-year energy plans. This body and the *Empresas Nacionales de Energia* (National Energy Enterprises) were 'the forerunners of an overall vision of the energy sector' (ibid, p64). Although at first there was no demand management policy, an implicit bent toward energy equity was evident in the reduction of energy prices and the diversification of local supply after the nationalisation of certain energy companies.

During the early 1960s, the concept of national energy planning gained publicity with a detailed study of energy demand at a sectoral level. National and provincial energy supply agencies were given increased support, and pricing policies that favoured low-income consumers were passed. In 1973, the task of energy planning was formalised, and a term translated as 'rational use of energy' embodied an energy strategy which proposed seeking strategies that would provide more sustainable, affordable supplies of energy resources, supporting principles of energy conservation, maximising the use of local energy resources and fuel substitution (Bouille 1992, p71). However, besides certain policies emphasising equitable redistribution, the extent to which these principles were put into practice was limited. Energy planning remained predominantly supply-oriented, and consideration of environmental sustainability was largely neglected.

The democratic election in 1983 further boosted energy planning efforts. A comprehensive 'National Energy Plan' for the period 1985 to 2000 was produced, covering the whole energy system in an unprecedented way. In comparison to the previous supply oriented equity strategy, this plan emphasised a more holistic approach, attempting to balance problems related to energy prices and investment financing with the earlier concept of rational energy use as well as environmental impacts of energy schemes. However, although an effective, integrated approach was incorporated into national policies in theory, government staff did not perceive them as having practical applications to the energy planning process: concrete steps of implementation were not spelled out (IDEE 1993, p39), as was the case in Mexico (section 3.1.4). Ad hoc committees addressed energy issues in a haphazard manner, lacking both intersectoral coordination and adequate influence over powerful energy supply sectors. Also, energy policies were significantly dependent on the political environment, with major modifications being made to energy plans with every change of government (ibid, p37). Such conditions of political instability and a high turnover of upper management staff (ibid, p40) resulted in an unfortunate loss of continuity. Argentina's history of discontinuity in energy planning illustrates the importance of institutional stability, especially since energy policies usually require a relatively long gestation period before success can be reasonably expected; energy plans therefore need to survive national political movements and turnover of planning staff, and mechanisms should be established to cope with such eventualities. These institutional difficulties are important lessons

for other developing countries, like South Africa, considering initiating an energy planning process.

Nevertheless, despite the weaknesses of the institutional framework and conditions of political instability, energy planning methodologies were successfully developed and implemented. Planning models for the oil and electricity sub-sectors were devised, and, more significantly, extensive National Energy Balances which would later serve as one of the bases for energy analysis of the whole of Latin America and the Caribbean were developed. Although there was a lack of clarity as to which institution was responsible for the various tasks involved, that these tasks were delineated at all made a significant contribution to the development of a rational energy strategy (Bouille 1992, p65).

In summary, the strengths and weaknesses of the energy planning processes in Argentina provide useful lessons. The increased access to energy services in a variety of energy sub-sectors by the poor and by the rural population shows that a strong commitment from government is an important element of success. Although there is a danger of a supply orientation in achieving objectives, a certain degree of supply orientation – in the form of targets – seems necessary to establish an incentive. What is required is that targets should not dominate an energy strategy because a demand orientation is equally important. Argentinian experience also shows that an energy database development process can be highly beneficial, if a sufficiently long-term view is adopted. Information is of paramount importance for successful energy planning, but the difficulty is to justify to the government of the day that the resources required are resources well spent.

After a long campaign to establish an effective integrated energy planning process in Argentina, that one was finally initiated and many successes were achieved as a result indicates that a long term planning process for the energy sector is indeed possible. Proponents of a similar process for South Africa should not be disheartened by seemingly unassailable political constraints.

3.2 South African experience

With this background of the experience in rural energy planning in other developing countries, an account of IREP-related experience in South Africa will be more readily appreciated. From the above investigation of other countries, one recognises that the principles of IREP/IEP are still new and, although clearly logical and relevant, are slow in gaining exposure and application. Countries do not operate in isolation, and evolution of IREP methodology is, to an extent, a concerted global effort. Countries learn from others' failures and successes. South Africa would do well to avoid others' mistakes, and emulate the strategies that seem to promise the best chances of achieving solutions.

This review of the South African experience in IREP is divided into two sub-sections. Literature that has been published on the subject is first examined, whereafter energy initiatives that have been implemented in the country and have relevance for a rural energy planning process are explored.

3.2.1 Published literature

In South Africa, only a meagre attention has been given to energy planning in the publications of research institutes and government planning agencies, and inevitably, rural areas constitute a small part of this literature. There are a few academic papers discussing particular supply strategies, a study of a national energy strategy for developing areas, and a number of regional studies on household energy consumption patterns. Literature has focused mainly on supply technologies rather than consumption patterns, indicating the supply-oriented background. Only recently has actual energy planning methodology been considered, particularly with the implementation of the 20 person-year Energy Policy Research and Training Project (EPRET).

EPRET was a project undertaken by the Energy and Development Research Centre at the University of Cape Town which developed policy options for widening access to basic energy services for the urban and rural poor in South Africa.

What follows is a brief review of the local literature, focusing on those papers that are relevant to rural energy planning.

Eberhard, A A and Dickson, B J (1987). Energy consumption patterns and supply options in Bophuthatswana. Energy Research Institute, University of Cape Town.

This was a pioneer study of fuelwood and domestic energy consumption patterns in rural South Africa. Although originally commissioned to perform merely an assessment of firewood supply, researchers found that an integrated energy study was imperative to provide a realistic picture of fuelwood use (Eberhard, pers. comm). Although this study implemented only a crude version of IEP, considering it was the first of its kind in this country, the endeavour was commendable. The study portrayed an awareness of the weaknesses of a questionnaire-based survey, and implemented qualitative survey techniques using in-depth interviews. Questionnaires included open-ended questions concerning, for instance, people's perceptions, opinions and preferences. An emphasis was placed on an end-use perspective, endeavouring to understand the 'conditions and problems as they are perceived by local people themselves' (p2). This was a new concept in development planning in the country, which had previously consisted primarily of prescribing technological solutions to the development situation with negligible consideration of the users' perspective. Data collection therefore obeyed in general the principle of participatory database development.

The study recommends an approach which combines 'grid electrification, a woodlot scheme, and an effective distribution strategy for reconstituted waste fuels and coal' (p89). Although this neglects to mention alternative potential afforestation interventions, the rationalisation of fuel supplies in other sub-sections and demand side management measures, it does reiterate the need for an integrated energy perspective to addressing energy problems in developing areas in the country. Specific attention was given in the report's recommendations to grid electrification and afforestation (woodlots). This reflects the reality of where energy planning needs to focus in this country.

The study recognised that the accuracy of its data collection process was questionable as a result of 'inexperienced interviewers and the inherent problems associated with collecting data on biomass consumption. What the study did not recognise was its neglect of disaggregation of the data energy by the services (end-uses) that the fuels provide. Although IEP methodology was obeyed in the sense that energy demand was analysed before considering energy supply scenarios, the energy sub-sections were taken as the focus for the analysis, causing the overlapping end-uses which each sub-sector services to be largely ignored.

In the extensive 37-page demand analysis (called 'energy consumption patterns'), there were no headings or subheadings on end-uses of energy, no tables or estimates describing them, nor were they referred to directly in a dedicated paragraph anywhere in the document. In fact, the study chose to *aggregate* the demand into rural and peri-urban areas, allocating a chapter to each. While aggregation is useful in creating potential energy solutions, neglecting a disaggregated perspective inhibits the ability to assess the potential impact of these solutions. Energy services were addressed specifically, yet briefly, only in a subsequent section called 'Energy demand' within chapter 5, entitled 'Alternative energy supply scenarios'. It would clearly have been more effective for the end-use perspective to have been emphasised, or at least mentioned directly, within the chapters considering current energy consumption patterns.

Nevertheless, there were several strengths of the study. The investigation of energy supply scenarios gave adequate attention to the combining of energy supply strategies with demand side management measures, including improved stoves and energy-efficient housing design. The study made sound practical recommendations regarding support of the supply options, including technical, educational or financial support needed for certain technological interventions. The interdependence between rural energy problems and socioeconomic conditions was suitably emphasised, indicating that a broader approach to planning energy interventions in these areas was required than simply a energy-specific strategy. The necessity of links with other development initiatives was noted.

In addition, consideration was made as to the institutional arrangements needed to develop a policy framework in order to address rural energy problems effectively. Since the study was implemented before Bophuthutswana was amalgamated into South Africa, recommendations concerning the Bophuthutswana government structures were made. Nevertheless, these recommendations can be translated into similar arrangements in the newly arising decentralised government tiers. It is worthy of note that the study recommends that a broad yet detailed energy plan for the whole of the region be commissioned. This is in contrast to the strategy of the recent Integrated Energy Demonstration Programme (see section 3.2.2), which saw site-specific pilot projects being the first step of a new energy planning initiative. Perhaps the recommendation of this study should be taken seriously – that is, not for South Africa as a whole but for regions of a similar size as the former Bophuthutswana or the sub-regions thereof.

Gandar, M V (1988). Integrated energy planning for Natal/Kwazulu: a position paper. Prepared for the Natal Town and Regional Planning Commission, Pietermaritzburg.

This study was one of the first papers in South Africa to posit the idea of integrated energy planning (IEP), even though a different interpretation of this term was employed. As Eberhard (1994, p20) points out, Gandar interpreted the term 'integrated' to mean 'holistic' in the sense that all energy supply options should be considered, with special emphasis on an ecologically sound exploitation of resources. The study recommends specific goals for the energy sector, but it does not describe an IEP-type planning methodology through which these goals can be achieved, nor does it suggest practical institutional arrangements within which the worth of an IEP process for South Africa can be investigated. It does mention that although the formula of specific energy interventions in a certain area cannot be repeated, the planning methodology certainly can be (p10) – but it does not adequately elaborate on this methodology.

Nevertheless, the paper makes pertinent points regarding what is needed for the energy system in the study region, including the importance of ensuring affordable energy supplies for all, sustainability through maximum exploitation of renewable energy resources and protection of the environment, and energy efficiency through the utilisation of waste and demand-side management of energy consumption. The different terms used for energy consumption (primary energy, available energy, and useful energy) are distinguished in a useful way, and the importance of considering the linkages between energy use patterns and the broader development context is noted, followed by a discussion of the implications of these patterns against the aforementioned goals. Sensible practical suggestions are made, such as the creation of rural energy centres, and the need for regulation to maintain a balance between strong policing and bureaucratic rigidity. The paper recognises that because of historical and political factors, there are significant obstacles in implementing an IEP process, however such a process is interpreted: the reality is that there is limited capacity and will in government agencies to adopt new approaches to energy planning. However, the political environment now is considerably different to that of 1988; the shift in orientation of these agencies, and the new structures created since, present much improved opportunities for IEP in South Africa.

Besides its different interpretation of the concept of IEP, this paper was, in a sense, a landmark study in that it was the first time interventions that supported many requirements of an IEP process were officially propounded. Two recommendations made by the paper were of particular significance: to *decentralise* the energy planning process and to adopt a strategy which seeks to develop a *repeatable* energy planning methodology appropriate for the country (p11, emphasis added).

McClintock, S E (1988). An integrated rural energy strategy for the Upper Tugela Location, Kwazulu. Research report submitted in partial fulfilment of an MA degree, University of Cape Town.

An analysis of an integrated energy strategy for a local rural area, the Upper Tugela Region of Kwazulu, was investigated. Fairly extensive consideration was given to analysis of rural poverty and rural energy problems and the history of development activities that have attempted to ameliorate them. The background to energy planning is investigated, but not in depth. The paper points out the need for development planning in general and energy planning specifically to endeavour to achieve self-sufficiency among poor communities, reducing reliance

on extra-local imports and increased local production of resources, with the implication of the importance of afforestation.

Two development planning paradigms are distinguished: the impractical and short-sighted technocratic approach versus the basic needs approach. The latter is further divided into an approach focusing on an objective of sound economics, productivity-oriented, or general improvements in the quality of life of the poor. Although the difficulty of defining basic energy needs is not mentioned, some valid points regarding specific goals of an energy planning process are made (p30), such as prioritising cheaper sources of energy in order to meet the needs of the poor majority, and endeavouring to ensure the sustainable exploitation of natural resources. The paper notes the need to balance technology development (such as that of renewable electricity technologies) with understanding the needs of the rural poor, and the complex conditions at local level, such as levels and distribution of income, costs of fuels, local customs, and physical characteristics of the area. Accordingly, the paper sets out both the socioeconomic and physical characteristics of the study area.

Because this paper was written in the context of postgraduate research, a more textured, in-depth investigation into the idea of IREP was enabled. The first few chapters provided a careful analysis of the various approach taken to energy planning in the past and the various possible objectives that could be regarded as a focus, including considerable reference to international literature on the subject of rural development. However, the latter few chapters did not conform to the same academic rigour. Energy supply analysis was merged into the consideration of the various possible technical options. There was an inadequate consolidation of the various options. Also, while afforestation strategies were investigated in great depth, strategies in the other sub-sectors were granted only a brief mention in the concluding chapter, neglecting to suggest possible policy instruments therein. This notwithstanding, the paper made valid, useful arguments regarding a rural energy strategy for the study area, with immediate relevance to many poor rural areas in the country.

Rivett-Carnac, J L (1990). Integrated energy planning: a study of the greater Marianhill Area. Prepared for the Natal Town and Regional Planning Commission, Pietermaritzburg.

Again, the concept of integrated energy planning employed was not in accordance with the methodology or principles recommended by the Asian and Pacific Development Centre and outlined in the previous chapter. The focus was on 'integrating' different supply options to meet the same or similar energy services. The end-use perspective was emphasised through the explicit consideration of energy services as section headings, the inclusion of statistics such as prioritisation of services, as well as this perspective being conveyed within the sections assessing different supply options. The author distinguishes a demand-oriented planning approach with a supply-oriented one. In this regard, the study was superior to the previous rural energy planning studies. On the other hand, the study neglected to consider energy planning firmly within a broader development context, and did not make adequate linkages between its energy analysis and specific goals such as energy efficiency. Therefore, although the awareness of the use of an end-use planning approach was there, obedience to the other principles of IEP was lacking.

The study recognised the importance of establishing a grid electrification strategy. Unfortunately, the effect was an ethical justification for the need for grid electricity rather than an objective assessment as to the advantages and disadvantages of extending the grid to domestic users. Perhaps in the political climate of the time, lobbying for electrification meant lobbying for equity. It was inappropriate in this climate to cast doubt on whether or not grid electricity is justified for a community. An investigation as to what the full implications of grid electrification on local communities would be may have cast such doubt. The climate has shifted significantly since then, and in the current context of a large scale accelerated rural electrification scheme in rural areas, there seems to be a greater awareness of the need to investigate in more depth what the implications of grid electrification are on overall energy use. Questions can now be asked more freely: to what extent will electricity be used, and to what extent will other fuels, especially woodfuel, be used less?

Eberhard, A A (1990). *Energy consumption patterns and supply problems in underdeveloped areas in South Africa. Development Southern Africa. Vol 7 No 3. p335-46.*

This study is a well-reasoned, concise description of South African domestic energy problems and their causes. However, because of the highly aggregated nature of the study it would be useful only for an initial cursory iteration of IREP. Subsequent iterations necessitate a decentralised and disaggregated perspective with regard to conditions of energy demand and supply. Although the study compares the costs of each fuel to the energy user, it does not adopt an integrated energy planning perspective in the sense that the overlapping services each fuel provides is not considered. The limited disaggregated information provided by this paper – in terms of the various factors which affect energy use, such as availability of fuels, income differentials, climate, socio-cultural factors and local perceptions to certain fuels – demonstrate why a decentralised perspective to rural energy planning is necessary. Also, although the study considers rural energy consumption patterns from a national perspective, the links with macroeconomic factors are not elucidated, thereby neglecting the IREP requirement of integrating energy and the broader economy (principle C, section 2.2.2).

Borchers, M, Eberhard, A A, and Archer F M (1990). *Energy consumption patterns and supply options in the Namaqualand Reserves. Energy Research Institute, University of Cape Town.*

This study was an improvement in terms of methodology on the previous studies. The economic context was properly described before energy use was addressed. Energy demand was appropriately assessed before the investigation of conditions in energy supplies, although supply analysis was not differentiated from alternative energy interventions, thereby inhibiting the role of demand-side management considerations. A suitable balance was implemented in data collection between quantitative surveys and in-depth, more qualitative interviews. The sample of households studied was carefully selected to be representative in terms of physical layout and household income. The experience of the researchers allowed various techniques to be employed so that communication with local people was improved. It was very advantageous that one of the authors was familiar with the area and was known to many of them, enabling easier acceptance of the researchers' presence. The detailed financial assessments of the various supply options (grid and off-grid electricity and gas non-electricity fuels) are a great improvement on the previous studies. The practicalities, such as community participation, of implementing a successful woodlot programme were considered, but the possibility of implementing alternative afforestation initiatives were not. The study recognised its limitation of not being able to provide information of changing patterns of energy conditions, thereby making predictions of future conditions prone to error. A limitation not recognised by the study was that the analysis again did not disaggregate the various energy sources by the services they provide. Furthermore, an integrated energy planning approach in accordance with the procedural methodology outlined in section 2.2.3 was not followed, primarily neglecting the balancing of supply and demand analyses and the consideration of demand-side management. In general, however, the study was a sound assessment of energy problems in the study area and the possible solutions that that could be taken to resolve them.

National Energy Council (1990). *An energy strategy for the developing areas of South Africa. Unpublished monograph. Pretoria: NEC.*

In contrast to the aforementioned papers which were mainly analyses of energy conditions at local or regional level, this paper considers formulating a national-level strategy of addressing energy problems of developing areas. The idea of a rural energy planning process coordinated at central government level is identified as an important component of an energy strategy for developing areas. This seems to be the first significant recognition of the possible need for nationally-driven IREP process in South Africa.

The paper recognises that energy planning needs to be implemented from an end-use perspective ('a bottom-up strategy', p29), noting the importance of local involvement. This perspective is enhanced with the provision of a useful disaggregation of rural energy demand into five categories (with the disclaimer that they are not exclusive): energy for agriculture, energy for community institutions like clinics, energy for commercial or industrial use, energy for domestic purposes, and energy for infrastructure such as water supply (p31). The paper pointed out the need for considering energy interventions as part of a broader development

strategy, noting the many failures of energy-focused interventions when they are made in isolation.

The need to decentralise the planning process is noted, not only because of the need to reach the local level but also because of a limited capacity at national level – in both the National Energy Council (NEC) and the Department of Mineral and Energy Affairs – to implement a nation-wide energy planning process. Structures of the previous political dispensation were still in existence at the writing of the paper, causing the regional development fora (RDACs) and 44 sub-regions to be considered as administrative structures for such a process – but the same recommendations are readily adaptable to the new institutional context, especially with its extensive decentralised structure. Although there is insufficient capacity to run the process at national level completely, the valid point is made that a national agency such as the NEC would do well to bear some of the costs of data collection; in return it will have access to collected data so that it can establish a national energy database (p30). Indeed, a suitable amount of emphasis was given to the need for the development of such a database, even so far as distinguishing it from the energy planning process in general.

The paper also recognised that an energy strategy requires the implementation of an on-going process rather than a once-off energy plan (p3). It is interesting that this awareness is conveyed from an already institutionalised body specifically responsible for energy issues, whereas authors of the earlier papers on IREP mentioned above, who mostly did not recognise this need, were independent consultants seconded by agencies responsible for rural development in general. The use of outside consultancies meant that the awareness of energy issues within the agency in question was lacking, and while consultants may be more aware of the significance of energy problems, they are less aware of the needs of a national-level planning process as well as the institutional mechanisms available to address them. In contrast, the NEC was inherently more aware of the need for an iterative process of energy planning. This is because of the tendency of any institution to justify its continued existence. Since the NEC was an agency specifically mandated to consider energy, it saw the pivotal role it would play in an energy planning process. This is a strong argument for running an IREP process (or at least the investigation into the worth of one) from a national-level agency specifically responsible for energy.

On the other hand, there were significant limitations in this paper. The paper identifies an energy strategy divided into five components: two components, energy planning and information management, are closely allied to the IREP methodology; the others are technology assessment, private sector involvement, and demonstration and communication. While these latter three would be significant aspects of a rural energy planning strategy, they are presented as having equal priority as the first two components. This perception is questionable: there needs to be an unambiguous focus, and if one is not explicitly spelled out then one will arise unintentionally, one that will likely emphasise a less important objective. There needs to be a clear prioritisation between the different objectives of an energy strategy.

The identification of these five components of an energy strategy is presented without a detailed methodology as to how each should be implemented or how they should be coordinated with each other. While the points are valid, readers of the document would undoubtedly be at a loss as to how to take these principles forward. It appears that what is necessary is a realistic strategy as to how to get energy planning (that is, IREP) off the ground. Appropriate institutional arrangements are necessary, including organisational restructuring, unambiguous allocation of responsibilities to the appropriate agencies, and suitable long-term funding arrangements. All of this requires that the option of IREP be an on-going discussion that will outlive pilot projects, conferences or other temporary processes.

In addition, the appropriate use of energy policy instruments by centralised government, such as pricing, has been largely neglected. Policies that would encourage more efficient energy consumption or to help poor energy users directly have never been passed. It is essential that all the various policy instruments available to the government to influence rural energy systems are considered. Neglecting this step means neglecting the practical requirements of policy

decisions. The formulation of policy objectives will do little unless mechanisms of translating them into changes on the ground are investigated and decisions are made as to which mechanisms or instruments are to be used.

A conceptual weakness of the study was that it based many of its conclusions on the 'energy transition model'. This model describes a process in which a society gradually abandons traditional fuels and adopts modern fuels, from the use of woodfuel, through the use of 'transitional fuels' such as paraffin, coal and gas, finally culminating in 'the complete dependance of electricity' (Viljoen 1990, p125). Contemporary development theory generally rejects this model. The literature has criticised it as being highly deterministic, in that it assumes that all societies are moving in a common direction with regard to energy use, and that they are all destined for a common modern urban lifestyle. Viljoen himself recognises the complexities of the process, particularly in rural areas where a definite trend is absent, and often appears to be random (ibid, p125). However, he falls short of rejecting the underlying paradigm upon which the transition model is based: that is, the mistaken presumption of modernisation theorists, most notably Rostow, who posits that all countries go through the same development path to modernity. Considering the great complexities in how societies change over time, and the significant differences which developing countries face compared to what the now-industrialised countries faced during their development, conclusions based on this modernisation paradigm – and therefore the energy transition model along with it – are doubtful and demand careful scrutiny.

Consequently, since this paper was based on the energy transition model, its conclusions are suspect. It is not clear that all societies in the country are moving toward total electricity dependancy. Although the model may be justified to an extent in the urban context, rural communities continue to use the full spectrum of fuels, particularly traditional, non-commercial fuels, even long after they have been connected to the electricity grid. Leach (1992, p123) confirms that 'while there is much evidence that the transition is occurring rapidly in many urban areas of the Third World, the present situation and prospects for rural areas are much more uncertain.' To base rural energy policy on the transition model could be sorely misguided, such as encouraging poor rural people to use more expensive fuels, ironically under the guise of assisting them to meet their needs more effectively: 'this dependence [on woodfuel] would of necessity be part of a general programme of economic upliftment of the rural areas to speed up the transition away from subsistence' (ibid, p130). Coupled with the common error of directly linking woodfuel consumption with deforestation, resultant energy policies could be disastrous.

These limitations notwithstanding, this paper is an important landmark in the evolution of national perception of rural energy and rural energy planning in South Africa. The sound recommendations made in this document indicate that the NEC showed great promise for tackling rural energy planning in a manner conforming well to IREP principles. Iterative steps would have weeded out the weaknesses in planning methodology. It is certainly unfortunate from an IREP point of view that the NEC is now defunct. Perhaps a body in the new dispensation can be formed that will be capable of putting the recommendations made by NEC into practice.

Thom C 1994. *Energy for Rural Development. EPRET paper 6, Energy for Development Research Centre, Cape Town:*

In line with the Energy Policy Research and Training Project (EPRET) at the Energy for Development Research Centre (see Section 3.2.2) this paper is concerned with widening access to basic energy services among the rural poor. It set out to provide a broad framework for energy provision in rural areas by considering present conditions and the key aspects of future rural development policy. It also explored domestic energy use by rural people and highlighted some of the linkages between energy services and other aspects of development. Finally, the paper summarised the policy recommendations devised during the EPRET project that are applicable to rural areas within a broad framework for rural energy planning.

With regard rural energy planning the paper suggested five principles applicable in South Africa, and constituted the first attempt in South Africa to introduce the concept of participatory planning into energy planning and policy. The first of these principles is that 'integrated energy planning should occur within and/or in accordance with a framework of integrated rural development' and hence should 'address broad objectives and concerns of rural development'. The second principle is that 'the starting point for rural energy planning should be a systems-oriented understanding of the circumstances, needs and priorities of energy users'. For this to occur participatory planning which understands the context within which energy is used by rural people is necessary. This also implies a sound understanding of the socio-economic and political systems which operate in the society. The third principle is that rural energy planning should be responsive to the needs, problems and priorities of rural people and therefore a national or regional energy development framework should be flexible and be able to respond to local conditions. The fourth principle is that 'mechanisms need to be provided in the rural energy planning process to ensure that planners and policy makers are accountable to rural people'. The final principle is that, 'if an integrated and participatory approach is to be adopted, a wide range of energy-related functions would need to be fulfilled at a local level'.

Thom C, Steyn G, Williams A and Hofmeyer I 1995. Energy for Rural Development: Decentralising Control. Land and Agriculture Policy Centre, Johannesburg.

This paper investigates the control of energy service provision in rural areas. The authors point out that international experience has shown that centralised energy planning, which is not able to take account of location specific factors, limits the rate of success of integrated rural development initiatives and thus it is argued that it is desirable to decentralise planning and control. The paper then goes on to investigate what opportunities exist to facilitate this decentralisation process.

The paper argues that it is essential that energy initiatives are undertaken within a framework that incorporates much more than just energy. However, it points out that local participation is complex and where there have been efforts to move away from centralised planning, initiatives have often not progressed further than consultation. One of the reasons for this limited progress has been that the development of systems and the delegation of administrative powers to local bodies is limited by the skills and capacity of local bodies. Notwithstanding these obstacles the paper notes that the 'success of beneficiary participation will depend on the extent to which the structures employed encourage truly inclusive community representation'.

Similar to the National Energy Council's analysis and proposals described earlier, this study takes a national perspective. The first part of the paper describes the current situation in rural areas, and highlights some of the complexities around rural energy supply and use. Within this context a proposed framework for energy service provision is discussed and key requirements for improvements in energy service provision in rural areas are identified. In addition, in line with the general change in public policies in South Africa, the analysis places primary emphasis on equity concerns and on meeting the basic needs of the poor. Three principles for establishing mechanisms for energy service provision in the rural areas are suggested. These are, 'decentralisation of decision making on energy service provision', 'meaningful involvement by users' in the planning process, and the 'facilitation of decentralised participatory energy planning process by people who are well versed in the development and participatory practices'.

For there to be any realistic chance of these three principles being incorporated it is suggested that facilitation at various levels is key. These facilitators need to initiate and facilitate participatory planning at the local level, communicate information and decisions generated to planning bodies as well as a number of other capacity building activities. Questions are raised regarding the appropriate institutions and/or organisations to locate such facilitators and the institutional arrangements to support their functions. The authors conclude that it will not be possible to support these functions on a national scale in the short-term. However they suggest that these matters should receive further research attention and that pilot projects should be started to test and develop the proposed approach as well as suitable institutional options.

Despite indicating a need for further research, the paper does propose 'some principles and objectives which should guide the allocation of public resources for energy service provision'.

These guidelines propose that all energy projects developed by or in conjunction with local bodies, including those undertaken by utilities and government departments should be considered for funding. Funding should be channelled to branches of government departments and local utilities as well as local authorities and CBOs. The level at which the funding should enter will depend on the capacity and skills available at the various organisation levels, but in principle should be at the lowest feasible level. It is proposed that preference should be given to CBOs rather than local authorities as recipients of funding as long as they can show that they are accountable to rural energy users, including the poor and women. In addition release of funds should be conditional on a formal contractual agreement between all concerned parties.

Conclusion

The above papers are a selection of energy studies that have been produced in the country. Although more have been written, it is felt that this selection is representative of the attention given to rural energy and the concept of integrated energy planning. To be sure, rural energy conditions have been neglected in the face of more visible energy issues, and there has been a general ignorance of developments in IEP methodology – particularly with regard to rural areas.

Studies have been of a variety of types. The emphasis of their conclusions depended on the level at which the study was aimed. Studies considering a specific local community or area describe the complexities and obstacles that local conditions present, highlighting how the community differs with its neighbours. Studies with a regional focus tend to place more emphasis on the planning of resources and energy flows. Studies that consider energy issues at a national level are more aware than other studies of the need for a suitable institutional framework, although they tend to sacrifice energy problems of rural areas for those which impinge more directly on the national economy (unless rural areas are being focused upon). It would clearly be wise to allocate the implementation of a study to a level of analysis that corresponds to the emphasis desired: either variances in local conditions, regional flows of energy resources, or considerations of the national institutional framework.

In the past, each study has invariably provided similar general information. Often there has been duplication of background material among studies, as well as contradictions between them such as conflicting definitions of energy-related terminology. Since at the time of these studies IREP was not considered an explicit methodology, it was appropriate that duplication and contradictions were allowed so as to facilitate debate about what the practical requirements are for IREP in this country.

It appears that this debate has served its purpose; the time is ripe for a more coordinated approach to energy planning and energy policy making. If a planning framework were established, uniform terminology would be properly defined, background literature would be readily available, and the theory would be better publicised. Energy studies that are initiated within such a framework would not need to expend time and resources in duplicating such efforts. The framework would enable studies to focus on what is required. Studies should conform to the needs of the user of the information – such as an energy planning body – albeit with an allowance for flexibility to encourage debate to continue.

This presupposes that a user of the information produced by the studies exists. Certainly, one should exist: an institutional home is necessary in order to establish the framework within which studies would be conducted. Theoretically, one does exist: the DMEA is officially allocated the task of coordinating energy research in the country, and it has indeed been active in funding research. Perhaps with the transformation of the political arena in South Africa, it will be more possible for the DMEA, with support from other relevant institutions, to instigate a coordinated and far-sighted energy planning process for developing areas of the country.

3.2.2 Important initiatives for IREP

Region F energy planning

This initiative constituted an important example where an energy planning process was initiated by a regional authority. In the previous dispensation, the country was divided into regions, roughly along the new provincial lines, and for each region a 'Regional Development Advisory Committee' (RDAC) was set up, consisting of white local authorities, business organisations and large industrial sectors. The former Region F (now Mpumalanga) was particularly proactive in following a politically progressive development path in the context of a non-democratic political dispensation. Whereas the RDACs in other regions were faced with strong right-wing resistance to cooperation with black structures, the RDAC in Region F had already recognised its illegitimacy before the announcement of potentially substantial political transformation. On 31 August 1992, the 'Regional Economic Development Forum' (REDF) was established, voluntarily drawing the institutions not formally represented political arena at the time into the provincial planning process: trade unions, South African National Civics Organisation (SANCO), homeland governments, and so on. The REDF was an unprecedented cooperation at the time between white organisations and the various black structures that existed.

There was an unusual level of awareness about energy in this region, and the RDAC had formed a subsidiary energy unit. With the formation of the REDF, this energy unit was renamed the 'Energy Task Group.' The REDF energy subcommittee was chaired by a regional Eskom representative. Besides Eskom, organisations also represented on this committee included the former Kangwane Electricity Supply Corporation (KESCOR), the Development Bank (DBSA), the former Transvaal Provincial Association, the former Regional Service Councils (RSCs) of the province, Sasol, Chamber of Mines, DMEA, COSATU, SANCO, as well as representatives from the Association of Municipal Electricity Undertakings (AMEU) and the South African Chamber of Business (REDF undated, p4). The existence of this structure presented an unprecedented opportunity in the country for integrated rural energy planning to be implemented: a regional agency (thereby serving as an important link between national and local levels), mandated to consider energy specifically (thereby other services not overwhelming energy issues), albeit within a broader development planning framework (thereby allowing automatic integration between energy and other services and infrastructure), was already in place with an ideological orientation appropriately slanted towards a democratic perspective (thereby open to the idea of end-use driven planning). Although the REDF was only an advisory body and therefore perhaps lacked the political power to influence more powerful vested interests, its formation showed great promise of a rational, decentralised development planning process within which energy could play a significant part.

However, when the provincial government was formed in Mpumalanga most of the main individuals driving the REDF left it to take up other government posts (Mayet, pers. comm.). Much of the impetus of the REDF was thus lost and the forum died prematurely as a result of more urgent political considerations. REDF promised better coordination of development activities, including effective management of the considerable development-oriented investments of organisations such as Eskom and Gencor, as well as improving the contribution made by rural energy investments to the regional economy. Without such a process, investments are made in the dark, and regional development objectives are unlikely to be achieved efficiently.

The Energy Task Group of the REDF set itself the primary aim of devising 'an energy strategy which would encourage economic growth and social upliftment' (REDF undated, p11). This suggests that the Task Group understood the need to balance regional and individual needs. However, the aim is supplemented with an end-vision being defined as a state where the majority of all households that need energy, that can afford it and that are willing to pay for what they use are given access to the appropriate energy source *subject to resource availability* (ibid, p11, emphasis added). This statement includes within it an excuse in the event of failing to meet its objective: if energy services are not provided then the reason will inevitably be that resources were unavailable. Another questionable point is that Energy Task Group focused on households at the outset, at the expense of agriculture, small industry and community services. This bias may or may not be appropriate, but it appears that as a broad policy objective such a

focus is premature. The validity of two other details was also doubtful: grid electricity was to be regarded as the 'chief energy source', whereas in practice woodfuel is the 'chief energy source' consumed – a supply-side bias is evident here – and a relatively short energy planning horizon (the year 2000) was set, thus inhibiting the consideration of longer-term financing arrangements which are invariably necessary with energy interventions.

Nevertheless, the intention of extending appropriate and affordable energy services for all appears implicit. Its 'philosophy' included the concept that energy is a basic need, that the development of constituent communities of the province is of paramount importance, and that consultation and transparency is essential (ibid, p11). These principles are useful starting points in achieving the above-mentioned aims. Of particular relevance to an IREP process is the recommendation that all task groups within the REDF integrate their efforts relating to planning and implementation. The example is given that if housing and other infrastructural developments are planned for a certain area, the energy suppliers should be informed about these plans so that they are able to plan effectively from their side. The Energy Task Group would serve as a conduit of information between energy suppliers and activities in sectors outside the energy sector (ibid, p20). This provides strong support for principle C that calls for the integration of energy and the economy (section 2.2.2).

The Energy Task Group envisaged a methodological process which is akin to an IEP methodology. Its main procedural steps are: definition of current position; development of a desired end state; development of strategies to bridge the gap; test strategies with stakeholders, including affected communities; implement; and, lastly, monitor and evaluate interventions (ibid, p20-21). Although these steps appear effective, their limitations are clear. They assume that the 'current position' is already known, thereby precluding the need for a process of database development. Especially in the rural energy context, this is a dangerous assumption. Also, the steps also assume that the desired end-state is known, indicating a supply-oriented, normative planning process, neglecting the importance of considering an demand-driven perspective that works with the rural energy consumers in determining what the most desirable end-state for all concerned actually is. In addition, the implementation details focus primarily on grid electricity. For example, issues relating to safety and efficient usage are mentioned only with respect to electricity, and little attention is given to how the supply of energy sources can be improved. (This seems inevitable because the committee was chaired and managed by an Eskom representative). Furthermore, the need for an iterative process was not recognised: a critical absence.

These points notwithstanding, there are strengths amidst the weaknesses. The emphasis was on implementation: the 'nitty gritty operations' (ibid, p22) that would resolve problems on the ground were sought. The need to address practical questions like 'Who does what?' and 'Who finances what?' was noted. The practical slant of the Energy Task Group is evident from the points it focused upon. Although they may neglect the more technical nuances of an integrated energy planning process, they appeared able and motivated to carry out interventions in practice. This advantageous characteristic is born out of the group being a provincial body, and therefore staffed by individuals who are more aware of actual conditions at local level than agencies at national level, even though they may lack theoretical understanding of the IEP concept. The implications for an IREP process seem clear: institutional bodies at both national and provincial levels are important. A national level body can perform the more analytical planning tasks and can provide the necessary conceptual guidance to provincial level, whereas the provincial body such as the Energy Task Group can serve a more 'hands-on' role based on implementation of energy interventions. As competence grows, the national level agency can increasingly relegate its functions to the provincial body, and perhaps the latter can further delegate to more decentralised tiers.

The REDF (and therefore its subsidiary Energy Task Group) has since been disbanded and replaced by the Provincial Development Coordinating Council (PDCC) under the auspices of the Mpumalanga RDP office. The PDCC is designated the function of serving as the mouthpiece of civil society. Whereas the REDF had no real contact with the people at the 'grassroots', the PDCC can now (arguably) call itself a legitimate representation of local communities because of

the recent formation of the RDP Reconstruction and Development Committees at each institutional level (Mayet, pers. comm.). The continued existence of a body similar to the REDF indicates that the Mpumalanga Government recognises the great potential benefit that this forum held. However, the PDCC has not been active for over one year and its future is uncertain, so that it is doubtful that an Energy Task Group can or should be re-established herein. Nevertheless, the promise which the former REDF's Energy Task Group showed in initiating an integrated energy planning initiative suggests that provincial government's superior understanding of local conditions compared to national government particularly valuable for implementing an IREP process. Moreover, the disbandment of the REDF indicates that a provincial level initiative without any support from national level may be unsustainable. The best solution seems to be to share out the various IREP tasks between national and provincial levels.

EPRET Project

The Energy Policy Research and Training project (EPRET) was a major two year research project launched by the Energy and Development Research Centre (EDRC) based at the University of Cape Town. Its objective was to 'identify and clarify critical policy options for the formulation of energy policies to enable the provision of adequate and affordable energy supplies for the urban and rural poor' (EDRC 1992, p1).

Comprising more than twenty person-years of effort, it produced twenty-one papers of different aspects of the energy sector, from broad topics such as 'Background of the South African energy system' to more specific, sub-sectoral issues such as 'Energy and the environment', with an overall emphasis on the household energy sector. More specifically, research topics were divided into the following categories: background papers, energy demand analysis, rural areas, urban areas, cross-sectoral studies, and policy options, as well as two ancillary papers. Papers in the rural category, and therefore of special relevance to an IREP process, were: 'Energy for rural development' by Thom (1994) which provides a lucid description of the problems and options in the rural energy sector in general; 'Energy and small-scale agriculture', which contextualises the function that energy plays in the needs of small-scale farmers; 'Energy supply options for farmworkers' by Hofmeyer (1994), which considers a major, and too often neglected, sector of the rural population; 'Afforestation and woodland management' by Gandar (1994), which looks at strategies in addressing shortages of biomass energy; and 'Rural electrification', which considers the practical implications of an electrification programme for rural areas. Most relevant to this document, however, is of course Paper 2 (Eberhard 1994), of the category of Background Papers, entitled 'Integrated energy planning: a methodology for policy analysis and research.' Being readily accessible, this paper serves as a useful introduction to IEP. It outlines the conceptual framework of IEP theory, both in terms of its principles and methodology, and reviews briefly the experience of IEP in South Africa. Five main policy proposals resulted from EPRET: accelerated electrification, a low-smoke coal programme, a fuelwood security programme, and an energy efficiency programme. In general, conclusions were realistic yet optimistic: 'ultimately, underlying this research is a sense that real progress can be achieved in the near future in widening access to adequate energy services for the urban and rural poor' (EDRC 1994, p7).

EPRET endeavoured to perform research within an IEP framework, noting that integrated, multi-sectoral research is necessary to tackle the energy needs of the urban and rural poor. 'Rather than focusing narrowly on single supply-side options (such as electrification or afforestation), the policy research process has utilised an Integrated Energy Planning methodology. In brief, this approach attempts to integrate both energy demand (end-use) and supply considerations, and to ensure the consistency of energy policies with broader socioeconomic and political objectives. The policies which ensue should therefore take account of linkages between energy sub-sectors and linkages with the rest of the economy' (EDRC 1994, p3). It is clear that EPRET was aware of the theory of IEP, although, rather than implementing the formal IEP *methodology* as it claims in this quote, it seemed to support IEP *principles* while focusing on specific sub-sectoral energy issues. Eberhard and Van Horen (1995, p202-205) noted that organising the project into a number of discrete sectoral studies, although necessary, resulted in certain issues being overlooked, such as the important requirement for an IEP process of a

comprehensive end-use-oriented study of energy demand. They also note two other weaknesses. The one was that it is possible to perceive the project adopting a certain bias towards electrification, despite its explicit intention of working from an IEP perspective. This was valid for the early stages of the project, but when neglected areas became exposed project resources were redirected to address them (ibid, p203). The other problem noted was that the timing and phasing of discrete research components created inefficiencies at times in that the completion of some components was necessary in order to inform others. This is understandable, though, for a research project of this size and time span to run into bottlenecks. These weaknesses notwithstanding, the contribution the project has made in raising awareness of an IEP-oriented perspective was considerable, and future energy policy is bound to be informed by this project for many years to come.

Besides the content of the research being an unprecedented major investigation into the energy conditions affecting the poor households of South Africa, the *process* of the policy research adopted by the EPRET project was unique. 'It was recognised that the process of work on the project was critical to its ultimate success, and that it was essential for researchers actively to engage the key players in their respective areas' (Eberhard and Van Horen 1995, p198). Throughout the duration of the project it actively engaged all players in the household energy sector, both formally such as through the National Electricity Forum (NELF), and informally such as through support to civic organisations (EDRC 1994, p1). Internally too communication and information sharing was encouraged, and a common ethos was engendered amongst the research team through weekly meetings (Eberhard, pers. comm.). In addition, the project organisers recognised the danger of research papers being shelved and forgotten, and so a deliberate process ensued subsequent to the publication of the papers to take their recommendations into the political arena. The so-called 'EPRET roadshow' consisted of a number of presentations to a diverse spectrum of audiences, including government departments, political organisations, working groups of the NELF, Eskom, local authority electricity distributors, petroleum and coal companies, NGOs, civic groups, trade unions, development organisations and forums, business organisations, the press and development finance institutions (Eberhard and Van Horen 1995, p199). Although it is difficult to assess the impact of the roadshow, the enthusiastic debates around the various issues presented points to an increased awareness of both the importance of addressing energy problems and of the concept of an integrated energy perspective in formulating the policies that would address them. The experience gained through this participatory process will certainly be valuable should an IREP process be implemented in the future, in which case the individuals involved in coordinating the project will need to be consulted.

Although the production of research papers was the core EPRET activity, it also included a component which sought to address the inadequate human resource capacity in energy policy-making and research organisations. The training component of EPRET endeavoured to address the lack of people with economic and sociological educational backgrounds and the under-representation of black people and women in these organisations. This component trained a group of seven people, equipping them with a range of relevant research and policy-oriented skills and experience. Their educational backgrounds, as well as those of the rest of EPRET research staff, were considered, and a good balance was achieved between people trained in technical fields, such as engineering, ecology and economics, and people trained in social fields, such as anthropology, development planning, and history.

Evidently, EPRET can be regarded as a pivotal initiative in building awareness of energy problems and integrated energy planning in the country, rather than simply a programme in which local literature on the subject was expanded. It is for this reason that the project has been described here rather than in the section on published literature. The project has international significance for an energy policy research project, in that debates around energy policy normally centre around energy efficiency and the environment – resources of the scale that were involved in implementing this project have seldom been devoted to a policy exercise which is aimed at equity and redistributive goals (Eberhard and Van Horen 1995, p198). Moreover, the project has potential impact on development in general, as 'it offers a challenge to development thinking and practice to reassert the importance of the role of the state in promoting equity and access to

services and development opportunities' (ibid, pv). Besides the international relevance, the project is destined to play a significant role in informing energy policy in the country. The engagement of stakeholders during the research, the training component, and the roadshow that followed ensured that the EPRET project was maximally effective in putting energy needs of poor South Africans onto the political agenda.

National Domestic Energy Use Database System

Already in progress in the country is the development of an energy database, which focuses on household energy use. Envisaged to be eventually located in DMEA, the database was set up as a tool for a future IEP process. At present, the database consists of numerous energy studies throughout South Africa, reviewing demographic, economic and social conditions which affect the demand and supply of energy. The database contains a rural/urban distinction and a categorisation of dwelling types (although rural households comprise only one type). Upon completion of the software for the database, a user will be able to specify a detailed request for information in terms of geographic and/or economic criteria; for instance, the energy demand characteristics of all rural households of an income of less than R300 per month in the North West Province could be requested. Admittedly, much of the data is of a low quality, and data collection methods vary between studies making comparison and aggregation tricky. Coverage of rural areas is worse than urban areas, with some rural areas being neglected completely. More importantly, because the studies were not administered nationally, they are not representative of a wider area and therefore not very statistically useful. Only recently, with the production of the SALDRU/World Bank study (1994), was the importance of representative samples recognised (Afrane-Okese, pers. comm.). Also, studies in the database do not consider flows of energy from source to use, or of regional aggregation of energy conditions. With a database now managed at national level, it is more likely that future energy studies will be selected with a national perspective in mind. Also, many of the existing studies are supply-oriented and lack a general awareness of IEP principles, but future studies are likely to reflect a support for a demand-oriented, integrated planning framework. Besides the limitations of the data, this initiative, this is an unprecedented initiative and therefore of great relevance for the potential implementation of IREP in the country.

A three year project is under way to establish a good foundation from which the database can be further expanded. To be completed in 1998, the project has a three-fold objective: to establish a suitable institutional framework for the database (that is, to establish the database within the DMEA); to establish an on-going maintenance and improvement of the software, so that the data is better synthesised and data presentation is more effective; and to standardise data collection, clarifying a method of representative sample survey selection, and determining how data collection will occur (Afrane-Okese, pers. comm.).

The possibility that different databases could be combined into a single interdisciplinary database for the country has been posited, or, perhaps more realistically, primary data collection activities be combined, as much resources are wasted at present because of overlapping or duplicate processes. The Central Statistical Service is well-placed to coordinate such a function, and is a useful structure to allocate the task of developing longitudinal (time-dependent) data through regular data collection. An interdisciplinary cooperation with regard to data collection will be a consequential move towards an integrated development planning process in the country.

Integrated Energy Demonstration Programme

The Integrated Energy Demonstration Programme (IEDP) was a small forum of approximately ten people that intended setting up the institutionalisation of IEP for rural areas in the country. Its mission statement was 'To test methods of Integrated Energy Planning for the cost-effective and efficient provision of energy services to the rural poor' (IREP 1993, p3). It drew on representation from the electricity and oil sub-sectors (Eskom and BPSA, respectively), the Development Bank of South Africa (DBSA), the Independent Development Trust (IDT), Department of Water And Forestry (DWAF), and the DMEA. At a later date, the EDRC was co-opted in order to provide theoretical support. The group contained individuals who are leaders

in their fields, and each was open to the idea of IEP, several being familiar with its principles and methodology.

The envisaged plan was to identify various pilot sites at which IEP methodology would be tested. One of these was the Umvoti Valley Integrated Energy Project, which is discussed later in section 3.2.2. The pilot projects would hopefully serve as a catalyst for the institutionalisation of a more formal energy planning process, replicating the IEP methodology in a broader national programme (IEDP 1993, p3). The IEDP saw itself as a temporary amalgamation of national energy sector representatives from which a permanent institutional structure could be later fashioned.

IEDP (1993, p4) delineates the responsibilities of each of the member institutions. Eskom was allocated the responsibility for convening IEDP meetings, and providing assistance to the energy users, including the utilisation of Eskom service centres and maintenance facilities in rural areas. Obviously, Eskom would serve as the electricity utility when required. DMEA was allocated a relatively minor role of facilitation, advice and funding of specific research elements required by the IEDP. DMEA and DWAF's joint existing management of a national biomass programme as well as their social forestry demonstration projects would be drawn into the umbrella of IEDP activities. Being the secretary for oil companies of South Africa, BPSA would be able to assess pricing options and bulk buying schemes in order to improve the retail distribution network of petroleum products in developing areas of the country. The parastatal funding agencies IDT and DBSA would provide grant and concessionary funding, respectively, to IEDP projects, either directly or indirectly through existing programmes. EDRC would serve in an advisory capacity, providing assistance in methodological procedures.

The IEDP conceived of the pilot projects being structured within a three-tier framework, as depicted in Figure 4 below. The IEDP would serve as a National Steering Committee which would provide overall guidance, coordinate information flow, and select demonstration projects within a framework that allows successful projects to be replicated. Communication links would be set up between the National Steering Committee and the National Electrification Forum, so that the latter's energy database could be utilised. For each pilot project, a project steering committee would be set up, consisting of local community leaders (political and commercial), local NGOs, energy suppliers, development funding agencies, departmental extension officers, as well as representatives from the lower tier Project Implementation Team. The functions of the Project Steering Committee would include appointing consultants, managing their performance, ensuring continuous coordination with the affected community regarding progress of the project, giving feedback to the National Steering Committee regularly, and appraising projects from a broad economic perspective and in the context of other local development initiatives. Lastly, a Project Implementation Team was to be established for each project, consisting of relevant energy suppliers, community representatives, contractors and the planning consultants. IEDP hoped that these teams would prevent a top-down attitude from being adopted or perceived as is the case when a consultancy plans a project in isolation, without local or intersectoral participation. The Project Implementation Team would liaise regularly with the Project Steering Committee, producing progress reports at predetermined milestones during the project. Its other functions would be to enter into contractual agreements subject to the approval of the Project Steering Committee, and to establish local capacity for maintenance of any infrastructure installed as a result of the project (IEDP 1993, p5-7).

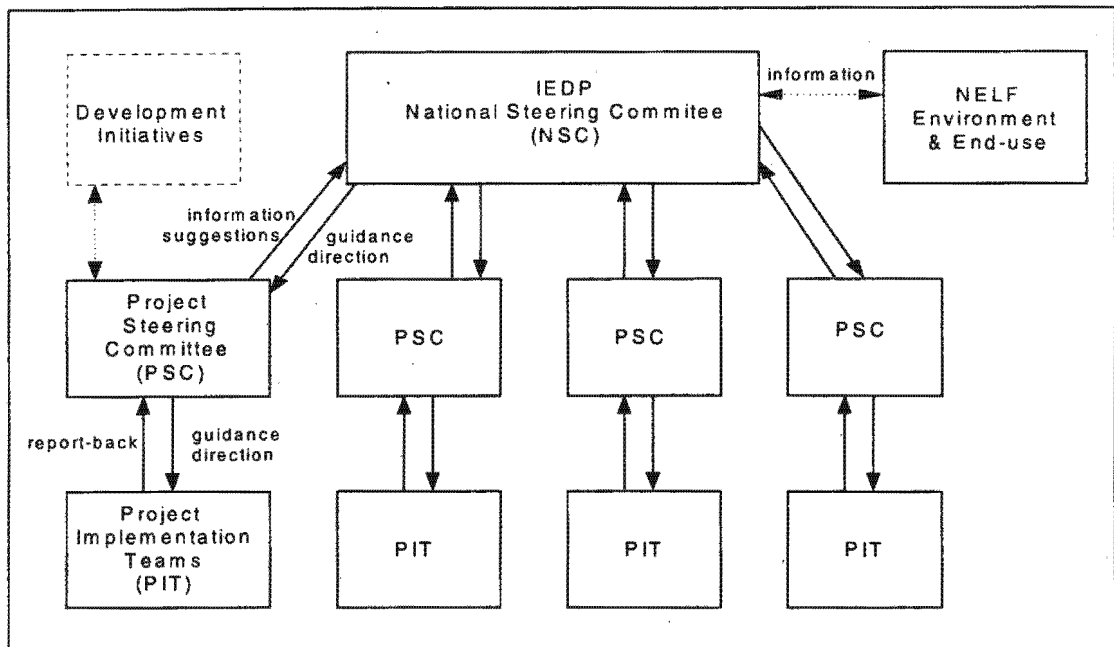


Figure 4 - Envisaged IEDP structure (IEDP 1993, Annexure I)

This attempt at establishing IEP as a methodology for energy planning in rural areas of South Africa was praiseworthy, for an endeavour such as this had not been attempted in this country previously. Never before had representatives from such diverse energy-related backgrounds come together in one forum to seek solutions to the country's rural energy problems. It was the first time a rural development initiative employed the energy sector as a focus. Consequently, the forum faced considerable institutional obstacles: DMEA did not give active support to IEDP (such as forming a unit that would manage the process on a full-time basis), political weight in general was lacking among the stakeholders, communication within the forum between the representatives of diverse institutional structures of the various fuel carriers did not match the communication in practice, and the predominant supply-oriented mindset embedded in their planning processes.

The forum had many advantages. Its members had the backing of significant institutional infrastructure to complete the task. Drawing in the participation of the respected research group EDRC allowed for a familiarity of IEP methodology to be present in the forum. The documentation of the Initiative indicates that a sound understanding of IEP principles and a good knowledge of organisational and management skills existed within the group.

The forum followed sound management procedures. It formulated a mission statement. It planned the formulation of the institutional structure of the various pilot structures (as described above). A sincere SWOT analysis* was performed by the forum to assess what factors are to the forum's advantage and disadvantage. However, despite all the effort that was put into achieving the above, despite the participants making all the right noises, the IEDP did not survive. Why did it not? An investigation into the reasons may be enlightening, providing exceedingly useful lessons for subsequent initiatives with a similar goal. These reasons are explored below.

Numerous constraints exist in the South African energy sector and in rural areas to reduce the chances of IEDP from succeeding in its objectives. IEDP exhibited an awareness of these conditions at a workshop held with its members (Viljoen 1993). They identified many obstacles: the forum was created against a political context of considerable instability and sporadic institutional transformation, for example, and there were frequent communication gaps and conflicts between different government departments and between competing fuel sub-sectors. The unreliability and inconsistency of available national energy data was recognised, as was the

* SWOT = Strengths, Weaknesses, Opportunities, Threats

inheritance of an unstructured, supply-driven approach to energy planning. The difficulties of local conditions compounded the problems: a void of a local public sector or similar representative organisations and an inappropriate land tenure system are examples, as is the widespread lack of suitably skilled people to serve as trusted middle-men and -women between the community and energy planning consultants. Other threats mentioned were language and cultural barriers, the presence of violence, and the unrealistic expectations of communities. The possibility of duplication of delivery channels, the possibility of development being used as a political football, organisations competing instead of cooperating with each other, were also anticipated.

Important considerations these certainly are. However, they were all external obstacles, constraints which are the context in which the IEDP was established in the first place. Yet the IEDP had weaknesses within it that hindered it overcoming its external obstacles. First of all, it was a part-time, voluntary committee which met on an ad hoc basis. It did not have the resources in time, money or sufficient appropriately skilled human resources to establish a more formalised institutional setting that allocates focused and regular attention to this investigation. It seems that a small unit that employs full-time staff and is physically located in an office is most suitable. Since it was only possible to form a casual arrangement between the IEDP members, continuity was dependent on the interest or conscience of the members involved.

A shortcoming of the forum was that it was not *aware* of the threats within itself that brought about its premature demise, or at least did not delineate them explicitly so that a strategy could be devised to confront them. This is evident from the above-mentioned SWOT analysis, if one reads between the lines, noticing what is omitted in addition to what is not. The IEDP members have unwittingly undergone a type of Rorschach test, since through interpreting the external conditions which they perceived they revealed their own perspectives and viewpoints. To elucidate: the SWOT analysis was clearly not sufficiently introspective, neglecting to pick out the inherent weaknesses within its own structure, and in this way attempt to guard against its own demise. Out of fourteen weaknesses and sixteen threats identified, no weaknesses and only three threats were introspective. Furthermore, and perhaps more critically, external obstacles were not *distinguished* from internal weaknesses, the latter of which would be more readily controlled. The three inward looking factors were that (a) the IEDP may not have all the role players in the energy sector represented, (b) an inappropriate First World male-oriented mind-set existed within the forum because of the background and gender of its participants, and (c) there was a possibility that no visible progress is shown as a result of IEDP projects.

Points (a) and (b) are basically the same one. Indeed this was an important observation. The forum did not have representation from all role players, and the people that did participate were all males and were all from a 'developed', urban background. Although this point was recognised, who exactly was absent was not defined explicitly. There was no representation of poor rural people, but it is arguably inappropriate for poor rural people to be represented on a national technical committee such as IEDP. Nevertheless, the group may have been more wary of any biases that may result from the absence. In addition representation of other service sectors such as housing and transport were missing, as was the representation of black people and women. Although here again there were practical constraints, it was not adequately recognised how significantly these absences affected the dynamics and topics of discussion in the group. If a non-representative forum is to attempt to be representative, it is essential that attention is constantly given to *what is not being said*.

Point (c) above is also significant, but its significance was equally swallowed up amidst the many external threats identified. Since the possibility of no visible benefits from the IEDP's pilot projects was a threat, then surely the pilot projects would need to be very carefully selected in order to maximise the possibility of benefit. This did not happen. The first pilot project, and the only one to date, was selected without much strategic thinking at all. Instead of identifying clear criteria of the site of the first pilot project, the community of the Umvoti Valley seems to have been selected primarily because it was a potential electrification target already known to Eskom, one of the forum's participants. In retrospect it is apparent that a pilot project which specifically

is not a primary electrification target would be a more appropriate site for a pilot integrated energy project.

An additional weakness of the IEDP was that it did not have sufficient influence in the political arena so that its findings could be translated into actual improvement on the ground. It had no statutory status, and therefore was unable to compel the institutions represented to conform to any conclusions arrived at by the IEDP. Also, it lacked influence over institutional structures which affect conditions of rural energy use. With a sufficiently powerful institution which has IEP as its priority in place, there would be an impetus that would propel a rural energy planning process. Once the potential benefits from a deliberate process of rural energy planning is assessed, and if these benefits are deemed worth the investment, steps could then be taken on an on-going, iterative basis to investigate methods and procedures towards an integrated energy strategy.

IEDP also ignored in its considerations that the limited institutionalisation at local and district level was a significant constraint in implementing IEP. This omission reflects the general inexperience with democracy in the country. We have become accustomed to *accepting* that representative governments at local level do not exist, and with this in mind the omission is perhaps understandable. However, if IREP is to be at all successful it will be essential that the newly forming decentralised governments are drawn into the planning process as much and as far as possible. Going 'over their heads' will only serve to undermine them as well as the IREP process. In order to achieve this, considerable resources will need to be allocated to provide capacity-building support to the government structures at these decentralised tiers. This is true particularly for rural areas, where capacity is likely to be lower than in urban areas.

A lack of regularity in convening the IEDP ensued. The other commitments of each of the members created significant time delays. The initial meeting was held in October 1992 and the IEDP policy document was finalised only a year later. The final report of the first pilot project was submitted only in August 1994. No evaluation of the project was implemented (besides *this* report – a further year later). It is a reality that time is money, and IEP efforts will inevitably take up people's scarce time. Without formal remuneration for this task it is understandable, then, that none of the participants took the responsibility for the process. The primary problem of the IEDP had less to do with its methodology or its planning than with the institutional context in which it found and placed itself.

It appears that because IEDP was an informal forum rather than an initiative driven from an institutional body with specific interest in IEP, most of these internal constraints arose. If the DMEA had provided stronger political leadership in driving the IEDP, the initiative would likely have lasted longer, achieved more, and still be in existence today. It could have been possible to establish the IEDP as a statutory body within the DMEA. The resultant stability would have enabled greater momentum in implementing several pilot projects efficiently, and full-time staff would enable mistakes to be learnt from and applied to subsequent projects. If the pilot projects were successful, the IEDP could thereafter be upgraded into a more formal agency that would be allocated the task of implementing IEP in accordance with the methodology outlined in section 2.2.3.

An underlying problem faced here was money – or lack thereof. Even though powerful players who boasted significant infrastructure were involved, the additional work that IEDP demanded was not specifically funded, and without funding none of the participants could be held accountable for IEDP's success or failure. There was therefore neither a carrot nor a stick to get things going and keep it going – no-one would be held accountable if the IEDP was not successful, and no-one rewarded if it was. Furthermore, to implement a full IREP process considerable investment would be required to perform the more time-intensive tasks such as participatory database development. It would be difficult to accrue funding simply through argumentation of the theoretical advantages of implementing IEP. Even if the 'theory' is accepted, it would be difficult to ascertain the practical benefits without reasonable amount of statistical evidence; this would require time to compile, and therefore, money. The adage 'seeing is believing' holds true for funders choosing between myriad funding candidates. Definite

benefits need to be shown and this will be possible only through slow and steady implementation.

A final source of failure of the IEDP relates to the ethos of the forum. Although a mission statement was defined – ‘to test methods of integrated energy planning and provision for the cost effective and efficient provision of energy services to the rural poor’ – this remained a somewhat vague goal towards which the group could strive, mainly because the different members interpreted ‘integrated energy planning’ differently. Perhaps this is characteristic of the energy sector, with its diverse objectives in a bewildering pot-pourrie of sub-sectoral institutions. This lack of a clear, focused vision resulted in limited motivation among the participants to proactively seek out means of achieving the IEDP forum’s objectives. Of course, the absence of a carrot or stick to encourage action was a primary reason why it did fail. The hope was that the personal anticipation of each of the members to create an efficient, equitable and sustainable process of planning rural energy provision would serve as an incentive. Evidently such a hope was naïve.

The demise of the IEDP was certainly premature, for the question it set out to answer remains as unclear as before: whether or not an IREP process is possible and worthwhile in South Africa. One hopes that this was not a final demise. The political transformation of 1994 has placed exceptional demands on many institutions that have a role in development in the period leading up to the election as well as subsequently. As this political upheaval settles down, yet before the institutional framework becomes too solid, the IEDP can be resurrected. On the other hand, it would be foolhardy to rely totally on external conditions to dictate if and when such an endeavor should be implemented. Careful thought is needed in planning a strategy in implementing an ‘IEDP II’: when? how? who? where? are aspects of such a strategy that require much thought and foresight.

Attempting a second IEDP in the future would likely be subject to similar obstacles as the first. The solution must necessarily include avoiding the avoidable weaknesses. This would allow a reasonable assessment as to whether or not an IREP process in South Africa is worthwhile and possible. Among other requirements, one institutional body would need to take on a contractual responsibility to drive the initiative, that participants’ time will be adequately funded and that more formal arrangements will be formulated so that continuity is enforced. Slowly, if the processes justifies itself with visible evidence, more funding will be attracted and a formal institutional body may be created which will enjoy sufficient political clout to exert influence in the political arena. In the meantime, however, a forum such as an IEDP will have to succeed with its own efforts and resources.

Umvoti Valley Integrated Energy Project

The Umvoti Valley in Kwazulu/Natal was targeted as the first pilot project of the IEDP, and consultants were commissioned to perform an ‘Integrated Energy Project’ on the area. It was envisaged that other pilot projects would follow on from it, although this has not as yet been achieved. A Project Steering Committee was set up by the IEDP in order to provide closer guidance for the project. After the implementation of the planning study was put out to tender, a consortium of three consultancies was selected to provide a combined planning effort, tackling the energy, socioeconomic, and spatial aspects separately. In the end, an ‘integrated energy plan’ was developed by the consultants, which concluded that all households in the study area should receive electricity. A parallel paraffin initiative was recommended alongside electrification. At present, Eskom is in the process of electrifying the area.

There were problems with the way the Project Steering Committee operated. Firstly, because its members represented a wide number of diverse interests in the energy sector, they were not able to provide a single, clear voice to the Project Implementation Team. The consultants consequently received mixed messages as to what was desired during the various phases of the project (Day, pers. comm.). This is obviously problematic. Additionally, the representation of the Project Implementation Team was relatively superficial, since the Project Steering Committee consisted predominantly of representatives of powerful institutions (these included Glendale Sugar Mill, The Department of Mineral and Energy Affairs, KwaZulu Forestry

Extension, the Development Bank of South Africa, British Petroleum South Africa, the Independent Development Trust, Eskom, and KwaZulu Finance and Investment Corporation). Even the inputs of some of these institutions were superficial, such as the IDT and the BPSA (Golding, pers. comm.).

Besides the structure of the Project Steering Committee, there were also several problems with the strategy of the pilot project. Since the project was of an isolated, unrepresentative community, the recommendations that came out of the planning process were necessarily limited. The reason for this is clear when one places oneself in the position of the energy consultants. They were to investigate what should be done in terms of energy in the area. The fundamental question is obvious: should the residents receive grid electricity? In order to answer the question, the consultants analysed the energy and socioeconomic profiles of the area, investigated whether or not they will be able to afford electricity appliances and tariffs, now and in the future, et cetera. All are appropriate and important considerations, but the answer to the question 'Should the Umvoti Valley residents receive grid electricity?' remained as difficult as ever. The difficulty is the result of the lack of a regional grid electrification scheme in which areas are prioritised, as well as the lack of clear guidelines regarding criteria for selecting new electrification sites.

A primary difficulty in determining whether or not grid electrification was appropriate was the assumption of extensive subsidisation of rural grid electrification in the context of ANC's election promises (in Umvoti Valley the average cost per connection was R 4000 to R 5000, compared to a maximum of R 2000 in urban areas). Because electrification planning criteria had not yet been determined, and Eskom had not yet determined when Umvoti Valley residents might expect electricity, it was difficult to implement an energy plan around these uncertainties. It was to the detriment of the project that no regional prioritisation of sites existed.

For planning to be equitable on a regional level, measures need to be devised that recognise energy needs of all rural communities and all rural groups within them. Energy strategies need to cater for the energy needs of the wealthier communities as well as the poorer, and the wealthier sectors within the communities as well as the poorer ones. For this to be achieved, an integrated planning process is necessary, so that no communities, people, or energy services are neglected. Regional integration is perhaps the most obvious type of integration. Upon investigation of aerial photographs of the area, the Umvoti Valley Project consultants found that households were scattered haphazardly across the countryside. Because there was little change in geographic density of the households, the area which had been 'targeted' for IEP resulted in the consultants being forced to divide households which are to be 'studied' from those which are not. This was unfortunate, but perhaps unavoidable.

The IEDP's initial plan to select a diverse set of pilot sites and to 'perform' IEP on these sites was perhaps misguided. By selecting random sites from disparate regions of the country's rural areas, a regional energy planning process is inhibited. An IEDP II of the future might do well by shifting its focus from a set of pilot 'integrated energy projects' such as the Umvoti Valley Project to an energy planning exercise of a single region. The selected region may exhibit a wide variety of energy, economic and social profiles among the communities' residents, and diverse degrees of institutionalisation of the public and private sectors. Actual integrated energy projects may then be implemented as part of the regional-level exercise. A strategy likely to be profitable would be to link the database development process which would be necessary to perform an analysis of regional energy flows with actual energy projects on the ground. These need not be integrated energy projects, but they should follow from an integrated energy planning process.

With such a strategy, the emphasis would be appropriately placed at the analysis level from the beginning. This would enable the political processes to be more easily exposed to the idea of integrated energy planning, and its potential advantages. Even if no visible benefits are realised, energy agencies and agencies involved in rural development would be more likely to recognise the legitimacy of an IEP process than a strategy that focused on the implementation of specific IEP pilot projects such as that of the Umvoti Valley. Furthermore, the implementation of an

integrated energy planning process of a pilot region would allow the idea of an integrated energy supply to be communicated to specific local communities which would be more open to such an idea. Projects arising from these communities would have far more chances of visible impact than in the case of the Umvoti Valley.

Besides the planning preceding the Umvoti Valley Project, its implementation had various shortcomings as well. The stated intention of the project being people-driven through extensive community consultation was not realised. The Project Implementation Team was noticeably dominated by Eskom and Glendale Sugar Mill. Community representation on this committee was effectively the small business lobby and the tribal authority – inherently representing the wealthier residents of the area. Marginalised sectors of the community, such as the landless, owners of inferior land, the unemployed and house-bound mothers, were not represented on this forum, neither were they actively sought by the research process. Inherently it is difficult to identify representatives of the poorest people, but an endeavour to do so needs to be made. Even if this were not possible at all, this fact should be recognised explicitly; the final report made no mention thereof.

To be fair, much effort was made by the consultants to involve many of the local people. 'Key respondent interviews' were held with individuals who had a general knowledge of the area (including tribal chiefs, nurses, shopkeepers, cane committee members, labour contractors, tractor operators, taxi drivers and businessmen), a random household survey was conducted to investigate the living conditions and illicit the views of a more representative cross-section of the population, and in addition, community workshops were held in various locations throughout the valley (SSMBA *et al* 1994, p6). Other aspects of the process ensured that the project was accessible to the local people. These included: the initial dissemination of an introductory pamphlet announcing and explaining the purpose of the project; interviews and workshops were conducted in Zulu or in English with a bilingual local person present; and at workshops certain people expressed the feeling that they had been marginalised by the electrification lobbying process in the community, indicating that the research process enabled marginalised people to express their views (Vaughn, pers. comm).

However, in many ways these efforts were inadequate. Besides the problems with an unrepresentative Project Implementation Team and a neglect of previously marginalised people of the community, there were additional problems as well. Insufficient time was allocated for this process, for example. This is ironic considering that the time taken to produce the report was longer, mainly because of requests made of the project report by members of the Project Steering Committee. In addition, although a follow-up process of presenting the results of the study to the local residents and receiving feedback from them regarding the project was intended and promised, it has yet to be implemented. Also, because the energy consultants were based far away in Cape Town, they were forced to conduct an intensive two-week period of fieldwork rather than a more careful, in-depth investigation of the dynamics related to energy use in the area.

An important weakness was limited community involvement at the Project Steering Committee level. During meetings, which were obviously more significant than the community workshops, involvement was stunted: the dominant presence of high-powered white urban-based individuals at these meetings created an intimidating atmosphere for the community representatives. This was worsened by the use of English as the medium of communication. Although all the representatives were conversant in English, they were uncomfortable in speaking freely and most of the meetings were concluded without any meaningful contribution from them (Borchers pers. comm.).

Moreover, the project was a once-off investigation. This had two negative consequences: firstly, seasonal and long term trends were not determined. The final document was mainly a snapshot of the system of energy use in the area, since history and future trends of energy conditions could only be inferred. Secondly, sustained communication channels were not established with the local community. Unnecessary effort will now be required to re-establish communication with the community if it is required to ascertain how conditions have changed.

The use of separate consultancies for different aspects was an interesting experiment. Each was a specialist in each field, so spatial and socioeconomic analysis and energy analysis were performed by two different consultancies, and these analyses were collated by a third consultancy. The advantage was that competent investigation in the separate subjects was possible. However, the disadvantage was that integration between the different subjects was unavoidably weakened. Communication and discussion was further strained since the consultancies were located physically apart from one another in Cape Town and Durban. Also, in the final project document, no discussion of this issue was made, even in the section on evaluation of methodology. It appears that, to a certain extent, the consultants felt compelled to 'sell' their product, and weaknesses such as this one were not noted even though the original decision to use separate consultants was not their responsibility. Energy planning projects must be encouraged to be self-critical, for only through honest, critical (although not necessarily negative) appraisal can we learn from mistakes, and improve the implementation of subsequent projects.

An additional weakness in this project was inadequate communication between the consultants and the Project Steering Committee. The steering committee was set up specifically to provide the kind of clear and firm guidance that the IEDP itself could not provide. Despite this, it is apparent that the Steering Committee did not provide clear or firm guidance. During meetings with the consultants, conflicting views were conveyed in terms of technical planning approaches and the degree of academic rigour and community participation. Meetings were infrequent, and consultants were forced to make decisions regarding the planning process without liaison with the committee. At the same time, consultants were not allowed the flexibility to alter geographic boundaries of the study area or time horizons.

Furthermore, the site identified by Eskom was a community with which Eskom had been in contact for several years. The desire for electricity had escalated into a fervent desire, especially since grid electrification was recognised by the local people as a real possibility. The emphasis on grid electricity in the integrated energy plan was inevitable. It is profoundly ironic that the final document of an IEP project, especially that of the first pilot project of the IEDP, initially displayed Eskom's logo on the cover (this was later rectified). This fixation on grid electricity caused most local people to be reluctant even to talk about other energy options. The scattered nature of households suggests that *Stage 1* of APDC's four stage rural electrification strategy* (APDC 1985, p238) would have been very suitable – that is, the provision of financial and technical support for installing autogenerating electricity systems for individual consumers – until denser nodes around which economic activity arises can be identified. In addition, because the project was specifically an energy project, it was not clarified what priority most of the residents placed on energy needs in comparison with their many other needs. In effect, the residents were asked the same rhetorical question that a conventional supply-oriented grid electrification project would have implicitly asked: 'Well, do you want electricity or don't you?' What kind of choice is that?

Therefore, although this was called an IEP project and despite the consultants sincerely trying to implement an IEP process, the success of a genuinely integrated planning process was doomed from the outset. Integration on a regional level was not possible because an isolated site was targeted without regional policy guidelines. Integration between grid electricity and other energy options was limited because of the bias toward electricity. The 'people-driven process' was more lip-service than any meaningful devolution of discussion. It appears highly doubtful

* The subsequent stages of APDC strategy entailed progressively upgrading electrification nodes as the load increases. For consumers in close proximity to each other, *Stage 2* can be appropriate – the installation of a low cost local network supplied by a common decentralised source. When adequate load has developed, *Stage 3* – replacing the decentralised source by the extension of an high tension grid distribution line to that point – can ensue. *Stage 4* entails substituting *Stage 2* off-grid systems with connections to the new grid line, as economic conditions becomes favourable. In South Africa, *Stage 2* systems may not be necessary because of the existing grid in many rural areas. Nevertheless, such a strategy is an important alternative to the short-sighted accelerated grid electrification schemes being implemented at present. The strategy entails a more equitable allocation of resources to meeting energy needs of the community, and it should receive support from the electricity utility since the strategy can normally be implemented to their benefit. However, 'it is hazardous to expect a sensitive area like rural electrification to develop on entirely logical lines' (APDC 1985, p238).

that the crucial requirement of consistent community involvement in decision-making was obeyed. Simplistically, the consultants came in and studied the area, made recommendations, and then were obliged to hand over the project to Eskom. The following question must be asked: what benefit did the residents of the Umvoti Valley gain from this project? It was fairly obvious that Eskom was going to electrify the area anyway.

It is a great irony that because of the delays experienced as a result of the 'integrated energy planning process', neighbouring communities were electrified and reticulated in the meanwhile. In fact, in the last meeting Umvoti Valley residents accused Eskom of lying to them because of these delays (Day, pers. comm.). This issue overshadows all other considerations. Although the community was supposed to be a pioneer in more effective development in the region, they were instead disadvantaged relative to their neighbours. Such a process cannot be justified. It is inevitable that a more democratic, effective and sustainable development planning process will take longer than the conventional immediate installation philosophy, but it is clearly unfair (and detrimental in practice) to identify one area amidst many to follow the longer process. Furthermore, in the case of this project, it is likely that the project had not in fact caused delays in Umvoti Valley receiving electricity, but community members automatically assumed (and reasonably so) that it was because of the project that neighbouring communities had received electricity before them.

Pilot projects are certainly necessary, but they need to be implemented before other communities in the region receive the services (such as electricity services) the pilot projects are considering. Understandably, there are strong political reasons why service provision cannot wait long. Projects need to be selected wisely, to ensure that the communities implicated will be open to participating in the project in a genuine way. Electrification is obviously a crucial factor in the minds of local people; a pilot project that precedes electrification would require an extensive education component so that people recognise that electricity is unlikely to meet all energy needs. A balance needs to be struck between careful planning and the timely implementation of development projects. Communities that are to be affected by pilot projects entailing more careful planning need to be selected with a far-sighted and pragmatic eye. Basically, a detailed national electrification plan would go a long way in enabling additional initiatives.

With these considerations in mind, the value of applying an IEP framework to rural electrification appears limited. The resources could perhaps be better spent by targeting energy initiatives that promise the accrual of benefits which would otherwise not have been provided. At the same time, electrification projects can be integrated with other development initiatives. In each case, the degree of a democratic, community participation-minded approach toward project implementation should be determined in advance and appropriately funded.

Nevertheless, the Umvoti Valley Integrated Energy Project was certainly not a waste of time. It provided us with important insights into the obstacles we face in implementing a truly integrated process. Mistakes need to be made, and fear to make them will prevent progress. But having made them, we need to study what went wrong, what aspects of the process were in error, and how the process could be improved in the future. IREP is a new way of doing things, and one must anticipate inefficient strategies and weak guidance. The Umvoti Integrated Energy Project final report (SSMBA *et al*, p191) agrees, '[T]he use of the energy sector as a lead sector for a development project has not been done before in Southern Africa. It is not surprising, therefore, that the project did not proceed exactly as was envisaged in the project proposal. Being a pilot project, it threw up unexpected challenges...' Such challenges should be welcomed; they elucidate what needs to be done the following time.

A useful consideration is how things may be improved in subsequent projects of this nature. Since the structural design of the project largely defines how it will unfold, this aspect can be aptly considered first. Most noticeably, the Project Steering Committee was unwieldy with its diverse representation. Its task should focus on providing guidance to the Project Implementation Team in terms of methodology, and time and resource constraints; time should not be wasted in theoretical nuances – the National Steering Committee (embodied by the IEDP)

should have already performed this exercise and furnished the Project Steering Committee with clear guidelines as to exactly what is required. It appears that this was not implemented adequately, resulting in the inappropriate situation of the Project Steering Committee analysing the requirements with the Implementation Team. The committees need to be as lean as possible, balancing efficiency with representation of interests. At the outset (albeit with revision if necessary along the way), the National Steering Committee should take considerable time in formulating an effective strategy, defining exactly what is meant by IEP or IREP, and identifying all possible threats, those internal as well as external to the IREP process. Thereafter, unambiguous responsibilities for specific functions should be allocated to the committees that would be formed, and, subsequently, those committees should be held accountable for them.

It is noted that while the Project Implementation Team was accountable to the Project Steering Committee, and the Project Steering Committee was accountable to the IEDP, the IEDP was not accountable to anyone. Because the IEDP forum was established informally and met irregularly, there was no pressure or stimulus to achieve the objectives in the ways originally intended. Without full-time, or at least frequent and regular, attention given to the exercise, the result was a lack of an agency or office that was willing to accept the responsibility that 'the buck stops here.' This weakness caused the limited participation of the Umvoti Valley residents and the stalled communication between the committees. Clearly, an institutional home for IREP is highly desirable.

In addition, the use of three consultancies was not efficient. Communication problems were exacerbated by the consultancies being based in different cities. Although the use of different consultancies allowed energy issues to be tackled by energy specialists and economic issues by economic specialists, the extent to which the two 'dovetailed' (section 2.2.2) was inherently limited. In order for energy planning to be integrated with economic planning, a single consultancy is preferable so that integration is automatic rather than deliberate. It is unclear (but less important, perhaps) whether the chosen consultancy should specialise in economic or energy planning, a decision that would need to be weighed up at the time of tender of each project.

The weakness of the institutional framework of the Umvoti Valley Project will hopefully provide useful lessons from which to draw for future integrated energy projects. An improved methodology would arise naturally out of an improved institutional framework. Planning requirements will be clearer, the intended degree of local community involvement would better match the financial resources available, and tighter delineation of responsibilities would increase efficiency. Another shortcoming of the Umvoti Valley Project was the delay in feedback, which was mainly the result of the national level planners (the IEDP forum and the DMEA) placing too much emphasis on breadth and depth of feedback, when all that is required is a succinct report as soon as possible so that action can be taken. Delays cause interest to wane and excuses to arise.

Hopefully, as the governmental structures in rural areas of South Africa develop, pilot projects will be enhanced by the existence of structured communication channels with local communities. Also, IREP-type projects will find it easier – and more effective – to tag onto the planning processes of various rural development programmes that are being initiated.

3.3 Summary

International experience with IREP is not extensive, although since rural energy interventions that contradict IREP principles have frequently produced disappointing results, IREP methodology necessitates serious consideration. The designers of an initiative to address the rural energy situation of South Africa clearly should be wary of supply-oriented, uncoordinated and short-sighted strategies. This chapter has investigated the experience of five countries whose experiences have useful implications for establishing an IREP process in South Africa. Most of these countries have had advantages and disadvantages to their programmes; consequently, with regard to each country's experience, certain aspects should be emulated while others should be avoided.

The importance of an appropriate institutional framework has been observed in most of the countries, but especially in India and Ghana. Botswana is a good example of the tension between objectives of growth-oriented and end-use-oriented planning. The danger of sacrificing quality for quantity of installations and not integrating interventions with each other and with the broader economic planning process is demonstrated by the disappointing rural energy interventions in India. On the other hand, the general successes in meeting basic energy needs in Argentina despite political instability and institutional problems can be attributed to the strong commitment by the government, the emphasis on demand-oriented planning, and the long-term energy database development process. The experience of Mexico can serve as a warning to South Africa that establishing appropriate energy policies is not enough: policies need to be put into practice, and proactive effort is required to achieve this.

Although a review of the experience of efforts to resolve rural energy problems in other countries provides useful lessons, the South African situation is unique; consequently, an IREP process for South Africa cannot be modelled on any other country. Rural energy conditions have not received significant attention in South Africa, so that gaining good experience in energy planning methodology has not been possible. Nevertheless, the several studies that have looked at rural energy problems and ways of resolving them have improved over the years, steadily increasing their obedience to IREP principles. Studies have focused on various levels of analysis – either local, regional, or national – each recommending different types of solutions, from specific interventions to more general policy and institutional reform. The relevance of each type of recommendation indicates that a rural energy strategy implemented at various government tiers would be appropriate. Also, the concept of Integrated Energy Planning has been interpreted variously by different authors; compare, for example, Gandar (1988), Rivett-Carnac (1990) and NEC (1990). These differences were useful in facilitating a debate as to the most appropriate planning methodology, especially considering IREP is a new idea, but the time is ripe for a more clearly defined and coordinated approach to rural energy planning in South Africa.

This chapter has also shown that there have been several initiatives to instigate a move towards a more effective, integrated process of energy planning, especially in the rural areas. In contrast to the early 1980s and before, when meagre attention was given to energy conditions or the improvement of rural services, there has since been a considerable increase in the amount of attention and resources given to addressing energy conditions and rural conditions: the Region F energy planning initiative, the Integrated Energy Demonstration Programme with its pilot project in the Umvoti Valley, the landmark EPRET project, and the on-going National Domestic Energy Use Database System. There seems to be a growing awareness that the energy sector is a sector in its own right, that the state has an important role to play in its management, and that this will only be achieved if deliberate and concerted efforts are directed towards this objective.

CHAPTER FOUR

IREP in South Africa: the context

4.1 Energy institutions

The history of energy planning in South Africa has been an implicit support of policies directly contradictory with IREP principles. It is debatable whether or not there even has been a *de jure* energy policy in the past. Policy can be inferred by the investments that supported the massive energy programmes of nuclear- and coal-powered electricity generation as well as the production of synthetic oil from coal (Sasol) and the extraction and conversion of natural gas (Mossgas). Faced with the dual threat of economic sanctions and the world oil crises, the South African energy sector was heavily subsidised in support of upholding national energy security at all cost. Because of the context of basic energy services being unavailable to the majority of South Africans, these policies were a rejection of IREP principles. A supply-oriented and technology-focused paradigm without any coordination between sub-sectors was adopted at the expense of end-use driven, people-centred planning. Energy needs of the rural poor took an even further-back seat. Serious shortages in affordable energy supplies remain widespread and worsens continuously, as do the socioeconomic costs being experienced by poor rural communities in the form of negative health effects (e.g. respiratory illnesses as a result of indoor air pollution), negative impacts on education (e.g. suitable lighting and audiovisual equipment not being available) and restriction on entrepreneurial activity (e.g. lack of electricity for irrigation and small-scale production enterprises). There have been negative impacts on the broader economy as well, including costs to the health care system and environmental degradation.

It will be a difficult, slow process to change these conditions. The difficulty of adopting appropriate energy policies and passing suitable legislation to support these policies is only part of the problem. Existing institutional structures and processes tend to have an inertia of their own, impeding the efficiency with which reform can be made and new policy implemented. What is required in essence is a change in the mindset regarding energy issues and regarding rural issues; mindsets are notoriously inflexible.

In comparison with other sectors in the economy, the national mindset of the energy sector is especially problematic: although there are significant inadequacies in the energy system in general and in the extent to which it services rural areas, there is little noticeable pressure calling for change. This applies at all levels, from national right down to village. Also, the nation-wide perception that grid electricity is the cure-all for rural energy needs overpowers the few who perceive a need for a more integrated rural energy strategy. These few are mostly researchers employed outside the public sector. This situation is exacerbated by a weak department addressing energy issues: the Department of Mineral and Energy (DMEA) is allocated a much smaller portion of the budget than most other departments. Also, the bureaucracy within the DMEA which deals with management of the energy sector is miniscule: according to DMEA's 1995/6 budget (DMEA 1995b), of DMEA's total expenditure of R716.4 million, only R20.5 million (2.9%) was allocated to non-nuclear energy matters, of which a mere R5.8 million and R5.6 million (both approximately 0.8%) was allocated to Energy Management and Energy for Development respectively. Being a weak branch of a politically weak department, the Energy for Development division finds it difficult to access resources. This difficulty can potentially be overcome through the establishment of an IREP process, which could induce a design of a more coherent regulatory framework and rational allocation of resources.

Because of past emphases in the energy sector, the DMEA continues to focus on those areas which are capital-intensive such as the large-scale energy initiatives of the Atomic Energy Corporation and Mossgas. The opaque processes of energy policy formulation in the past have benefited the more powerful and influential vested interests in the energy sector, such as Eskom and Sasol. DMEA is highly centralised at national level – the Energy Branch even more so – so that its ability to develop a decentralised planning process on a wide scale is severely constrained. Also, it does

not enjoy the political power needed to influence the sub-sectoral supply agencies. If an IREP process is established within the DMEA, it will need the power to pass legislation that influences organisations like Eskom and Sasol.

In addition, its institutional framework of the various energy supply sub-sectors is fragmented with negligible coordination between sub-sectors. Energy supply institutions were seldom encouraged to communicate with each other, with government agencies in other economic sectors, or with poor energy consumers. Energy planning has been an institutional horse race with each animal competing against each other, tunnel-vision blinkers trained solely on a vague end-goal. At present the blinkers remain, despite the new orientation of government.

Institutional restructuring is a realistic possibility, especially in the current context of significant reform in most sectors of the country. An extensive process of discussions around reform in the energy sector was implemented in 1995 (Eberhard, pers. comm.), with the view of producing a 'White Paper' policy document. A policy discussion document, or 'Green Paper', was first produced, which contained numerous alternative interventions. These alternatives were subsequently presented at various fora in diverse sectors of the energy economy, from presentations to large corporate organisations to workshops in poor rural areas. A democratic orientation was emphasised, in that an endeavour was made to hear all relevant interests. This process peaked with the holding a National Energy Policy Summit, at which the full spectrum of players in the energy sector were represented.

Besides the content of the discussions which came out of this process – which is set to serve as an effective foundation in the imminent production of an Energy White Paper – the process which was followed was also very useful. It exposed the diversity in perceptions towards the energy sector and its panoply of issues. It demonstrated how it is difficult to involve all players in the sector, particularly those who have been marginalised in the past (such as rural people). Not insignificantly, it created a sense of eagerness and motivation among the participants to achieve reform in the energy sector as effectively as possible.

The contexts of each of the energy sub-sectors in South Africa are investigated separately below. These are electricity (grid and off-grid), biomass, and hydrocarbon fuels. The additional rural energy sources of draught animal power and human labour are not considered in this document because it seems that in this country problems in these sub-sectors would be more appropriately addressed as problems in the sectors of agriculture and human resources, respectively, rather than as perceiving them as energy issues.

4.1.1 Grid electricity

The parastatal Eskom embodies the bulk of the grid electricity sub-sector, and supplies 98% of all electricity generated in South Africa (Steyn 1994, p7). Traditionally focused predominantly on the generation and transmission of grid electricity, it has been drawn into the field of electricity distribution in areas where other distributors have not been able to serve. Since these other distributors are mainly urban-based local authorities, Eskom is allocated, by default, the task of electrifying rural areas. Mandated to inherit the activities of the former homeland electricity utilities which served mostly rural communities, Eskom's principal task in distribution is rural electrification. This is problematic, because, in contrast to urban areas, it is not always clear that rural electrification is immediately appropriate for a community of diverse needs and socioeconomic conditions. Nor is it clear what communities and what types of services should be targeted through a rural electrification programme.

There is strong political pressure to increase the amount of electricity connections as efficiently as possible. A large proportion of these connections will occur in rural areas. Although rural electrification programme may not be financially viable, and while there may be energy interventions that are more equitable and cost-effective, the qualitative superiority of energy services that grid electricity provides tends to overpower the equally important considerations of local equity and cost-effectiveness. Moreover, the sight of pylons crisscrossing the landscape is bound to gain much needed political support. The mechanics of the electrification planning process are nevertheless unclear. Since electrification distribution is a slow process, and since there is

insufficient resources at present to connect all domestic households in the country to the grid, the criteria for where, at what level and to whom the grid is extended are important considerations. Various constraints restrict Eskom from adopting demand-oriented planning, particularly an inadequate database of local areas and a human resource base that has been trained from a very technical, supply-oriented perspective.

A large-scale rural electrification programme is unarguably necessary in South Africa to bring people in rural areas into the modernised world which surrounds them, and the provision of electric lighting, television and telecommunications which will be possible with access to electricity. However, electricity is unlikely to be extensively used for services which are energy intensive and which require expensive electric appliances. Also, one can be certain that there are insufficient resources to provide all communities with domestic grid electricity connections (Steyn, pers. comm.), and also that poorer people will not be able to meet most of their energy needs through electricity. Electrification clearly demands a complex set of planning criteria, particularly when connections are being justified on intangible grounds such as stimulating development or improving quality of life. These two objectives are often conflicting, making it difficult to balance the two. It is anyway debatable if electricity connections made on the grounds of stimulating economic growth will achieve this objective, or if electricity connections made on the grounds of equity are in fact equitable investments.

Also, were purely financial criteria being employed, it would perhaps have been reasonable for Eskom to perform its planning without intersectoral communication or external accountability. However, since this is not the case – Eskom is not merely a supplier of a service which is provided if the customer can afford it, but a means of achieving the goals of development. Because it provides one option among many of meeting energy needs, it is logically obliged to produce transparent plans and involve other institutional bodies. One cannot reasonably expect Eskom to volunteer to comply, though, and the institutional framework would need to be restructured to encourage transparency and accountability in the process.

Fortunately, the institutional framework of the electricity sector seems set to experience reform. It appears likely that Eskom is to formally split into two companies: one handling generation and transmission, the other handling all its distribution activities. A national distributor is likely to be established, constituting an amalgamation of Eskom's distribution activities and all electricity utilities of local authorities (Cohen 1995). The state and the local authorities are to be shareholders in this company, and it is to have a strong degree of decentralisation (Davis, pers. comm.). With these envisaged changes, policies between generation and distribution will not conflict with each other, and electrification targets will no longer need to be met mainly in rural areas.

Nevertheless, various anomalies will remain. A primary problem inhibiting the adoption of an integrated approach to the energy sector is the absence of an effective body supervising Eskom's electrification programme. The Electricity Council is allocated this responsibility in theory, but has been largely ineffective in that it has not been proactive in influencing Eskom's activities, and does not have the capacity to undertake any of their own long-term planning (Steyn 1994, p16). The DMEA is responsible for considering the energy sector in general, but is not sufficiently powerful to influence Eskom, which reports to the Department of Public Enterprises. Consequently, no independent evaluation of the rural electrification programme occurs, and the planning process remains hidden, preventing a public review. These are critical obstacles in the potential for meaningful rural energy planning in the country. Perhaps with the imminent institutional reforms this may change, such as the new National Electricity Regulator being required to oversee and influence Eskom's electrification planning policy. What is essential is that accountability of Eskom's electrification process is somehow ensured.

Because at present no such accountability exists, instead of an agency implementing energy planning within which grid electricity is one of several possible supply options, Eskom plans its programmes according to its own criteria. Eskom thus becomes a referee in its own game, deciding which communities and sections of communities to electrify, and what level of service to provide. Strategies are often irrational from an integrated energy point of view, such as inducing higher electricity consumption artificially so that financial returns on investment are improved, in direct contradiction with an end-use oriented perspective. Nor does communication between Eskom and other energy suppliers, or other infrastructural services, occur. The recipient communities are

consulted, but only through community meetings thus rather than taking care to listen to all the various interests of the diverse sectors within each community, including those normally marginalised (in community meetings, for instance). An understanding of the dynamics within and between communities is essential if an electrification process is to be most effective.

Furthermore, Eskom has been able to justify considerable losses in its rural projects because of the ambitious electrification targets – 2.5 million households and all schools and clinics by the year 2000 – promised during the 1994 elections. A loss of R50/month/connection has been quoted as the average (Mocke, pers. comm.); this is an enormous amount if one considers that this R50 would be sufficient to install a basic solar electricity system (lights and television) and pay it off in a mere three years (Morris, pers. comm.). One may wonder why the lucky few who are receiving electricity are being subsidised even further with a monthly discount. Why is that subsidy not being utilised to support those people who are not provided with grid connections? It is unfortunate that simplistic targets rule the 'game': it would be far more appropriate if targets referred to number of connections at which a certain amount of electricity was consumed, or alternatively the number of connections that met certain criteria. Understandably, Eskom would be reluctant to support such requirements, as its attitude is invariably: the more grid connections are made, the more successful Eskom has been, no matter what the cost. 'No wonder the electricity sector has been compared to Bakusara, the demon of Indian mythology', writes Reddy (1994, p3), 'who had an insatiable appetite and however much he was fed, wanted more.'

Eskom currently communicates with local level fora that it has set up specifically to discuss electricity issues. These Eskom fora are based around the former homeland boundaries and often conflict with the new local government boundaries. It is unclear whether or not these local electricity fora will change. As a result of these structures being Eskom- rather than government-driven, Eskom finds itself in the uncomfortable position of being in between the arising local government structures and the communities they serve. Although it would prefer to serve as a technical agent commissioned by government, it finds itself obliged to perform its own communication processes with communities because no government body fulfills this function at present. This makes it difficult to incorporate economic criteria into the planning process, because Eskom is a government representative rather than an independent supplier: for example, Eskom finds it impossible to communicate to communities of a region that certain villages are being given priority because they have the best growth potential (Sterley, pers. comm.).

In addition, at provincial level, Eskom is not included in development planning, but rather is required to communicate via a line department, such as Public Works. This department is inevitably unaware of the complex dynamics involved during rural electrification. As a result of this indirect communication, Eskom is inhibited in placing its electrification programme within a development context, in obedience with the important IREP principle of integrating energy and economic plans. As mentioned in section 3.1.1, Sinha *et al* recommended that this principle is even more important than integrating different energy sub-sectors. Considering the political visibility and emphasis placed on access to electricity in this country, electrification planning should be central to the general development planning of an area rather than a task implemented and funded in isolation.

4.1.2 Off-grid electricity

The fact is often ignored that rural electrification does not necessarily refer to connection to the electricity grid. There are several off-grid alternatives available which may be more viable, particularly in communities where very few electrical services are likely to be used for a long time, and where returns on investment are likely to be exceedingly low or negative. Low income communities, remote rural areas, and areas in which households are very dispersed fall into this category. Solar electricity is a particularly pertinent option for rural South Africa, but other renewable energy technologies and diesel-powered installations also demand consideration. Since not everyone is going to be grid-connected anyway (section 4.1.1), off-grid electricity is a necessary component of a rural electrification strategy. A shift in perception is needed in 'shedding the shackles that equate rural electrification with grid supply' (APDC 1985, p238).

In order for off-grid electricity to be seriously considered as an alternative to connection to the grid, the institutional setup would need to ensure effective coordination between the two sub-sectors. This is not the case at present: Eskom focuses largely on grid electrification, while the Independent Development Trust has been the most significant provider of off-grid electricity connections through its clinic-building programme. Cooperation between the two is small and planning of each operation is implemented in isolation of each other. Results of this lack of cooperation have sometimes been frustrating for the off-grid electrification planners: cases have occurred where off-grid electricity consultants selected villages which Eskom confirmed its grid electrification programme would not be able reach for a number of years, only to find on arrival that an extension of a high powered grid line was already under way (Morris, pers. comm.). Such miscommunication impedes the efficiency and cost-effectiveness of the planning processes of both grid- and off-grid electrification schemes.

Off-grid electrification in South Africa has focused on clinics and schools since these connections promise suitable energy loads, and because they service the majority of community members. Off-grid connections have been predominantly ignored as an option for domestic households and for economically productive activities, even to villages which are unlikely to receive grid electricity connections in the medium term. Arguably, Eskom is ill-placed to fill this gap. Even though its grid electrification programme is suitably aligned to domestic and productive connections, it seems to lack the capacity and the will to cater for those customers to whom it cannot extend the grid. Its centralised structure does not easily support the very decentralised nature of off-grid electrification. This notwithstanding, Eskom's school electrification programme shows promise in balancing grid and off-grid options.

A discussion as to alternative structures of the off-grid electricity supply industry is beyond the scope of this document. It is sufficient to say that, at this point, an institutional body that is responsible for the off-grid electricity sub-sector is lacking. There is a variety of institutions implementing off-grid programmes – IDT with its clinic electrification scheme, Eskom with its school electrification scheme (which uses solar electricity where necessary), and now the newly established Renewable Energy Funding Agency (REFSA) intends to implement solar home electrification projects. This creates problems of coordination and effective planning; in some villages three different off-grid systems have been installed by three different institutions, with no communication between them (Geerds, pers. comm.). One hopes that these programmes will be better coordinated in the future. An appropriate solution would be to create an agency that is responsible specifically for off-grid electrification, but it will need to be well-defined, enjoy good political support and be allocated adequate financial resources. REFSA is a good possibility to take on such a facilitating role, at first looking at solar electricity in the context of a broader perspective of energy and development planning, and then perhaps later expanding to other off-grid options, other renewable energy options, and possibly interventions in other energy sub-sectors as well.

4.1.3 Biomass

Biomass is a broad term that denotes all forms of fuel which have an organic source, such as fuelwood, dung and crop residues (corn stalks and bagasse, for instance). The most common form of biomass in South Africa is fuelwood.* The non-commercial nature of this energy source, with supply often being performed by the consumer herself, makes it difficult for government to intervene in problems – be they attempts at afforestation, reduced consumption, fuel substitution or redistribution from areas of surplus. Nevertheless, biomass is the fuel predominantly used by rural people to meet their energy needs, and many are finding it increasingly difficult to find adequate supplies because of the depletion of trees and other biomass resources. The disappearance of trees from the landscape threatens land fertility which, in turn, stunts food production: biomass depletion thus threatens 'the very life support systems on which rural people depend' (Williams and Dickson 1995, p6). There are also considerable shorter-term problems incurred as a result of the use of this fuel, from social and economic costs of fuel collection to negative health effects such as household air pollution. Interventions made in other energy sub-

* There is often a confusion as to the meaning of biomass-related terms. *Fuelwood* is also called firewood, and comprises tree branches which are suitable for burning. *Woodfuel*, on the other hand, is a term used to describe all forms of fuel derived from trees or shrubs. Besides fuelwood, woodfuel includes twigs and other tree matter which is less suitable for making fires, as well as charcoal.

sectors – such as rural electrification – are unlikely to have far-reaching impacts on these conditions in the short and medium terms. It is therefore vital that interventions are made in this sub-sector.

Experience in biomass-related interventions in this country and elsewhere has usually been disappointing. The error has invariably been the treatment of the problem as solely one of deforestation. Catastrophic prophecies of total denudation of trees created a widespread panic from environmental lobbyists. The orientation on the numbers of trees brought about the perception that became known as the 'fuelwood trap', a term denoting the error of perceiving the required solution as simply the planting of more trees. This simplistic fixation on the number of trees instigated large-scale plantation forestry schemes, many of which have been shown to be 'spectacularly unsuccessful' (Harrison 1987, p174). Harrison notes that, of the 4 million hectares of forest that were being managed in Africa in 1960, less than half of this area remained protected in 1980. Furthermore, the rate of new plantations in Africa has been a little more than one-thirtieth of the rate of deforestation. With such experience, it is widely accepted that the endeavour to halt the depletion of trees through conventional plantation forestry has failed dismally.

Strategies have been mainly the use of supply-enhancing and demand-limiting methods, but these approaches have done little in resolving the problems because they neglect the complexities being faced. For example, interventions have generally rested on the unproven assumption that fuelwood collection is the primary cause of deforestation, while land clearing for agricultural production has often been found to be the main cause (Van Horen 1994, p38). Another example is that interventions have generally ignored demand-side dynamics related to biomass use. These come into play particularly during shortages of supply in the form of people's spontaneous coping mechanisms, such as the improvement of the efficiency of woodfuel use, the planting of trees, and switching to lower quality but more abundant fuels like crop residues or to commercial, more expensive fuels like paraffin. Supply-driven strategies have neglected other IREP principles as well, such as neglecting a participatory methods of planning and implementation. The consequence of this has been the fundamental error of assuming *trees* to be the primary product which people demand whereas in reality more trees may not equate to more fuelwood: in fact, most people perceive fuelwood as a mere by-product from trees which provide other, often commercial, usages like fruit, fodder, fibre, construction material and medicines (ibid, p39).

Besides these distorted perceptions that have impeded the effectiveness of programmes, the data used in modelling supply and demand of biomass resources has been mostly deficient: inaccurate, unreliable, and aggregated to levels that obscure the local differences in surplus and deficit. Biomass surveys have generally stopped short of a physical quantification of resources, and therefore the information from such surveys can be 'at best only indicative, and should not be used for anything more than the broadest of regional planning purposes' (EDRC 1995, p102). Besides the need for more detailed quantification of biomass data, there is also a need for more qualitative information regarding conditions of biomass demand and supply. There is a crucial need 'to look at the different energy services (cooking, water and space-heating) in greater detail. This is particularly important if any form of integrated energy planning is to be carried out in rural areas, as there is a need to know what the energy is being used for, and what possible substitutes for fuelwood could thus be contemplated' (ibid).

An alternative to the supply-oriented, energy-focused biomass strategies is the broader approach of 'social forestry', a term that encompasses a variety of techniques of addressing the problem of depleting biomass resources, including sustainable woodland management, individual farm forestry, and village tree planting (Williams and Dickson 1995, p6). Social forestry differs from commercial forestry in that the latter refers to sizeable plantations dedicated to the production of materials for wood-based industries, whereas the former denotes a broad, holistic approach that necessarily ensures genuine local community participation in the planning, implementation and management of projects. Social forestry insists that intersectoral cooperation is necessary to solve the problem, as trees are found in both formal forestry and natural woodland areas, and are inextricable from a broader strategy of natural resource management which include the management of water resources, soil and wildlife.

Despite the apparent potential for social forestry to contribute to the improvement of access to biomass energy, this will not necessarily be the case. Access to biomass energy relies on many

factors in addition to the status of the resource base. Methods of use, social and economic dynamics within and between households, and the beliefs and customs related to biomass consumption can all play a significant part. Also, social forestry is just one of various possible strategies for addressing the problem: other interventions include redistributing biomass from areas of surplus, encouraging switching to alternative fuels through pricing instruments and regulatory mechanisms, and encouraging more efficient usage of biomass through training and dissemination of improved stoves.

To complicate the issue further, the fuelwood problem and potential solutions in general are 'no longer conceived of in narrow "energy" terms' (EDRC 1995, p1). Social forestry, as one of the potential solutions, should therefore not be regarded as an *energy* strategy. Rather, it is one potential tool of a natural resource management programme, and a contribution to the resolution of energy problems as a result of a social forestry initiative is merely a by-product. The recent South African social forestry programme, the Biomass Initiative, was therefore inappropriately based within the Energy Chief Directorate of the DMEA. Although social forestry requires considerable intersectoral involvement, and this would include significant input from the DMEA, Williams and Dickson (1995, p18) confirm that the DMEA should not take the lead role in a social forestry programme. In fact, it seems inappropriate that the DMEA lead most biomass energy strategies (except those options which would not be considered by any other department, like biogas digestors for example).

A cautious approach thus needs to be adopted for any single proposed solution to the biomass energy question, including social forestry. Effort and resources will be required to improve the knowledge of the supply and demand of biomass resources, which would constitute a component of the IREP process of the development of an energy database (section 2.2.3). Mechanisms are necessary to develop this knowledge: to assess the conditions of the resource base, to ascertain how the resources are used, and investigate contributing socioeconomic and political factors. 'There is clearly a need to develop simpler, cheaper and more easily applicable biomass resource quantification tools that can be used at the local level to assess fuelwood resources as part of a local integrated energy planning process' (EDRC 1995, p102). Whatever mechanisms are used, it needs to be borne in mind that such mechanisms are notoriously difficult to set up. They nevertheless remain necessary if the problems are to be investigated effectively and appropriate solutions are to be identified. This is because knowledge is necessary to support a demand-oriented planning perspective, a perspective that is more important with biomass than with any other energy sub-sector because of the complexities involved at the demand end and the infamous failures of supply-oriented approaches in this sub-sector in the past.

Paradoxically, the principle of people-centred orientation implicitly affirms the above proposal that biomass-related initiatives should not adopt an energy focus, since local people themselves generally do not perceive the depletion of biomass resources for energy services as a priority problem, despite biomass being the dominant source of energy. Besides the explanation that they face a variety of difficulties other than energy shortages, there are also complex socio-economic reasons for this such as problems with land tenure, the inferior social position of women who are usually the fuelwood collectors, and the situation that fuelwood is perceived as a free good and is therefore not worthy of dedication of land and labour to its production (Van Horen 1994, p39).

There are additional complexities associated with addressing the biomass problem. Most apparent is the overlap between political boundaries on the one hand and boundaries defined in terms of the biomass resource base and characteristics of biomass consumption on the other: invariably, they do not coincide. This creates the problem of establishing a suitable institutional mechanism at a decentralised level to address the problem coherently and efficiently. This difficulty is made worse by local political dynamics, such as confusion over land tenure or whether land is owned by traditional authorities, the state, or an individual. Often all three situations exist in a very localised area, creating conflict and distrust.

To complicate the issue further, scepticism has been expressed towards the frequent claims that degradation of the natural resources actually exist. Fairhead and Leach (1995) suggest that Westernised biases are behind the cries of widespread deforestation. The authors reject the conventional view that vegetation 'originally' existed in a pristine natural state with a

corresponding traditional social order, and explain the many failures of afforestation interventions as the result of artificial attempts at recreating this original 'baseline' state and reestablishing a lost social order. They recommend, instead, that priorities are 'to create the enabling policy and economic conditions in which local resource management constellations can act effectively, to support the diverse existing local institutional forms, and to build on the beneficial environmental implications of broader rural development and pricing policies...' (ibid, p1033). Utopian environmental dreams should not be allowed to distort realities on the ground:

'from this perspective, environmental policy can call no moral high ground in recreating the natural (or the social that went with it). It becomes very clearly a question of social or political choice about what vegetation forms are desirable at any given time in social history, and about ensuring that conflicting perspectives on this – such as between local, global and intergenerational interests – are adequately articulated and addressed' (ibid).

At present in South Africa, there is a void of institutional structures to articulate problems with biomass energy or to devise a suitable strategy. Up to now, the only national social forestry initiative has been the Biomass Initiative (also known as 'Plant for Life'), an inter-departmental programme which was created in April 1992 but began operation only in 1993. It was overseen by a Steering Committee which included representatives from the national departments of, inter alia, DMEA, Water Affairs and Forestry (DWAF), Agriculture, and Population Development, as well as the Development Bank of South Africa and the Energy and Development Research Centre (Williams and Dickson 1995, p8). The programme had two foci: improvement of the knowledge of fuelwood demand and supply conditions in rural areas, and the implementation of pilot social forestry projects. The latter was supported by the setting up of nurseries, training of nursery staff and extension workers. Although some important lessons were learnt, such as the common local attitude that energy is only a minor by-product of tree harvesting, in general, the Biomass Initiative did not achieve the majority of its goals, an impression which is evident from the conclusions of Synthesis Report of the initiative (EDRC 1995). The first focus, the biomass resource assessment and fuelwood consumption survey, did not really add to existing knowledge base, serving only 'to confirm much of what was already known' (ibid, p102). The second focus, the pilot project component, was badly coordinated. Without a formal reporting framework, a well-coordinated process of monitoring and evaluation was not implemented and as a result experience was difficult to collate and many aspects of the projects were not even recorded (ibid). Lessons that were extracted from the process were mostly from what should be avoided rather than repeated in a future initiative: these included, inter alia, the conclusions that a pure energy focus will not produce the desired results, and a strategy which focuses on a single, technical solution, such as woodlots or nurseries, will reduce the potential effectiveness of a biomass programme.

The inadequate implementation of the Biomass Initiative's various tasks indicates that it was not managed effectively. It also raises the question of whether it was correctly driven from within the DMEA, although alternatives are problematic as well. The Department of Agriculture (potentially a future Department of Rural Development) may appear ideal. It has inherent linkages and a history of involvement with a variety of sectors which would be relevant to the biomass problem, but the department has shown no interest in social forestry or other biomass-related interventions, so it will be difficult to persuade them to take on the responsibility. The Department of Water Affairs and Forestry (DWAF), on the other hand, has expressed interest in taking on such a responsibility, but whether or not it has the capacity and resources to do so successfully is unclear. There would be great advantages if DWAF were able to initiate a general natural resource management programme, as this would enable trees to be incorporated into an integrated process of managing the entire natural ecosystem of the country (Williams, pers. comm.).

Evidently, a lack of clarity exists as to the most appropriate institutional framework in which problems involving fuelwood consumption can be addressed, or whether or not they even should be. What is certain is that involvement of a number of government agencies, including DMEA and DWAF, will be necessary in a future initiative. It has been mentioned above that in order for remedies for fuelwood problems to be successful, they should focus on the wider problems of poverty in order to address the conditions of the biomass-resource-base. Munslow (quoted in Van Horen 1994, p40) goes further to say that the best way to deal with fuelwood problems may be through finding solutions to other problems which are related to peoples' more pressing needs.

Leach and Mearns (referenced in *ibid*) confirm that the need for indirect approaches to fuelwood problems is a fundamental requirement in their resolution, as is the importance of establishing *local* assessments and interventions instead of large scale aggregated analyses, and the need for a *multi-disciplinary* approach which utilises competent and trusted 'grassroots' agencies.

It would be difficult to implement such a programme, but it worth attempting to do so, for the benefits to local socio-economic conditions as well as to the natural ecosystems could be considerable. To have maximum chance of success, the institutional framework will need to be structured appropriately. In their investigation of what an effective institutional framework for social forestry may entail, Williams and Dickson (1995, p16) delineates four requirements. Although written with regard to social forestry, these criteria apply to an initiative that encompasses fuelwood- and energy-related strategies as well. The requirements are as follows.

- *Horizontal integration.* Extensive cross-sectoral linkages are necessary to facilitate cooperation between agencies in diverse sectors.
- *Vertical integration.* Mechanisms are needed to facilitate effective communication between the various government tiers.
- *Funding channels.* Clear entry points for funds and mechanisms for allocating funds and delivering them to where they are needed.
- *Effective networks.* Because of the general lack of knowledge and experience with regard to social forestry, there is a need for effective communication networks to enable those involved to share their experience with each other.

Another prerequisite for success of any interventions in the biomass sub-sector is genuine and representative participation by local people. The concept of social forestry arose out of the recognition of the need to involve local people because of the local complexities and dynamics present: a social forestry strategy 'must be driven by the needs of the rural society, and it must be planned and implemented by rural people' (Williams and Dickson 1995, p24). If the need for local participation is recognised, consideration of the appropriate institutional arrangements to support such a principle is important. Project planning should be decentralised as far as is practically possible; provincial, district or local government levels would be relevant here. Provincial government may be too removed to provide effective analysis, but would serve an important facilitative role. Local government would be useful in providing disaggregated information because of hands-on familiarity with local conditions, and district government would be a pivotal link between provincial and local levels. However, capacity at these levels will probably be low for some time. Also, in support of local participation, it would be important that community level organisations are made an integral component of projects. Williams and Dickson (*ibid*, p20) suggest that the community-level Local Water Committees proposed by the White Paper on Water Supply and Sanitation Policy could be considerably useful in implementing social forestry projects as they would be suitably sized and would already be involved with natural resource management and linkages between water and trees. Other biomass-related interventions would apply too. In addition, many NGOs, particularly those which have had close ties with communities for some time, could be very valuable in facilitating the implementation of projects.

Evidently, the problems of biomass consumption for energy services are clouded by a myriad social, economic, and political complexities. Any hope of success in resolving biomass problems will require an in-depth investigation into them, always bearing in mind that it is not a uniform problem and local specificities must be exposed through a well-coordinated, decentralised planning process.

4.1.4 Hydrocarbons

The petroleum industry in South Africa is dominated by the large, private-sector oil companies such as Shell and BPSA, and by the parastatal synthetic fuel company, Sasol. These companies are profit-oriented, and given the risks involved in investing in extending their services to remote, poor rural areas, they are reluctant to do so. Because the access to liquid fuels by the poor in this country is not given high priority in the context of the potential availability of electricity, little attention is given in government to considering policies that would provide assistance to oil companies to

improve liquid fuel distribution networks, such as a guarantee on investment or direct financial incentives to oil companies. The national-level DMEA is the only government agency responsible for this sub-sector. While provincial government may be well-placed to influence the hydrocarbon markets, no effort is being made to influence provincial government to do so, plus no provincial department is readily identifiable to take on this role. Furthermore, the distribution networks of this sub-sector are poorly understood and difficult to influence.

Interventions in this sub-sector may entail a combination of regulatory mechanisms and direct government involvement. The former option may entail incentives to instigate private sector suppliers to extend their networks to more remote areas, and the latter option may include the creation of a facility to establish bulk-buying cooperatives for paraffin and communal transport for heavy fuels like LPG.

A further role for government is addressing health and safety issues associated with the hydrocarbon sub-sector. Fire hazards, consumption of paraffin by children, and air pollution from coal use are examples. Education is necessary to assist users in safe habits regarding energy use, and policy interventions such as supporting the production and distribution of low smoke coal have been called for.

4.1.5 Conclusion

Within the context of these anomalies of the South African energy sector, particularly the lack of visibility of the sector as a sector in its own right, it is evident that it will be difficult to implement a large-scale implementation of an IREP process. A slow and steady inquiry into the worth of such a process is called for. The sector will need to realign its own existing resources to exhibit a more integrated, end-use oriented perspective. Only through a far-sighted, well-strategised energy planning initiative will it be possible to develop the evidence needed to access more funds it seems to deserve.

4.2 New orientation

The new democratic orientation of government presents a significant opportunity to redirect resources in order to address the energy interests of the majority of the population. A significant proportion of this population lives and therefore consumes energy in rural areas. In theory, therefore, there is strong political support for improving access to affordable and convenient energy services to rural areas in the most effective way possible. The 'most effective way possible' may entail the implementation of an IREP process.

Certain factors that relate to the energy sector and rural development are fairly well entrenched into the interim constitution, and are unlikely to change by its final enactment in 1996. National government is allocated the responsibility of controlling the energy sector. This creates the problem of addressing energy issues in remote rural areas which inevitably exhibit diverse characteristics for which national government cannot hope to account effectively. Formal and well-designed links with the decentralised government tiers will be necessary in order for the Ministry of Mineral and Energy Affairs to have any noticeable impact in resolving rural energy problems. Local government is allocated the responsibility of distributing and reticulating electricity, although it seems that the task will be to *ensure* that electrification takes place rather than be involved in its physical implementation, considering that existing electricity utilities of local authorities are likely to be amalgamated with Eskom to form a national electricity distributor (section 4.1.1).

The constitution delineates three tiers of government: national, provincial and local. In most cases, local government will be divided into two further tiers, the so-called district and local governments. The latter would consist partly of representation by the various villages in its area and partly by political party representation. Local governments would be coordinated by district government, of which there may be three to eight per province. The detailed powers and functions of local government is still very unclear. What is logical is that the so-called 'Transitional Local Councils' that are to be formed as a result of the recent local government elections will be allocated responsibilities that they are capable and well-placed to perform. Variation in capacity and resources imply that local governments in different areas will be allocated different levels of

responsibility; in rural areas, the level of responsibility can be expected to be low. Decentralised governments that are not yet competent to carry out certain allocated tasks will be implemented by the next highest tier.

In order to bring about the reorientation of government departments in terms of efficiency and end-use driven planning, the Reconstruction and Development Program (RDP) was set up with the mandate to influence line departments. Originally the election manifesto of the ANC, the RDP was formerly institutionalised after the national elections. Housed in the Office of the President, it enjoys significant political weight and considerable resources. However, these resources are not sufficient for the RDP to implement development initiatives on its own, nor would such a strategy be wise. Rather, the RDP sees its role as providing financial incentives to line departments if their operations can be shown to obey RDP principles. Through this formal guidance from the RDP, it is envisaged that by the 1999 elections the line departments will be sufficiently reoriented to RDP principles that the RDP office will be redundant. This is somewhat doubtful, considering that a Government of National Unity is in place until these elections, preventing one party formulating long-term, integrated plans in each economic sector. The inevitable divisiveness of party politics inhibits coherent planning within and between economic sectors.

Nevertheless, there has certainly been widespread support for the RDP. While the RDP appears to be an unofficially transitional arrangement, it is clear that the primary policy thrust of the new government is the RDP. The principal RDP document (ANC 1994), often referred to as the 'RDP Base Document' to distinguish it from the subsequent RDP White Paper (RDP 1994), is worthy of investigation here. Four of the six RDP principles regarding the overall reconstruction and development process of the country have direct relevance to the implementation of IREP. These four principles of the process are outlined here with reference to the implications for the rural energy situation.

- *It needs to be integrated and sustainable*
Intersectoral strategies should be brought together to harness all resources in a 'coherent and purposeful effort that can be sustained into the future' (ANC 1994, p4). This principle will be applicable at all tiers of government, in parastatals and structures of civil society. As the first RDP principle, the support for integrated and sustainable development planning provides theoretical endorsement of IREP in terms of its principles of coordination and cooperation between energy sub-sectors and between energy and other economic sectors.
- *It should be a people-driven process*
The focus on the most immediate needs of people in all areas and communities requires that people are enabled to drive the process of meeting these needs. 'Development is not about the delivery of goods to a passive citizenry. It is about active involvement and growing empowerment' (ibid, p5). This will entail a building of the institutional framework of the country. This endorses the end-use driven principle essential to IREP. Energy demand analysis is essential before the consideration of how interventions should affect energy supplies. The process of participatory database development is thus supported.
- *A key goal must be nation-building*
This principle refers to the effort to bridge the dualistic division in the country between the 'first world' and 'third world' component. Resources must be directed to the development of both. Economic, political and social viability should be emphasised. This provides support for addressing the energy needs of rural people since most of the 'third world' of South Africa is situated in rural areas.
- *It should link reconstruction and development*
This refers to the theory that redistribution (reconstruction) and growth (development) are not contradictory. Reconstruction, including meeting basic needs and providing access to modern and effective infrastructural services, can contribute to opening up 'previously suppressed economic and human potential in urban and rural areas. In turn this will lead to an increased output in all sectors of the economy, and by modernising our infrastructure and human resource development, we will also enhance export capacity' (ibid, p6). The apparent contradiction between reconstruction and development parallels the tension in meeting needs

of energy for production and energy for consumption. Similarly, a balance is necessary since both contribute to economic growth, the former directly while the latter indirectly. Furthermore, energy planning is similar to the planning of economic development in the sense that the latter must consider questions such as where growth occurs, how sustainable it is, how it is distributed, the degree to which it contributes to building long-term productive capacity and human resource development, and what impact it has on the environment (ibid); energy planning has similar considerations regarding energy resources and energy flows.

The RDP Base Document addresses energy issues explicitly in its section on Energy and Electrification. It makes the recommendation that 'future energy policy must concentrate on the provision of energy services to meet the basic needs of poor households, stimulate productive capacity and urgently meet the energy needs associated with community services such as schools, clinics, and water supplies. Energy policies must be developed on the basis of an integration of supply-side and demand-side considerations' (ibid, p32). An IREP process would make a significant contribution in achieving these objectives. However, the somewhat vague nature of the 'provision of energy services' is likely to be neglected in the face of firm and ambitious electrification targets. Nevertheless, the RDP recognises the need to consider energy policies broader than electrification: low-smoke coal programmes, social forestry and other biomass interventions, improvement of gas and paraffin distribution, as well as policies supporting energy efficiency and solar energy options are mentioned. Although the RDP document places emphasis on electrification as the primary option in this sector, it allows space for a broader vision within which an IREP process may find support; the South African Energy Policy Discussion Document (DMEA 1995a, p4) confirms that the RDP Base Document 'goes some way towards establishing an analysis of the problems around the provision of energy services to meet basic needs.'

The RDP's document on Rural Development Strategy recognises that energy use patterns in rural areas are dictated by poverty and neglect (Ministry in the Office of the President 1995, p22). It also recognises that energy does not necessarily stimulate economic growth, but 'a lack of adequate energy services is certainly a constraint on development' (ibid), limiting the potential for meeting basic needs, inhibiting health and educational services, and preventing the development of manufacturing or trading enterprises. The document outlines six potential options to address conditions of energy services in rural areas (ibid):

1. A rural electrification drive, including both grid and off-grid connections, for all types of users: homes, schools, clinics, small and medium-scale farms and small businesses.
2. Policies to secure fuelwood supplies, including social forestry and woodlot programmes, the redistributing of wood from surplus areas, the management of natural woodland harvesting and endeavours to improve efficiency of wood use.
3. Options to improve access to petroleum fuels, including reducing the size of diesel bulk supply containers, granting fuels like paraffin a zero VAT rating, and improving the packaging and distribution networks of paraffin and LPG.
4. The development of rural service centres, which would provide information and advice on energy use, sell energy-related goods like appliances and electricity coupons, and provide repair services to appliances and equipment, among other possibilities. These centres could be linked to agricultural or small business service centres.
5. Miscellaneous policies that would address rural energy issues, such as those dealing with the health and environmental impact of coal use, thermal efficiency of homes, financial assistance for equipment and bulk-buying, and improved dissemination of solar water pumps.
6. Short to medium term subsidisation for certain initiatives are also mentioned, such as for woodlots and electrical connections.

Furthermore, the document recognises the potential of implementing a rural energy planning process, and its recommendations align well with IREP principles, such as involving local villages and decentralised government where possible and integrating energy with other rural development initiatives. The document also notes the need to make decisions around electrification 'in the wider context of developing and maintaining energy sources' (ibid, p23).

While government may recognise the potential benefit from these options, there are practicalities that impede on their actual implementation. Questions of *who* and *how* are difficult to answer: what institution is willing and able to give political impetus to rural energy options, and from where will the funds to implement them come? These questions notwithstanding, there is much support by government to address poor people's energy needs in an integrated and end-use driven way. It is an auspicious accident that the RDP White Paper concludes with the phrase, '...the energy of the nation can be harnessed for the good of all' (RDP 1994, p54). While human energy rather than other energy sources were referred to here, perhaps there was an unconscious, growing awareness of the pervasive importance energy plays in the upliftment of people's lives.

4.3 Evolving institutional framework

The historical biases in South Africa towards urban, industrialised and wealthier sectors of the population has resulted in extreme contrasts between these sectors and poor rural communities. High poverty levels cohabit areas boasting a well-industrialised economy. With the new political orientation of democracy in the country, a process of rural development is under way. However, the extent to which this strategy will entail a genuine effort of rational development planning to relieve the plight of the poorest and the majority of these areas is debatable.

Because of the widespread absence of rural local and district governments, the sectoral policy frameworks still being developed, and the difficulties associated with the merging of former homeland and provincial structures into a new institutional framework, there is a considerable amount of fluidity in government at present. Although a general vision of what is required may be relatively clear, the details of the institutional makeup at all levels is far from clear, especially in the context of the on-going wrestling between the various political actors, both within government and between government and civil society structures.

The national and provincial governments are embarking on strategies that will fill these institutional gaps and minimise the fluidity and consequent instability of the institutional framework as efficiently as possible. The current absence of clear policy in most sectors makes government uncomfortable, so there is a strong impetus for clarifying policies quickly. The relative firmness of imminent policy documents and subsequent legislation serves as an encouragement to the vast variety of players within government and outside it to put their interests and beliefs onto the agenda of policy debates.

Civil society structures are being brought into these debates at all levels, and this is likely to continue for some time. This involvement may include, inter alia, the inclusion of large sectoral interests at national and provincial levels, the inclusion of trade unions, tribal authorities, representatives of the business sector, churches at district level, and the participation of the smaller non-government organisations and community-based organisations such as village development fora at the local level. As decentralised governments become more firmly established, the active involvement of civil society will lessen, serving more as watchdogs rather than being given the ability to influence the processes as they are now.

These are significant constraints but also opportunities for an IREP process in South Africa. The sub-sections that follow consider the trends of the evolving institutional framework, both at the centralised government tiers (national and provincial), and at the decentralised levels (district, local and village), the latter being especially relevant for an IREP process. Of course, some issues span several tiers. In such cases, issues are described under the heading of a suitable tier, and, where relevant, the implication is that they apply to the overlapping tier as well.

4.3.1 Centralised government tiers

National level trends

Since the constitution defines energy as a national responsibility, the national Ministry of Mineral and Energy Affairs, in liaison with and guided by its Parliamentary Portfolio Committee, will be responsible for formulating a new energy policy. This policy is likely to give rural areas more attention than they have had in the past. In addition, the potential establishment of a National Energy Policy Forum (proposed in the RDP Base Document) presents an opportunity for rural

interests to be better represented: it has been proposed that representatives of domestic rural energy consumers, principally women, be included in such a forum (DMEA 1995a, p29). However, there is a need to devolve these energy policy debates to more decentralised government levels for it is unlikely that a national- DMEA will be able to reach decentralised rural areas effectively. Neither is the DMEA likely to be able to influence the planning processes in other sectors. An Economic Advisory Board with energy experts on it would likely be more effective in raising energy concerns than a DMEA-based National Energy Policy Forum (Golding, pers. comm.), although the latter may nevertheless be useful in reforming the internal orientation of the DMEA. Regarding integrated energy planning, broad functions that are oriented towards a national perspective would be appropriately implemented at national level, such as facilitation of the overall process, administration of financial resources, and the collation and management of the energy database. The DMEA would be appropriately placed to implement some of the national tasks, but perhaps not all of them. The remaining energy planning functions, such as demand analysis, balancing, and impact assessment, would need to be implemented from a more decentralised level.

The national institutional landscape constrains the extent to which rural problems can be raised in the political arena. Most noticeably, there are invariably no rural distinctions in the various structures. This causes rural interests to be marginalised, because agencies that are relevant for the development of rural areas tend to have an urban focus. In addition, the absence of a collective rural voice means that rural interests remains mostly unheard besides the ad-hoc evaluation process by the media, non-government agencies and the research community.

The institutional framework also restricts an integrated approach to development planning. The line department orientation of government structures, at both national and provincial levels, create a focus around separate economic sectors and specific interests. There is no national ministry or agency mandated specifically with the responsibility of planning the development of poor or rural areas as a whole. The focus on sectoral line departments, especially at provincial level, serves as an implicit endorsement of supply-oriented planning in each sector. Rather than intersectoral cooperation being built into the framework, proactive effort is necessary to implement initiatives that are of an inter-departmental nature – such as energy.

Government nevertheless recognises that there is a great need for rural development to be integrated intersectorally, and that rural development is likely to continue to be marginalised if it is not addressed explicitly. A unit called the Rural Development Task Team (RDTT) has been set up within the national RDP office in order to facilitate intersectoral cooperation and produce a strategy to deliver services as efficiently as possible. The RDTT is responsible for monitoring rural development. It is also responsible for ensuring that different departments who are engaged in rural development activities cooperate and learn from each other, where appropriate. It consists of a multi-disciplinary team from a wide variety of agencies involved in rural areas, both within government and civil society. These include various national departments such as Agriculture, Land Affairs, Health, Education, Labour, Water Affairs, Housing and Mineral and Energy Affairs, as well as the Post Office, Police, and the South African National Defence Force. Civil society are represented through NGOs such as the National Land Committee (NLC), the National Rural Development Forum, and the Land and Agricultural Policy Centre (LAPC). The Development Bank of South Africa and Eskom are also represented.

The RDTT meets monthly, reporting on progress of rural development programmes and projects. The unit has been effective in establishing an inter-departmental network of agencies active in the delivery of services in rural areas, and has instigated the formation of joint programmes – for example, the electrification of schools and clinics which is a cooperation between Eskom, Department of Health and Department of Education, and the land reform programme in which the Department of Agriculture works closely with the Department of Land Affairs (Ngobese, pers. comm.). The RDTT has thus been effective in facilitating the weakening of previously impenetrable line department walls, in the context of rural programmes which more often than not demand inter-departmental cooperation. It should be noted that its existence is not long-term, although the functions it performs will likely continue in a different institutional setting. Its role is already being taken over by the Development Chamber of the National Economic Development and Labour Commission (Golding, pers. comm.).

The efforts of the RDTT notwithstanding, national government departments are too centralised to make a visible impact on rural development besides encouraging intersectoral cooperation, assisting the more decentralised government in their programmes, and giving guidance and supervision to them. Such encouragement may take the form of policy, financial incentives, or regular attendance at provincial fora oriented to rural development. An example is the national level Department of Water Affairs and Forestry setting up 'Interim Management Teams' at provincial level – an initiative to facilitate the smooth integration of structures from the previous dispensation into a new national department and to manage water supply and sanitation services in the various regions of the country (DWA 1995). Although it would be preferable that a decentralised government tier takes on the responsibility of driving the rural development process, generally it will need to be driven by provincial government for some time, since the district and local governments are likely to lack sufficient capacity to take complete ownership of such a task. Provincial level would therefore be important government tier at which to launch a component of an integrated rural energy initiative.

A variety of specific high-profile projects and programmes – the so-called Presidential Lead Projects – in each major economic sector have been initiated. These initiatives aim at gaining experience in how things should be done differently. Local participation, a decentralised focus, intersectoral cooperation, combining implementation with capacity building, and environmentally sustainable planning will be key themes – evidently well-aligned with IREP principles and therefore valuable opportunities for IREP to gain a foothold. From both successes and failures of these projects lessons will be drawn for future programmes in each respective sector. These projects present a useful opportunity for rural energy programmes to link into rural development programmes in other sectors, for it is apparent that an energy strategy will only be effective if interventions are directed at communities *indirectly* (in accordance with the recommendations to this effect in sections 2.3 and 4.1.3) – that is, via projects in other sectors.

The Presidential Lead Projects which have particular relevance to rural energy planning are the small-scale farmer development programme (whose aim is 'to respond to demands of land-based communities for small-scale agricultural production training and support'), the extension of municipal services (whose aim is 'to ensure a rapid and visible improvement in the provision of municipal service, facilitate the democratisation of local government, and lay the basis for the sustained payment of rent and services by local communities') and lead projects of land reform (whose aim is 'to develop and support integrated sustainable rural development and rural government models') (RDP 1994, p55-60). Land reform is especially pertinent in this regard: the intention is to adopt a multi-level, multi-disciplinary approach to the planning process – bringing together local, district, provincial and national inputs, as well as various public institutions, non-government institutions, professional services, and beneficiaries (Department of Land Affairs 1994, Annexure p1). The emphasis that this programme places on integration and local participation, as well as the district-level focus of pilot projects, suggests that it is perhaps the most important opportunity at present for IREP to demonstrate its potential worth.

Since the inception of the RDP, most line departments have begun to realign themselves to RDP principles in order to benefit from RDP funds. A plethora of development projects and programmes are under way across the country, although almost all are still in their initial planning phases. All relevant sectors have initiated RDP-oriented projects, from agriculture and land affairs to education and health. A white paper from each sector has been or is in the process of being published. These white papers set out the strategy by which the respective sector can be realigned toward meeting the needs of the underprivileged, by which efficiency and sustainability can be improved, and the strategies by which resources will be accessed to achieve this. Depending on the complexity, the extent of conflicting interests, and the existence of a sufficiently proactive and powerful institution driving the sector, the publication of a white paper has had varying speeds of publication. It is of relevance that the process towards the publication of an Energy White Paper has been one of the slowest, and implications are clear: the energy sector is complex, it has extensive conflicting interests associated with it, and people driving the process have vested interests in the status quo.

Besides broad policy considerations of the white papers, all national line departments and provincial governments are required to prepare detailed five-year strategies to reorientate their programmes so that they are consistent with the RDP and improve their efficiency with which they use available resources (RDP 1994, p19). Of particular interest to an energy planning process is the use by the RDP of 'Key Performance Indicators' – criteria which will be used to decide whether or not to sanction a project proposal. Key Performance Indicators, defined per ministry, will allow uniform performance appraisal across a spectrum of projects (ibid, p20). Indicators continue to be discussed and updated. This provides the opportunity for energy planning to be incorporated into a variety of rural development projects which would otherwise ignore the energy dimension. Construction of thermal efficient housing and combining tree-planting as part of a small-scale agricultural development programme are examples. The impact of these Key Performance Indicators could be far-reaching: Hurst and Barnett (1990, p18) suggest a possibility that standard energy-related investments are added to all rural development activities. 'The onus of proof would then be transferred to those proposing projects to show why such investments should not be included rather than proof that they should.' If there is an awareness of the danger of a supply-orientation of such a mechanism, it could constructively raise the visibility of the energy dimension. Key Performance Indicators seem set to form a principal component of the 'terms of reference' of development programmes, and are thereby an automatic target to influence their operations; indeed, 'apart from creating a general sense of awareness about energy, the administrator's most powerful instrument is the design of terms of reference' (ibid, p17).

An important trend at national level is the endeavour of government to establish sufficient knowledge of rural areas to implement an informed development strategy, an issue directly relevant to integrated energy planning considering the significance IEP places on database development. There is a stark lack of information about rural areas known to government planners, and this is a pivotal obstacle in implementing an effective rural development process. Without information, planning is impossible; and without planning, a process of rural development is doomed. All types of information is needed: quantitative demographic and economic data, as well as more textured information regarding social dynamics and cultural perceptions. At the same time, however, government is faced with considerable pressure to sacrifice the process of information collection and use resources instead to upgrade infrastructure and services quicker. Political impatience is a powerful force impinging on the scope for a rational, integrated, and demand-driven process of development planning – and therefore on a process of IREP as well – to be implemented. In theory, the government's 'Rural Development Strategy' agrees: 'good information is the basis of good planning' (Ministry in the Office of the President 1995, p39). Without good information, planning development is fumbling in the dark. The extent to which this problem impedes on the tasks of government departments to implement any rational planning seems sufficient to instigate a move to correct it. The government has launched a 'National Information Project' which embodies its intentions to standardise information collection, to clarify what information should be collected regularly, and to determine information collection mechanisms that will minimise costs and maximise outputs.

Obviously, the lack of data extends to the energy sector as well, with both a lack of quantitative information (such as type and amount of fuels used, what services they provide, level of consumption, efficiency of use, and so on), and a qualitative picture of energy use (such as fuel-switching, cultural dynamics and factors implying latent demand). Because of a general lack of awareness of the significance of the energy dimension in rural development, the collection of rural energy data is neglected in processes of developing rural databases. Neither is government aware of the complexity of rural energy, and so, where rural energy data collection does take place, the information is usually of a low quality. Awareness building will be needed so that the crucial role energy plays in people's lives is recognised, and the need for the collection of rural energy data is suitably supported.

To the advantage of the energy sector however, one of the primary rural databases of the government is the Eskom/NELF database. This is currently being expanded with additional demographic data and data from other sectors such as housing, land and telecommunications. This database 'will form a database on infrastructure to which all government agencies will be linked' (Ministry in the Office of the President, p39). The core focus of the database on energy conditions provides an excellent opportunity for IREP-oriented database development to gain a foothold

within an integrated framework of overall rural data collection. Also, this database could perhaps be linked with the energy database which is to be located within the DMEA (section 3.2.2). The Central Statistical Service could potentially coordinate the management of the database systems of the various sectors, and implement data collection on a regular, on-going basis.

An aspect of the government's strategy toward management of rural information systems is the establishment of early warning systems in order to monitor the vulnerability of the poor (Ministry in the Office of the President, p40). Poor people are especially vulnerable to risks such as natural disasters, market fluctuations and unemployment, civil strife as well as general risk to their physical health. Besides the normal indicators describing progress of rural development (such as a reduction in epidemics, rates of adult literacy, provision of low-income housing and levels of employment), indicators like child nutritional status will help identify areas which are not responding to development initiatives – for an indicator of children's growth not only measures the child's well-being but also that of the community and region in which the children live (ibid). It may be possible to include an energy vulnerability index in the early warning systems, but this may be difficult to measure. Alternatively, communities which are deemed particularly vulnerable (say, according to the child nutrition index) could be provided with supplementary energy support as part of their welfare package.

In addition, as mentioned in section 2.3.2, database development in rural areas requires that a two-way flow of information occurs: that is, a process of participatory database development is necessary. At present, however, there is little efforts employing more participatory and qualitative data collection techniques. Conventional surveys in conjunction with ad-hoc feedback from rural people are likely to be the norm for a while; the use of participatory techniques is likely to be employed experimentally until trust in the techniques is established. Furthermore, rural people require information regarding government plans just as much as government requires information regarding conditions, habits and perceptions of rural people. Unfortunately, government has often been unwilling to practice such an open-door policy, especially those departments which have inherited the tradition of secrecy from the previous political dispensation. In other cases, government agencies have been willing to draw various civil structures into government debates. Certainly, there is much room for hope that government and rural people will know a lot more about each other in the future.

Provincial level trends

It seems that provincial level is the most appropriate level to implement integrated development planning for now, because of the combination of its moderately good access to local areas and its fairly high level of capacity and expertise. National government is too removed, while local government will be too lacking in skills and financial resources for some time. Of course, provincial level planning would not be instead of the development of intersectoral development structures at local and community levels. Community-driven development is indisputably the ideal, but the reality is that it will take decades before capacity is built up sufficiently before such a system is feasible. An interim strategy necessarily implicates the extensive involvement of provincial government in facilitating intersectoral development.

Integrated development planning at provincial level is a realistic possibility according to Williams and Dickson (1995, p19). Even though individual line departments will be autonomous, the RDP White Paper attests to the desirability of establishing 'overall integrating mechanisms' at provincial level (RDP 1994, p21). In addition, since there is much diversity and variation between provinces (compare Western Cape with Northern Cape, for example) each province is likely to tackle rural development in a different way. At the same time, the national-level Department of Agriculture has the potential of being transformed into a Department of Rural Development (Williams and Dickson 1995, p22), in which case it would constitute a crucial link in the rural energy planning chain.

Provincial government will be in the best position to receive messages both from 'above' and 'below'. Messages provincial government receives from 'above', namely national government, include quota for low-cost housing, terms of reference for land reform projects and minimum supply of water to domestic users. National government has control over the purse strings, and can therefore provide financial incentives and disincentives in order to make its messages heard at

provincial and more decentralised levels. Messages from 'below' would predominantly mean the indirect expression of needs from the public, via local and district governments or any interim structures. Theoretically at least, the needs of the local majorities will be represented. For minorities to be able to express their interests, they will be able to organise themselves regionally so that they can influence government at a higher level. The democratic orientation, and the threat of discontinued support for government, provides the incentive to listen to these messages from 'below'. According to this information, provincial government will be able to prioritise the allocation of development resources as efficiently and effectively as possible. Criteria would exist in determining the level of service and the sequence of communities that will receive various services, balancing demand-oriented and supply-oriented perspectives. Who needs what most, and what can be most easily provided to whom, are important questions for government to consider. Because of the absence of services in most rural areas of the country, attempts will be made to spread the services around as effectively as possible. In addition to messages from above and below, provincial government departments are of course influenced by the messages from the 'side': the Office of the Premier, in particular the Provincial RDP Commission housed in this office, influences line departments through financial incentives and communication at regular inter-departmental meetings. Line departments are required to realign themselves to RDP principles if they wish to enjoy RDP funds.

Provincial government will find it difficult to juggle the mass of often conflicting messages it receives. The scope for implementing an analytical process of integrated rural development planning (IRDP) in addition to its current tasks is limited at present. Even with the less ambitious integrated approach of 'critical-path analysis' which emphasises intersectoral coordination than complete intersectoral planning (section 2.3.1), an extensive process of training and institutional reform will be necessary. While the benefits in resource optimisation would be great, much capacity building will be necessary. The negligible impact the provincial-level RDITs have made since their inception last year is evidence of this. Until sufficient capacity is built, a relatively ad hoc, reactive planning process is likely to be followed. Such a process will neglect the benefits of a more proactive, analytical development planning process.

Besides the external messages from 'above', 'below' and the 'side', government also face many often-conflicting guidelines of development planning itself. Requirements of intersectoral integration, environmental sustainability, economic efficiency as well as the need to provide optimum levels of local participation need to be weighed up against each other. Support for these criteria may be mere lip-service considering that government resources at all levels and sectors are stretched. Simply getting a job done requires considerable effort at these initial stages when processes are still solidifying and clarification is still required as to who is responsible for what. Other obstacles exist too. Human resources in provincial government are likely to be cut back considerably in the future because of their drain on the economy (Golding, pers. comm.). Provincial governments often also have their own agendas that can conflict with that of national government. Local support for the development process may be low, and even if it is not there will inevitably be groups of people who object to any government action made. Also, project administrators and consultants are often discouraged from reviewing their projects honestly and openly, because project failures reflect negatively on those involved. All these problems are the result of a lack of experience in government in dealing with poor communities since only a sparse amount of development-oriented projects were implemented in the former dispensation. The planning processes of most sectors need to be fashioned anew.

In addition to the development processes, there is a high level of institutional fluctuation in provincial government level just as in national government at present. The tasks of amalgamating former homeland government departments and old provincial departments, creating various new departments because of the increased number of provinces, and creating and developing lower government tiers have been of Herculean proportion. Institutional growing pains exist in every sector, from interpersonal tensions and political conflicts to administrative difficulties and financial anomalies. Understandably there is much resistance to change, as change always creates friction. Conflicts are sometimes public: the issue regarding payment of tribal authorities by national government, thereby undermining the power of the controversial Natal/Kwazulu provincial government, and the resistance to the national land reform programme by large scale farmers are two recent examples. Conflict also occurs 'behind-the-scenes': differences between civil servants

within single agencies as well as differences between different agencies is common when institutions are restructured and processes recast. For example, at present ideological, cultural or simply personal conflicts are fairly common between staff from the old provincial administrations and their new colleagues from the former homeland government departments that have since been subsumed into equivalent provincial departments. These differences tend to inhibit efficiency as a result of a stunted communication between staff, and to limit the extent to which intersectoral coordination can occur because of non-cooperation between organisations. Some programme managers have found it necessary to employ outsiders to set new priorities and new systems for them; the danger here is that reforms may not last when the outsider leaves (Ministry in the Office of the President 1995, p11).

These obstacles notwithstanding, it is RDP policy to achieve improvements in the way services are delivered and restructure the institutional contexts from which they are delivered in addition to simply delivering them. As the RDP White Paper states, 'the management of institutional change and the delivery of municipal services must occur simultaneously... Improved services must be implemented in a manner which enhances appropriate institutional change within local authorities' (RDP 1994, p22). Despite the aforementioned obstacles, there is definitely a climate of excitement and motivation in the provincial governments, and this provides a strong impetus to reform the process of development planning and the institutional framework in which it occurs. This mood is not confined to the staff of the new RDP Offices. After years of stagnation, a sense of revitalisation seems to have been stimulated even within the old line departments (Captain, pers. comm.). There seems to be a willingness to tolerate and overcome interpersonal and inter-departmental conflicts amidst the overall renewal of direction and purpose. Progress is being made on all fronts, but far-sighted, firm guidance from national levels is needed constantly to bring about democratic and effective government. While such a situation may appear imminent, the patience of the public will surely be tested in the context of the many institutional and political obstacles that lie in the path of democratic transformation and widespread infrastructural development. Development planning is a new game in South Africa; it will take time for the rules to be learnt and obeyed.

Energy is no exception: there is a dearth of capacity and awareness particularly in the country's provincial administrative structures of the energy sector, where no institutional body is allocated the responsibility of considering energy conditions, and proponents calling for energy to be recognised as an important aspect of rural development planning are extraordinarily scarce. Where such individuals do exist they are unable to influence the larger momentum of the structures in which they are involved. There are, nevertheless, possible options to address this problem. The Energy Policy Discussion Document (DMEA 1995a, p33) suggests some options. Certain energy planning functions could be relegated to provincial government, thus ensuring regional development planning includes an energy component. A more far-reaching suggestion made is to establish provincial energy planning committees, which would certainly improve the capacity of an integrated energy planning process for rural areas considerably (although there is the danger of duplicating efforts of national bodies). Other possibilities include establishing inter-departmental energy fora at provincial level, or creating energy units within provincial and national agencies oriented toward rural development, such as within the departments of Agriculture, Water Affairs and Forestry, and Eskom. It is imperative that the alternative energy planning tasks which provincial government could implement be investigated in depth and debated by all concerned, so that the most effective institutional framework is established. In time, tasks can be relegated to more decentralised government tiers, but for the moment and for the foreseeable future, provincial government will be the crucial link in the development planning chain, and an energy planning process must necessarily conform to this reality.

4.3.2 Decentralised government tiers

Rural local government has been developed as a two-tier system, consisting of 'local' and 'district' level tiers. Authorities at the local level take the form of a Local Council but also elected sectoral boards (such as for water or health) which may or may not be subsumed into the Local Councils over time. At the wider level, District Councils will be formed with members who will be directly elected, as well as counsellors indirectly elected representatives from each local council. Where relevant, District Councils will subsume the old Regional Service Councils and Joint Service Boards (Ministry in the Office of the President 1995, p12). Traditional authorities will be granted *ex-officio*

representation on government structures, and will provide the roles of unifying communities and advising counsellors of traditional values and customs.

Because of the importance of devolution of control to bring about effective rural development, rural local government has a vital role to play. 'Local authorities are key institutions for delivering basic services, extending local control, managing local economic development, and redistributing public resources' (RDP 1994, p22). President Mandela (quoted in Nthai 1995) confirmed the importance of this link in the institution chain: 'You do not build schools, clinics houses from the Union Buildings in Pretoria. You do not provide water, electricity, sewerage and refuse removal from the buildings of Parliament. These things must happen where people live out their daily lives.' Local government will be responsible for ensuring the provision of basic services, such as water supply, local roads, refuse and sewerage removal, primary health services, emergency services, transport, cemeteries and recreation facilities (Ministry in the Office of the President 1995, p13).

It needs to be noted that because of the scattered nature of rural settlements, not all communities will be represented by a local government. So-called 'unorganised' local people will be accounted for through the employment of Community Development Facilitators, a responsibility of the District Councils until the lower tier is organised and active. Besides assisting 'unorganised people' in establishing development fora, Community Development Facilitators will also be responsible for working with communities to identify and prioritise their needs, serving as an invaluable communication link between local people and local government. Fieldworkers are particularly important in ensuring the needs of communities who are very remote or marginalised. The IDT has established an extensive amount of experienced and generally competent fieldworkers in most of the former homeland areas. However, since fieldworkers are responsible for a very wide area and a large number of communities, their time is considerably stretched and they are only able to visit each community infrequently (Mosandiwa, pers. comm.). Additional fieldworkers will certainly be necessary to enable assistance to reach the myriad of widely distributed rural communities.

Human resource capacity

Limited human resource capacity is perhaps the most obvious obstacle to effective development planning in rural areas – and thus to an IREP process as well, which is why this issue is considered in greater depth than others. Decentralised communities tend to lack people who are competent at basic planning skills, such as financial management and organisational administration. Capacity building through training and on-hand assistance is a very slow process – not likely to produce the results in the time frame which the political context may demand. Nevertheless, by implementing the tasks without transferring the associated skills to the local people who are likely to be required to implement them in the future is a short-sighted, 'quick-fix' type of strategy. Spoon-feeding poor communities will keep them that way. The Japanese proverb is apt: 'Give a man a fish and you feed him for a day. Teach a man to fish, and you feed him for a lifetime.' A strategy of compromise will be necessary in order to balance the need to deliver services efficiently with the need to engender a self-help attitude.

Limited local capacity is very noticeable with regard to energy issues. There are a myriad electricity committees throughout poor rural areas, but often these committees do not consider the broader energy needs of their communities. Often the focus is on the benefits that electrification will bring: all energy needs will be met, jobs will be created, quality of life will receive a quantum leap and people will finally be able to live a comfortable life. The costs of electricity tariffs and electric appliances are sometimes forgotten. Capacity building initiatives will be necessary to expand electricity committees into broader energy committees. The limitations of electricity must be publicised, explaining to people the rationale behind an integrated energy approach. Furthermore, local people should be made aware of implications of their depleting biomass resources, the existence of pricing regulations, as well as issues surrounding energy safety and energy efficiency. In addition to community level electricity committees, Eskom has in the past established electrification fora at approximately district level. Expanding these into energy fora is an interesting opportunity for IREP to gain a foothold.

Projects supporting capacity building would inevitably take more time and effort than those that do not. The extent to which capacity building is supported will therefore need to be balanced against the constraints of limited resources and political pressures of urgency in showing results.

Mechanisms that build local capacity but do not tax government resources for planning unreasonably will be sought; relegating project responsibilities to local development fora is an example, as is linking private sector development funds to capacity building aspects of government projects. A notable example of capacity building in the energy sector is Eskom's training programme during electrification of new areas. Local people are trained and become accredited as electrical contractors for subsequent reticulation and house wiring in the area (Ministry in the Office of the President 1994, p38).

When sufficient capacity is established, local government will definitely play a pivotal role in an integrated rural development planning process. They will provide an unprecedented opportunity in this country to communicate with rural people, both listening to what their needs and priorities are, and in providing them with information regarding government plans and what is required of them. The decentralisation of the planning process will allow development initiatives to be identified for rural areas without interference at this point by more powerful vested interests. (If resistance is experienced at a more centralised level, the existence of a decentralised development plan will at least make such resistance visible, instead of initiatives being rejected before they are publicly considered.) Furthermore, local government is the only government tier with 'integrative functions across sectoral concerns of different provincial and national departments' (Ministry in the Office of the President 1995, p12). The absence of well-defined line departments at local government level makes it a crucial opportunity for integrated development planning to be initiated.

It is, however, difficult to assess exactly how future local government structures will impact on the potential for IREP tasks to be performed at this level. Electricity distribution is an important factor: if this task is allocated to local government, IREP would benefit in that a decentralised tier would be directly involved in at least one energy sub-sector and attempts could be made to enhance the methodology to a more IREP-oriented perspective. On the other hand, if electricity distribution was not implemented by local government, an opportunity would exist for energy services to be considered by local government from a more holistic perspective at the outset. Complications with devolution of this responsibility involve the dilemma that while electricity distribution would be a primary source of revenue for local government, accountability in the electrification process would be diminished. Indeed, in general it is difficult to envisage how local and district government tiers will operate years from now, although it is possible that they will become a highly functional and competent system of decentralised government. If sufficient capacity is established, a remaining constraint could be the reluctance of provincial government to relinquish powers and functions to district and local levels. Institutional structures are never cast in stone, though, and a South African version of the fully decentralised Swiss canton system is not impossible.

It is the policy of the new government to incorporate capacity building into all development initiatives. RDP emphasises the need to develop the country's human resources by providing training to as many people as frequently as possible (ANC 1994, p8). Nowhere else is training more critically needed than in developing decentralised governmental capacity to perform administrative and planning tasks. Government policy is to draw beneficiary communities into the planning, implementation and evaluation phases of development projects wherever possible.

In addition, the variety of networks that have been developed at local levels also serve a capacity building role. The networks link up communities that are otherwise isolated from each other, thus allowing rural people to learn from each other's successes and failures. For example, the IDT's CBO Network is an important association between village-based organisations across the country. The network has been surprisingly successful considering the lack of telecommunication services in rural areas; through postage and word of mouth, district meetings enjoy extraordinary turnouts, with attendants even from very remote villages. The CBO Network has been formally constituted, with committees existing at each of the nine provinces and at national level. In addition, the national committee has linked with the NGO Coalition and the National Economic Development and Labour Commission to elect eight trustees (along with eight other trustees from the IDT and Kagiso Trust and a government nominee) on the Transitional National Development Trust, an initiative which has recently been allocated R125 million start-up funding to provide financial assistance and professional support to CBOs and NGOs in the country, on condition they have discernable RDP-aligned development objectives and sound financial management capacity, and if they are deemed worthy beneficiaries of financial support (TNDT 1996, p1).

Line departments have also established local networks that deal specifically with their respective sectoral concerns. The Department of Agriculture's Broadening Access To Agriculture Thrust, or the BATAT programme, is an example, linking small-scale farmers and promoting small-scale agriculture. The impetus coming predominantly from provincial level, BATAT involves, inter alia, facilitating the development of farmer associations amongst previously disadvantaged farmers, improving local technical expertise around land management and agricultural practices, developing a Farmer Support Scheme to support productive activities of farmers, developing a Farmer Training Programme of short, flexible courses, and developing a set of resources from which farmers will be able to draw information about available services and agricultural practices (Ministry in the Office of the President 1995, p18). The comprehensiveness of this programme presents a good opportunity for a people-driven component of an energy planning process, as agriculture encompasses most of production-oriented energy needs in rural areas. Also, since an emphasis of this programme is on increasing employment, local skills and providing products for the immediate local market and for the local agro-industry, the concept of energy planning may gain support by BATAT projects because both require an end-use orientation. Furthermore, the RDP sees BATAT as 'a coherent part of an integrated strategy for local economic development' (ibid), so that, at least in theory, it lends itself well to incorporating an integrated energy planning component into its general planning approach toward agricultural projects.

Of course, people-driven development should not wait until decentralised government structures are in place. Unstructured planning processes, whereby communities are mobilised and empowered to take more control of service delivery, are important measures in the development process, as they develop administrative skills and an understanding of the development planning process, and they stimulate motivation among communities to take control of their own development. However, they are only of temporary value, as structured development planning is essential in creating a sustainable mechanism of service and infrastructure delivery. Should government adopt a passive role, merely waiting for local communities to mobilise themselves without a government agency driving the process, nothing will happen on a wide scale. Although spontaneous initiatives from communities should be encouraged, government will need to take a proactive role in mobilisation of communities.

It will be some time before decentralised government tiers are able to incorporate appropriate degrees of local involvement in the development planning processes. Mechanisms and processes by which the planning of infrastructural development and provision of services takes place are still being clarified. Meanwhile, in the context of the RDP principle of 'people-driven' development (section 4.2), provincial government is being encouraged to assist local communities in preparing business plans for the projects they wish implemented. In order to facilitate this process, 'Project Preparation Facilities' has been set up in the provincial governments to carry out this function. Labelled a Presidential Lead Project, the facility will incorporate local involvement in producing a feasibility study, a preliminary design and a business planning analysis (RDP 1994, p58). If a project is confirmed to be feasible by the facility, the implementing agency will be required to repay the facility 70% of the cost of the planning process, so that its resources for this service can last as long as possible without having to acquire additional funding. The initiative's strong emphasis on capacity building makes it a significant opportunity in developing local administrative skills. Skills may include project administration, community liaison skills, understanding the rationale behind market economics and income generation, or specific financial and business management skills. Such skills would have to be learnt either through hands-on experience or through a formal training, attaining certification such as the 'Development Management and Local Government Certificate' by MAG Training Centre in Montagu or the 'RDP Public Management Diploma' being run by Technikon SA. Such training programmes are still scarce and not readily accessible to most rural communities, but they are likely to be expanded as awareness of this need grows. It would be useful to include an energy component into the training syllabi, covering the complexities associated with rural energy problems and possible solutions.

Lastly, it is noted that there is a great danger of underestimating the abilities of local people to take control of the development process. A widespread perception is that poor rural communities are unskilled and uneducated, completely incapable of administering the planning, implementation and evaluation functions of service delivery. This is frequently a false perception, and often even in

very poor villages reside people who are sufficiently skilled and educated to implement a variety of administrative tasks – and usually in ways that are more suitable to the local context than outsiders implementing such tasks ‘for’ the local people. The knowledge that villages leaders (official or not) have of cultural conventions as well as their local popularity are significant advantages over outside consultants. Besides gaining a more textured understanding of local conditions and improving subsequent acceptance for results which the use of local people can provide, costs of the project can also be reduced because less outside consultants need to be employed. Local capacity must be carefully assessed so that as many tasks as practical are performed locally.

Besides limited human resource capacity at decentralised levels, there are many other obstacles to the effective operation of local and district governments. The most noticeable ones are considered below. While these obstacles present threats to successful infrastructural development and service provision, there also exist various possibilities in transforming them into opportunities of a successful process of helping the rural poor uplift themselves out of the vicious circle of poverty in which they so often find themselves.

Availability of funds

Most obviously, decentralised governments face critical financial problems because of a limited available funds from more centralised levels, undefined channels through which funds could be provided, and a culture of non-payment for services among the rural communities. New financing strategies will need to be devised that overcome these obstacles. A set of criteria will be used to determine whether or not funding is appropriate. There are both administrative criteria, such as the construction of reasonable budgets and effective operation of democratic structures, and criteria that assure projects follow appropriate methodologies such as being proactive in winning the trust of all local residents, being sensitive to issues of affordability, creative about financing and more efficient in delivery of services (RDP 1994, p23).

In the past, tribal authorities have largely been responsible for channeling information between the former homeland governments and rural people. They often failed to represent the communities’ diverse interests and to employ the available funds to maximum benefit for all. Also, tribal authorities often have limited administrative capacity, and many do not enjoy the traditional community-wide support they knew in the past. The formation of alternative civic structures arose in reaction to perceived failures of tribal authorities. Nevertheless, there are tribal authorities which are competent and fair, and are staffed with well-educated and sincerely altruistic individuals. The local perception of these tribal leaders’ failures is unfortunate, for the blame is often misplaced at their doors instead of those of the former homeland governments.

Until local structures are capable of accessing and distributing funds to development projects effectively, communities will be able to access funds through a variety of possible financing mechanisms. Non-government grant funding and concessionary loans could be provided to community trusts, funding from provincial government and the national fiscus could be accessed via local or district governments (or ‘councils’, until governments are established formally), or provincial or national government departments can implement development programmes themselves. The Transitional National Development Trust mentioned above (p113) is another potential channel. In addition, local and district governments will be able to raise revenue through taxes, service charges, levies, private sector loans, and the sales of bulk services. Provincial taxation will only provide a small percentage of development funds. Utilities, such as Telkom, Eskom and Water Boards, will also implement development projects funded by user tariffs and subsidisation from the fiscus (Callear, pers. comm.). Multi-national donor agencies are also likely to play a significant role.

A question of trust

People in poor rural communities tend to distrust government. A natural suspicion exists among rural people as to whether or not government will keep its development promises. In South Africa this is particularly true because of its history of neglect towards poor rural people. Trust of people perceived as government representatives, such as fieldworkers, researchers and consultants employed to investigate the potential impact of specific projects, is nevertheless a crucial component of a successful development planning process.

The dominating issue which exposes this distrust in the energy sector is the fervent desire of local people for electricity. Because their experience with homeland electricity utilities and Eskom in the past has been one of weak communication and persistent delays, rural people understandably distrust new promises of electrification. In most cases, this prevents the possibility of any interim energy interventions. Non-electricity energy options will need to 'work around' the rural electrification programme, targeting interventions at only those energy users who have expressed the need for or those who are supportive of such options. An extensive educational process regarding the need for an integrated energy strategy may appropriately focus on prospective electricity customers specifically. Much inter-organisational cooperation and far-sighted design will be necessary.

At the same time, government planners tend to distrust rural people. Planners and development organisations may be unnecessarily sceptical of the honesty and capacity of community level organisations, local government and local people in general to feed back suitable data or implement certain technical tasks effectively. Exaggerated suspicion towards local informants hinders the planning process by either increasing the expense of data collection because of the unnecessary usage of outside researchers, or by reducing the amount of data collected. It is thus imperative that mutual trust is built up between rural people and the state – obviously an ambitious task, but an essential one. Indeed, considerable effort in this regard is currently being made through the establishment of rural governments, village committees and the widescale implementation of development-oriented projects in rural areas.

A level of distrust also exists between competing villages as well as sectors of a village with conflicting interests: when grid electricity is provided to one community and not to another, for example, or when land is used for afforestation and not for agriculture, jealousies arise and subsequent conflict can snowball. Conflicts are often manifestations of underlying tensions such as political differences. Since development means change and change brings conflict, tensions between households, between villages and between local government areas are inevitable with the increasing provision of services. Skilled, sensitive mediation will be necessary on the part of the administrators of development projects.

Overcoming the mutual distrust between government and rural people and between and within neighbouring villages will be a slow, gradual process. A fundamental requirement is the visible improvement in the quality of people's lives, but the accelerated and widespread provision of services and infrastructure is a considerably difficult objective, particularly in rural areas. Efficiency could be improved significantly if rural people were able and willing to feed back information regarding themselves, but because of the distrust and suspicion people are reluctant to furnish information freely and openly. A chicken-and-egg situation therefore exists: mutual trust and efficient service provision require each other to be achieved. In time, the apparent vicious circle will surely be escaped, and both mutual trust will exist and adequate and widespread services will have been provided.

Mini-apartheid

In addition, there are significant weaknesses inherent in the government's overall strategy to reverse the inequality created by apartheid (and its antecedent, colonialism). A major factor is that apartheid has not created inequality but inequalities: disparities in access to services and infrastructure exist between household members, households, villages and larger areas – not only between major population groups. Correct development planning methodology calls for planners to implement a locally driven process of needs prioritisation, both within villages and between them. Questions that need to be answered include not only 'What is needed most?' and 'By whom?' but also 'According to whom?'

Accurate answers to such questions often elude planners. The communities that benefited more from the former homeland governments generally consist of the people from the relatively more educated, wealthy and influential local areas. Since these people are more visible and verbal on the new local governmental structures, allocation of development resources will likely favour the relatively privileged. It will be exceedingly difficult to balance the allocation of resources to meet both the needs of the wealthier and the poorer people of a certain area or community. Because of

differing needs and demands, a supply-oriented approach of providing uniform service to all is obviously flawed, but the democratic alternative will inevitably prejudice the poorest. It is a widespread phenomenon: at all levels, the poorest of the poor are least heard. This applies to the poorer areas, the poorer villages, the poorer sectors within villages (such as the landless and the unemployed), and the often-voiceless members within households (such as women, youth and the elderly).

A microcosmic continuation of mini-apartheid in these areas thus appears to be probable in the future. Attempts to avoid this situation would undermine the new local government structures which are vital for stability. Interference from 'above', such as provincial government obliging local authorities to direct resources to the poorest of the poor, is a possibility, but impractical on a large scale. In general, the elite minority tend to benefit most from interventions. Every action that attempts to alleviate a problem will invariably result in many people not benefiting or benefiting less than envisaged. This is a reality of a democratically-oriented development planning process – as Winston Churchill once declared, 'Democracy is the worst possible option for government, except for all the alternatives' (NDIIA 1990, p1).

Energy issues are subject to the same phenomenon, and IREP's paradigm of 'people-driven' planning is thus problematic because of the simple question, 'Which people?' For example, while the call for electricity is likely to be heard loud and clear, people who would be unable to benefit much from electricity are not likely to be noticed. Usually it is the voiceless who are the energy-less; those people who would benefit most from electricity are likely to already have sufficient energy services to meet their basic needs. It will be a considerable challenge for an IREP strategy to balance services that meet energy for production needs (which electricity can potentially achieve effectively) with services that meet energy for consumption needs (which electricity cannot achieve effectively).

Problems of efficiency

Rural development projects and programmes are known to be faced with a variety of problems of efficiency on all fronts. Administrative anomalies, errors in financial management, speed with which a new technology is accepted, shortages of spare parts, and unforeseen local tensions as a result of an intervention are just examples. Inefficient channels of communication is a general problem in rural areas as a result of the large distances involved, the frequent absence or low quality of the telecommunications network, as well as the not-insignificant factor of different cultural perceptions regarding the meaning of being 'on time'. It is perhaps representative of all rural areas that the 'Lowveld' area of Mpumalanga is sometimes heard being referred to colloquially as the 'Slowveld'. Indeed, slowness is a reality in rural development.

Duplication of development efforts is another aspect of inefficiency. This is a real danger because of the fluidity of institutional framework and still-forming communication channels (Ministry in the Office of the President 1995, p12). Duplication is possible in a variety of areas: transitional structures continuing to be operative after official structures have been established, a plethora of possible financing channels, overlapping efforts being driven from different government tiers, or programmes initiated by NGOs before the inauguration of the new government and those initiated by government subsequently. One example is the nationally-managed CBO Network of the IDT and the provincially-managed RDP civil society structures in Mpumalanga called Community Reconstruction and Development Committees (Community RDCs). The intention is for these initiatives to work in parallel (Nuttall, pers. comm.), but clearly there is a danger of redundancy.

Generally, it can be regarded as a rule that rural development programmes never work as planned. Flexibility must be allowed and a willingness to improvise should be encouraged. The practicality of improvisation is sorely limited, however, because funders are intent on maximising the benefit of funds by placing strict requirements on their deployment. While inefficiency of rural development programmes and projects can be anticipated, certain efforts are necessary at least to try limit it. Although there are many factors in play, two primary requirements seem to stand out. Firstly, adequate resources need to be allocated in advance to the different phases of the programme in question. This applies especially to the support of a monitoring process to confirm that expected impacts do occur, and to support future iterations so that the process is an on-going one. Secondly, the intended degree of community participation must be realistically supported

financially, bearing in mind that the more the local community is involved, the slower and more expensive the process will be. There are few firmer guarantees of failure of a project than if the extensive community involvement is planned for without the necessary funds, often resulting in the omission of important components of the project such as feedback and impact assessment. (Note that this local involvement in projects is in addition to participatory RRA-type surveys for database development – which need not increase costs, as mentioned in section 2.3.2.)

Inefficiency is possibly worse when it comes to energy because of the general lack of experience with energy planning in the country. Mistakes can perhaps be expected: wasteful use of administrative resources, inappropriate reliance on analytical tools, non-optimum use of resources for participatory data collection. One may anticipate some pilot exercises that do not produce many worthwhile conclusions, and campaigns to raise energy awareness that raise nothing but tempers. With experience, however, a successful energy planning strategy can perhaps be achieved in the end, with potentially extraordinary benefits to the well-being of rural people and to the rural economy in general. It would be sad for petty excuses to be the justification for not even attempting to overcome the obstacles to an integrated energy planning process for rural areas of South Africa.

Village-level representation

Since it is the first time in South Africa's history that local authorities are obliged to work with communities in a comprehensive and democratic way, identifiable, representative voices in the communities are usually lacking. This problem is more insidious than the obvious financial and human resource constraints – and thus more likely to be neglected. In recent years, most poor rural villages have established a variety of CBOs which are functionally independent of the local tribal authority. CBOs range from church, schools or sports CBOs to those with a more development-oriented focus. The various CBOs, as well as tribal authorities and other village structures, may not be supportive of each other, so that conflicting needs and interests present government with a communication problem. In the absence of a single community voice, development planners find it difficult to assess local needs for services and infrastructural development, and to prioritise those needs effectively. Assessment and prioritisation of needs can therefore be problematic. For instance, a committee from a village may call for basic sanitation services, whereas another committee from the same village may call for electrification of domestic households. It is exceedingly difficult to ascertain what the priority needs are, according to the community as a whole.

A single village voice may seem idealistic in the context of the myriad village committees each dealing with a separate issue, interests of people not represented by a committee, the varying degrees of local support for the tribal authorities, and the political party divisions within the communities. Nevertheless, government has set itself this objective. With the promise of attention by the provincial RDP Office and its sibling line departments, each village has been encouraged to organise itself into a single development committee, encompassing all development needs and inclusive of all interested parties. This entails the merging of all existing CBOs and the creation of a new, theoretically all-inclusive and apolitical forum in each village, variously named from province to province ('Community RDCs' in Mpumalanga). These committees are allocated the mandate and responsibility to be the sole voice for expression of the village's priority needs. Specific responsibilities of RDCs will be 'to ensure a flow of information, to prioritise development needs, to take part in the planning and management of projects, to manage their own funds, to assist in capacity building' (Bushbuckridge North Development Forum 1995). To enjoy the recognition (and any development funds) of provincial government, village development fora are required to have achieved specific tasks, such as adoption of a constitution, creation of a treasury, and opening of a bank account – but funds are only granted to community projects, and no individual is paid a salary. Once formed, the new committees are required to prioritise their needs and feed this information back to the provincial RDP office in the absence of intermediate structures.

Much progress has been achieved in establishing these village-level structures, even in remote rural areas (Captain, pers. comm.). There are, however, several practical constraints. It is unlikely that interests not previously represented by a CBO would enjoy representation on the new structure. These may include the very poor households and women's interests. Also, some communities are not aware of the necessary significance of this new structure and regard it instead merely as a new CBO. Furthermore, the deep rural villages often find it difficult to prioritise their needs, and they

tend to confuse the provincial RDP office with their local tribal authority (who may not forward the request to provincial government).

Unanswered questions are many: whether or not the formation of apolitical structures is realistic; whether or not the institutional division of needs assessment by civil society and implementation by government is appropriate; whether or not these civil society structures will be effective voices that are trusted by the people to communicate their needs to government; and how the sectoral concerns of the community will be effectively identified. Also in question is whether or not these informal structures will be sustainable. Lucrative new government posts will attract many of the individuals driving the civil society structures, and the extent to which these positions will be effectively replaced by other, probably less-motivated community representatives is dubious. What is clear, though, is that these structures are important now since they provide people with a voice that can be heard and answered. They may become redundant by the establishment of effective decentralised government, falling away voluntarily once government is perceived to be meeting local needs effectively. The future is (as usual) uncertain, and progress with establishing these very decentralised structures will need to be monitored carefully. Sharing experiences of similar efforts with other developing countries may be valuable, such as the establishment of *panchayats* in India (section 3.1.1).

4.4 Summary

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The apartheid era of South Africa caused energy policy to be dominated by national self-sufficiency rather than equitable access to energy services. The overriding context of confused political goals in the country created confused energy sector goals. Government directed billions of rand towards the synthetic petroleum plants of Sasol and Mossgas and towards producing nuclear power through the Atomic Energy Corporation. Considering that locally produced petroleum and nuclear fuels are unusually expensive, the cost to the economy has been extraordinary. An energy planning process thus arose insidiously and therefore incoherently, a process that was oriented towards the increasing of energy supplies without energy services in mind, one that regarded the various energy sub-sectors as independent of each other and separate from the broader economy, and one that ignored that individual people, who face complex and varying social and economic forces, are major consumers of the fuels supplied. The new political orientation of the country suggests that reform in the energy sector is imminent. This chapter considered the current trends in the various energy sub-sectors and in the rural development process.

In a way, the context for IREP in South Africa is paradoxical. On the one hand, there are significant obstacles to its implementation. Institutions in the energy sector implement their own planning procedures with no coordination and little liaison with other institutions within the energy sector and in the broader economy. The Department of Mineral and Energy Affairs is weak in the political arena, and allocates miniscule financial resources to the management of the energy sector. There is a national misperception that grid electrification will meet all energy needs. The lack of a rural development department presents a threat that rural areas will continue to be marginalised. Factors at decentralised institutional levels also constrain the impact that an IREP initiative could have: limited financial and human resource capacity is a major problem, as is the inherited legacies of the past such as ubiquitous sense of distrust, general inefficiency of operations, and a danger that local apartheid-style conditions may continue. Furthermore, the overall orientation of the institutional landscape towards line departments places an immediate restriction on the degree of integrated planning possible. These are some of the factors which an IREP initiative will need to face.

On the other hand, the transformation of government has caused its economic principles to be reoriented towards a significant, albeit cautious, emphasis on social equity. This is a unique opportunity for an energy planning initiative, since energy planning more commonly focuses on the improvement of efficiency and environmental protection than on social equity. There is therefore an unusually strong political backing behind the call for IREP. RDP's basic principles conform extraordinarily closely to the core principles of IREP, especially the importance of integrated planning and a people-centred approach. Since the RDP is a major force in the political arena, but possibly a temporary one, there seems no better time than the present to get an IREP initiative up and running before it's too late.

With these two contradictory trends, what can one conclude as to the relevance of IREP for South Africa? What is the way forward? This question is addressed in the following and final chapter.

CHAPTER FIVE

The way forward

5.1 Summarising the context of IREP in South Africa

This dissertation has outlined the theory of IREP methodology, reviewed the experience of rural energy planning in various parts of the world including South Africa, and considered the implications for this methodology for South Africa. This chapter now deliberates on the question 'So where to from here?' Before this commences, though, it seems necessary to summarise the situation in which South Africa finds itself with regard to rural energy.

Currently rural energy needs are being addressed almost solely through the provision of grid electricity. In the minds of most people, grid electricity is the only solution. Yes, grid electrification is an essential component of the upliftment of rural areas. It is a consequence of the negligence of the past that grid lines connect scattered farms and wealthier rural communities while they bypass poor rural villages (sometimes directly overhead). In a country which produces most of the electricity consumed in Africa (Eskom 1994, p1), it is unacceptable that only about 40% of domestic households have electricity connections (Steyn 1994, p6). Electricity will bring modern technology to rural areas such as electric lighting and television, and will enable people to establish industries which would not have been possible without electricity. Foley (1992, p145) points out that 'electricity is the key which opens the door to the modern world. Without it, communities are denied a high proportion of benefits and amenities which people in the industrial countries take completely for granted.' The extension of the electricity grid is also sensible from a political point of view, for it is reasonable that the government meets its promise of electricity connections to 2.5 million households and all schools and clinics.

However, the time frame and nature of this extension is debatable. It is widely accepted that provision of electricity will not necessarily stimulate economic growth in rural areas. 'Rural electrification does not cause development. Electricity is a derived demand occurring only when an area has reached a certain economic level,' confirms Foley (ibid), who goes on,

'The political and social pressures to increase the pace and scope of rural electrification are intense. The problem is that the financial resources required for doing so are in scarce supply. Policy-making in rural electrification is thus a matter of difficult choices about where, when, and how best to carry out programmes. This demands clear thinking about how the benefits that are obtained from electrification are distributed, how much consumers should pay for obtaining them, what criteria should be used in the selection of areas for electrification and what supply technologies should be used.'

Clear thinking and much debate is imperative to answer these questions effectively, so that a rational rural electrification programme in South Africa can be formulated, particularly in the context that it is financially impossible to provide everyone in the country with a grid electricity connection (section 4.1.1).

The South African electricity supply industry is indeed faced with intense pressure to supply electricity to previously marginalised people. Usually, the only planning criterion considered is a financial one: that is, is it financially justifiable to extend the grid to this or that village? This supply-oriented paradigm is pervasive in the country. Demand-side criteria are generally ignored: the expected consumption patterns of electricity and other energy services as a result of electrification is an example, as is the opportunity costs of how the resources for electrification could be utilised in other sectors.

Most proponents of grid electrification are largely unaware of the widespread disappointment with rural electrification programmes in other developing countries, and of the advised demand-side orientation in rural electrification planning. Anticipating fantastic economic growth and radically improved access to affordable and convenient electricity services, these proponents do not acknowledge the dangers: scarce resources could be consumed without a noticeable impact on local economic growth or access to energy services. The majority of electricity connections are likely to service only energy needs that are not energy intensive, such

as lighting and television; rural people are likely to continue using 'free' woodfuel for services like cooking. After billions of rands are poured into rural electrification, the dismal image is still possible: an out-of-work male head of the household sitting in front of his grid-connected television all day while his wife slaves away far in a depleting woodland collecting firewood, as she has always done. Where is the improvement in people's lives? How do we eliminate this outcome from the various future scenarios of today's rural electrification projects? How do we prevent rural electrification from becoming another Mossgas mistake?

From the deliberations in the previous chapters, the solution lies in adopting a broader perspective of rural energy conditions. A demand-driven process of electrification is necessary. In other words, that electricity connections be made to communities who are either most able to show financial returns to the utility, or whose access to electricity promises most significant contribution to local economic growth and therefore justify government subsidisation. The level of supply is also a necessary consideration in low income rural areas, where electricity loads are likely to be considerably low no matter what level is supplied. Load-limiting circuit breakers may be potentially useful in these cases. In such instances, possibilities to supplement electrification with measures of other energy sub-sectors are likely, but only with extensive community participation.

Of primary importance, however, is that the reality that grid electrification is just one of a number of options for meeting rural people's energy needs has to be recognised and publicised. The APDC (1985, p238) advises, 'aim at *rural energification* rather than *rural electrification*' (original emphases). Off-grid electricity is an important alternative to grid supply: it can supply the low energy-intensive services which are those services that are likely to be used by the majority of those with grid connections anyway. For this option to be taken seriously, all that is needed is 'the shedding of shackles that equate rural electrification with grid supply' (ibid). Other energy interventions are essential considerations too, because other energy sources will undoubtedly continue to be consumed by rural people after access to electricity is attained, and especially for the more energy-intensive services. Eskom needs to conform to the international trend whereby electricity distribution utilities are 'beginning to see themselves as selling lighting, heating and cooking services, rather than simply selling kWh of energy' (DMEA 1995a, p5). Furthermore, to be effective, a rural energy strategy must necessarily be integrated with rural development initiatives in other sectors, for energy will inevitably be a significant component of many of them. To avoid the disappointment with regard to energy strategies as experienced by many other developing countries in the past, therefore, an integrated energy perspective is evidently necessary in rural areas of South Africa.

Whether or not this perspective implies that a formal Integrated Rural Energy Planning process would be possible and worthwhile, however, is less clear. There are significant institutional obstacles that would need to be overcome. Eskom is not held accountable to an independent body. The sheer size of Eskom restricts the potential impact of the select few individuals at top management level who are aware of the need for a more holistic approach. Transforming Eskom's activities will be a slow process.

To be sure, a lack of theoretical support for an IREP process in South Africa is not the problem: the principles of IREP clearly parallel RDP's 'basic principles', and the need for recognition of a broader energy perspective than simply grid electricity is mentioned in the RDP explicitly (section 4.2.1). The main constraint to the establishment of an IREP process in South Africa is the lack of political demand. Pressure from line departments is not significant. The Department of Mineral and Energy Affairs (DMEA) lacks the necessary political power to exert such pressure. It has also lacked the will to do so, as is evident by the minor resources that have been allocated to non-nuclear energy issues in the past, and the even smaller amount of funds allocated to addressing development-oriented energy issues. In other departments, both at national and provincial levels, there is generally a lack of awareness of the energy dimension in their programmes, the impact a rural energy planning process may have on them, or even the limitations of a supply-oriented programme of grid electrification. Just as within Eskom, only a few individuals across the public sector are 'energy-aware'.

Anomalously, the limitations with rural electrification generally remain unexpressed by the local communities themselves. There is consequently no public lobby to address rural energy needs from a broader perspective. The fervent desire for access to grid electricity and the

unwillingness to consider alternatives before being connected is understandable if one empathises the potential quantum leap in one's quality of life from access to electricity. After the realities of the cost of electricity consumption and electrical appliances set in, the blame is not directed to the planning methodology that had been followed – no rural person would begrudge the provision of electricity even if most of the various possible benefits from it were not affordable.

Hence limited political pressure from 'above' (government) or 'below' (local communities) exists to address energy-related problems beyond the provision of electricity. The result is that an integrated rural energy strategy is called for, mainly by the odd research institute and the rare government or utility employee. Yet, rural energy problems are real and serious, and are not going to disappear. They are likely to worsen insidiously until efforts are made to address them directly.

Rural energy planning is faced with a double bind. Both on the energy front and on the rural front, a lack of political visibility exists. Certain institutional movements are nevertheless promising: the adoption of integrated, community-driven development planning principles by the RDP and Presidential Lead Projects bodes well for the potential of a rural energy planning process. The new village- and local-level structures arising throughout in rural areas will be invaluable for IREP. Support for intersectoral initiatives are also encouraging: the land reform programme and the possibility of a social forestry programme are cases in point. Rural people seem to be gaining political strength as the country progresses towards the next elections, as are development-oriented energy issues, which have become more visible with the imminent publication of an Energy White Paper.

The likelihood that there would not be considerable resources available for an IREP process in the short term means that, if an investigation into the worth of such a process is to be undergone, then a far-sighted strategy consisting of carefully selected pilot projects and a well directed publicity campaign will be essential. There will be little space for experimentation, even though, ironically, an attitude of experimentation will be preferable. An institutional home will clearly be required for the implementation of IREP. An institutional home will even be necessary for the *investigation* into the worth of the process: the *de facto* demise of the Integrated Energy Demonstration Programme is evidence of the weakness of an investigation that does not enjoy a formal institutional backing. While it would not be necessary to create an entirely new organisation, a unit within an established agency seems advisable for the investigatory phase.

If successfully implemented, an IREP process would provide clear, accurate descriptions and predictions of energy flows between suppliers and consumers. This would enable well thought out policies to be established, appropriate legislation to be passed, and government interventions to be implemented that will create more efficient, more equitable and more environmentally friendly energy flows. This is the theory: practical issues – such as conflicting vested interests, institutional obstacles, and financial constraints – inhibit the extent to which clear, accurate descriptions of rural energy flows are possible, the extent to which predictions of future scenarios is feasible, and the extent to which government intervention in rural energy markets can be effective. Nevertheless, a process which obeys all the specific requirements of IREP methodology is not essential: even a more holistic awareness of the need to consider various energy options and the need to integrate energy options into a broader development strategy will do much to enhance the current strategies of addressing energy needs.

5.2 Institutions to consider

The *Energy Chief Directorate of the DMEA* is officially allocated the responsibility of forming energy policy, so it would automatically be implicated in an IEP programme. Because the Chief Directorate already has an energy orientation, it is in a crucial position to participate in an IEP programme. However, at present the Chief Directorate does not have the mandate nor the financial resources to implement energy planning, nor does it have sufficient and appropriately-trained staff to do so. Furthermore, it does not enjoy the political power necessary to influence other sectors to consider the energy dimension in their planning activities. In the process of restructuring the institutional framework of the country, the Energy Chief Directorate may be

changed, and since it is unlikely that energy will be allocated even less resources than it is already, it could be well-placed to implement certain IREP functions – particularly energy database management and supervision of the overall planning process.

The *National RDP Office* is a possibility for use as a body which could provide political impetus for the implementation of an IREP process. It enjoys political power, has good intersectoral links, and has an appropriate political orientation towards the people-driven philosophy of IREP. These are important requirements for IREP. Although procedural IREP tasks would not be appropriately placed in this office, allocating it the task of getting energy onto the agenda of planning programmes of various sectors should prove profitable because of its political clout and suitable political orientation. Longer-term and more resource-taxing tasks at national level would need to be implemented by another institution. It is noted that since the RDP Office does not have a good awareness of energy issues, an awareness-building process or alternatively the establishment of an Energy Unit within or with close ties to it may be suitable.

A partnership between the DMEA and the RDP Office may be a constructive strategy. The partnership would not need to implement IREP at this point: only initiate an extensive *investigation* in the possibility of addressing rural energy issues in an integrated way. However, to be useful an investigation would have to entail the implementation of certain IREP tasks. Pilot exercises at various institutional levels would be a necessary part of such an investigation. It would certainly be fortunate for the rural energy sector if such pilot exercises were to constitute a programme that is allocated the enviable label of Presidential Lead Project.

Other national departments are also relevant for the implementation of an IREP process. Of particular relevance is the involvement of departments that are oriented towards rural areas, such as the *Department of Agriculture* and the *Department of Water Affairs and Forestry*. These departments would be particularly useful for considering interventions in the biomass energy sub-sector as no other department is likely to do so. A potentially profitable option is to establish Rural Energy Units within these departments. While not enjoying as much political power as other departments and the RDP Office, the reduced political visibility of the rural-oriented departments would be an advantage from the point of view that Energy Units within them could address rural issues without a significant backlash from the more powerful vested interests in the energy sector, such as those of mining and industry, and of oil companies and Eskom.

Eskom is automatically implicated in an integrated energy planning programme. Rural electrification will be a crucial part of a rural energy strategy in South Africa (and justifiably so). Therefore, Eskom – or the prospective National Electricity Distributor, of which Eskom's distribution section will constitute a principal component – will inevitably play a pivotal role in any intersectoral rural energy strategy. Non-electricity energy interventions will need to be carefully targeted at communities and people who desire such interventions; people demanding electricity to whom an integrated energy strategy is proposed will be unsupportive of the idea until their demand for electricity is either accepted or rejected first. Only then are communities likely to consider alternative energy options – either to supplement electrification services or to take their place. In addition, to maximise its effectiveness, a rural electrification programme needs to be implemented within a context of general rural development planning. Good linkages are necessary with government departments, both national and provincial – such as Agriculture, Public Works and Housing – as well as linkages with suppliers of other services, such as telecommunications and water. Eskom's powerful centralised structure along with its extensive decentralised network may prove to be a considerably useful mechanism for an IREP strategy to utilise, despite the inevitable grid electricity bias.

Various possibilities exist to enhance Eskom's orientation toward IREP. It may be profitable to establish an Energy Unit within Eskom, structured within its distribution section and at an appropriate level to allow for an awareness of local conditions and dynamics, and including staff with a non-technical educational background (in contrast to the large majority of Eskom's planning staff). Also, Eskom's provincial branches could be more directly involved in provincial government's planning activities, rather than having to communicate via a line department which is generally not aware of the many difficulties faced in an electrification programme. A major reorientation will be necessary for such options to be effective. In the interim, Eskom's planning processes could be made more transparent and more accountable through

restructuring institutional and financing arrangements. Capacity-building workshops could be held for Eskom's planning staff. Informal linkages could be formed with other energy sub-sectors and suppliers of other services, and steps could be taken to place Eskom's local structures more firmly within a context of local and district governments.

Although there is less of a political demand, the involvement of oil companies is also implicated by IREP. They have the potential to expand their distribution networks and reform the pricing structures so that petroleum products are more available and affordable to poor rural people. The obstacle is not so much the financial risks involved but the small returns. Policy could be reformed to encourage oil companies to adopt a more development-oriented approach, either through regulation or incentives. The prior involvement of BPSA in the IEDP (section 3.2.2) suggests that they be encouraged to take the lead in this regard.

Provincial government currently serves an important link with local government. Although it may be unwise to entrench IREP activities too firmly at this level – thus hindering the possibility for such activities to be relegated to a more decentralised level at a later date – it would also be foolhardy to wait until decentralised capacity is sufficiently built up. Provincial government is at present the most decentralised tier which is capable of implementing any form of integrated energy planning, and therefore should be required to do so. From an IREP perspective, provincial government lacks a general awareness of the energy dimension in rural development. This is a problem: an awareness-building programme is called for.

The *Provincial RDP Offices* vary from province to province in terms of competence and the degree of support they enjoy. In general, though, they are influential and respected, proactively seeking out means of improving the way government does things in various sectors. The extent to which the RDP Offices will be successful in achieving a sustainable reorientation at provincial level is, of course, unclear, but the strong intersectoral links, strong links with local communities, and the strong links with national government suggest that they hold much promise. To their disadvantage, they are very stretched in terms of their human and financial resources. They would be reluctant to take on new tasks, but if they become aware of how energy constitutes a part of most sectors – whether planners like it or not – it may be possible to draw an IREP-perspective into the RDP initiatives in various sectors.

Provincial line departments would be relevant in an IREP programme. Provincial departments of Agriculture, Environment, and the department responsible for land reform are of particular importance. Respectively, the energy needs of agriculture are a primary part of rural life (both energy needs for production and needs for consumption, of small-scale farmers and their families, and of farmworkers); there is good potential for environment management programmes to assist in biomass production and redistribution; and there is scope for an energy planning component to be incorporated into the pilot land reform initiatives that are being implemented in each province. The *provincial branches of the DMEA* could play a role in energy planning at this level, perhaps providing technical assistance in energy demand and supply analyses. At present, however, these departments are solely mining-oriented, so this would entail expanding them to include energy divisions. The advantage here is that administrative infrastructure already exists.

From a long-term perspective, *district government* may be the ideal level from which a rural energy planning programme could be driven. However, where district governments exist, capacity is usually lacking to implement even its more menial tasks effectively. An appropriate plan would be to allocate such tasks to provincial level under the proviso that they be relegated to district level when possible. *Local government* will also be a crucial link in an energy planning chain when adequate capacity is established. Its democratic legitimacy will be useful in lobbying support for its actions. Rural people are likely to be familiar with counsellors, and with the responsibility of ensuring that basic services are provided being allocated to this tier, there will be more of a sense of personal accountability. There will surely be conflicts, and marginalised communities will be in danger of continuing to be so, but this notwithstanding, the arising local government structures are an exciting opportunity for all aspects of development planning, including IREP.

As capacity at these levels are built up, civil society will continue to play a vital but probably diminishing role. *NGOs* are an important resource at local level, with their historical knowledge

of the area and people. Their experience, skills, and community contacts will be invaluable for government requiring a smooth entry into communities. Utilising them as consultants will often be necessary, although one should bear in mind that NGOs do not cover rural areas comprehensively, and that supervision of their activities is inherently problematic. Also, the involvement of *CBOs* is crucial in the implementation of rural development programmes – representing the natural institutionalisation of local communities, they enjoy stability and community support (even though they are often not fully representative). They certainly require much capacity building because of their limited technical and administrative skills. If one accepts that a fine-tuned development machine is a pipe dream for rural areas, then the newly-created CBO networks and the on-going rationalisation of the plethora of CBOs show much promise for an institutional infrastructure that will facilitate a relatively efficient rural development process in the future.

Schools are another important opportunity for a capacity building aspect of an energy planning initiative. For the energy planner, children are a significant part of the rural household because they are likely to be most interested in issues such as energy efficiency and environmental protection. Syllabuses of technical subjects could constructively overlap with energy issues, such as energy efficiency, energy safety, and environmental implications of energy use. There is also the suggestion of Prasad (section 2.3.2) that an energy database development programme be linked with school activities, particularly with regard to the notoriously difficult task of biomass data collection. Most importantly, we dare not forget that scholars are the counsellors, administrators, entrepreneurs and energy planners of the future.

Mass media is a further means of reaching the people, especially in stimulating debate around controversial issues, such as the scope of electrification to meet people's energy needs. Radio and television are common in poor rural areas, and localised radio stations are already being established – it would be unfortunate if energy-awareness building programmes were not a regularly broadcasted feature to sensitise people to energy-related problems and their alternative solutions and prevention strategies.

5.3 Several-phase strategy

There is an unavoidable lack of clarity as to what impact IREP can have on South Africa. There is certainly a strong possibility that it will have a strong impact. Through the implementation of IREP, local people could be empowered by participating in the energy planning process, the right energy source could be selected for the particular service required, and the energy dimension can become an integral part of the planning activities in various sectors of rural development. IREP could be crucial in achieving optimum consumption patterns, including access to basic, convenient and affordable energy services to all and rural development programmes ensuring appropriate energy services are available for their needs. On the other hand, an IREP process may not be effective: perhaps energy planning is unable to gain a foothold in the rural development planning framework. Perhaps the fragmented structure of the energy sector does not lend itself to an integrated planning approach. Perhaps the development of a suitable energy database is not realistically feasible. Perhaps only an IREP *perspective* rather than a comprehensive application of the IREP *methodology* is suitable for this country.

The question needs to be asked, 'How urgent is the rural energy problem in South Africa?' This leads to the consequent question, 'How urgent is a rural energy planning process in South Africa?' These questions are obviously fairly open-ended and no definitive answers can be expected, but one thing seems indisputable: something needs to be done. Rural energy problems exist, and are not going to diminish without a conscious effort to diminish them. Also clear, however, is that the immediate application of the full IREP methodology in the country is neither feasible nor justified. Not only is a rural energy database sorely lacking in sufficient and appropriate information, the existing institutional framework is at present unsuitable for energy planning to play a meaningful role. The energy sector lacks the necessary visibility and intersectoral influence to bring about significant reform.

Idealistic visions of how an IREP process should one day be structured in the relatively distant future are definitely constructive and useful. They can serve as a model of how rural energy issues should be addressed – they indicate a path along which to follow. However, what is also

needed is clarity on what immediate action is required in moving toward the resolution of these problems. In parallel with the question, 'What could a rational rural energy planning process achieve?' is the recurrent question, 'What steps are needed now?' Whereas the former question is necessarily inconclusive, a definite answer to the latter question is imperative.

So, if something must be done, but IREP in its entirety is not advisable for now, then what is the way forward? A thorough *investigation* to answer this very question is a necessary start. Such an investigation would entail the implementation of various pilot exercises, the results of which would inform us in formulating an effective strategy to resolve rural energy problems. A set of pilot exercises at different government tiers and in different sectors seems necessary. This would provide insight into what practicalities and obstacles to energy planning exist throughout the institutional framework.

For such an investigation to be meaningful, its duration would need to be of reasonable duration so that sufficient time is allowed for impacts of pilot exercises to unfold. It would also need to adopt a far-sighted perspective so that as many potential obstacles as possible are foreseen. In particular, obstacles that are *internal* to the investigation team should be highlighted – a weakness of the now defunct IEDP (section 3.2.2). The investigation's objectives must be lucidly spelled out. If the term 'Integrated Rural Energy Planning' is used, the term must be unambiguously defined. Staff should be alerted of conceptual tensions, such as that between the theoretical methodology of IREP and integrated energy projects, between normative and projective planning, and between focusing on energy for production and energy for consumption. If rural areas are being focused upon, a reasonable definition of 'rural' will be necessary. Also, the distinction between policy options and specific instruments to shape the market should be emphasised. Staff are likely to be unaware of many of these nuances, and much training and supervision will be necessary to ensure that the investigation does not go off-track.

Since some action needs to be taken in the end, it seems reasonable that such an investigation should constitute the first phase of a several phase strategy. There are some constraints on the implementation of such a process which require proactive, immediate effort to resolve, others which require patience and well-timed intervention. The former include constraints like anomalous institutional characteristics at centralised levels, inadequate political awareness of the energy dimension, and the deficient rural energy database. The latter include weak decentralised government, ineffective management of biomass resources, and the fixation on grid electricity in the rural electrification process. Therefore, certain steps should be taken immediately, others would be premature. In addition to an investigation into the potential for IREP which can commence at once, beginning to reform the institutional framework of the energy sector and setting up a long-term programme of energy database development are also immediately possible. In the short term future, an initiative that seeks out and assists areas, villages and people whose energy problems are severe or critical – that is, adopting an 'energy for consumption' focus – would be appropriate.

For the rest of the rural population, it seems sensible to wait until conditions are right for the implementation of a more formal implementation of IREP methodology – for example, when the decentralised institutional framework is better established and the rural electrification process has matured somewhat. Slowly, the extent to which the analytical IREP procedures are implemented can increase. Meanwhile, the *idea* of perceiving the various energy sub-sectors in an integrated way can be propagated throughout government, particularly in the agencies that are involved with rural development. Clearly-defined milestones through which an IREP initiative would progress, from preliminary investigation to formal implementation, are recommended. In this way, the process can be monitored against fairly objective criteria.

It is important to obtain a balance between, on the one hand, adopting a long-term perspective so that a sustainable process is assured, and on the other, implementing urgent tasks proactively. Establishing suitable institutional arrangements are necessary now for an energy planning process in the future, and a well-devised set of pilot exercises are necessary to inform that process. An 'energy awareness' campaign also requires proactive and skilled effort in order to lobby support in preparation of the time when a rural energy planning process becomes viable.

Perhaps the most urgent (and feasible) aspect of IREP at present is an energy database development programme. Longitudinal (time-dependant) information is invaluable in energy planning, for without it, analysis is based on hearsay, extrapolation and guesswork. The longer the collection of energy data is delayed, the less information will be available in the future, and a lack of longitudinal information will be especially lacking. Moreover, rural energy data collection is a considerably slow process: detailed, in-depth information is required of conditions of the demand and supply of energy, disaggregated by energy services, and including a qualitative picture of the socio-cultural and economic dynamics that play a role. A domestic energy database programme that is already under way (section 3.2.2), and it will hopefully instigate an effective, well-coordinated process of energy database development which is properly infused into the imminent National Information Project (section 4.3.1).

This programme may stimulate the far-sighted vision that is necessary for the implementation of an IREP process. Expansion of the database should be properly designed. Data must be collected from carefully selected case-study villages, areas and regions, so that the resultant information is statistically useful. Slowly, gaps in the database can be filled out, longitudinal information can be developed, and a comprehensive picture of energy conditions and trends in rural areas can be attained. With such information at hand, there would be strong justification for the application of IREP methodology. Even without the implementation of a formal IREP process, more knowledge about rural energy conditions will always be valuable.

If an investigation into whether or not IREP is possible and worthwhile is to be effective, it is crucial that it occurs within a formal institutional context. A casual forum or committee is doomed from the start. A proactive, on-going investigation is necessary, and this seems possible only if the investigation is driven from a stable institutional home.

An institutional home (an 'IREP Unit') from which the investigation is driven is required no matter what its characteristics are, but there are of course certain characteristics that are desirable (section 2.4.1). The IREP Unit needs sufficient resources to carry out its tasks. It should be staffed by full-time, appropriately skilled people who will recognise the importance of social dynamics and the need for 'grassroots' participation in the process, and who will be capable of a long-term perspective at the same time as being proactive in the short-term. Its responsibilities and mandate should be unambiguously defined, and some form of effective supervision of the unit's performance is necessary. A small, intersectoral forum of motivated members that meet regularly is a possibility. The IREP Unit should be positioned within an institution that has strong intersectoral links so that communication with other departments and development-oriented agencies will be fluid. This umbrella institution should preferably enjoy good influence in the political arena in order to bring about reform in other departments, and be sufficiently stable because energy problems can only be resolved gradually. In addition, the IREP Unit should have adequate access to decision processes at the decentralised levels – the target and focus of IREP (section 2.4.2).

5.4 Specific institutional possibilities

Broadly speaking, an initiative to investigate the potential of IREP in South Africa (or in other words, an initiative to investigate how to address rural energy problems) could take one of two forms in terms of where the IREP Unit – which will drive and manage the investigation – will be located: either from national level or from provincial level. These are the only government tiers which potentially have the capacity at present to administer such an initiative. Of course, in the future one may hope that IREP would be driven and managed from the district or local government tier, but at present and for the foreseeable future, this is not feasible.

Important to remember during the design of such an initiative, however, is that a decentralised emphasis must be a theme running throughout. Rural energy is a decentralised issue, which consequently requires a similar focus of attention. Although policy instruments that affect all areas in a region simultaneously are definitely worthy of consideration (for example, removing VAT on the price of paraffin), arriving at a conclusion that an instrument should be applied requires a decentralised and disaggregated perspective (if VAT on paraffin is removed, how will consumers using paraffin for different services be affected differently?).

On the other hand, there is a limit to decentralisation of energy planning. Local rural people are unlikely to respond positively to an energy planning process being 'thrust' upon them. Rural people generally express the need for the services energy provides, and identify problems with particular energy sub-sectors, without recognising that they are identifying *energy* problems. Energy is more of a conceptual tool for planners than a priority need expressed by rural people. At village level, therefore, planning should follow a multi-sectoral development approach, and the IREP-oriented investigation should seek ways of extracting energy needs from the prioritised needs for general services and infrastructure. If the investigation concludes in the affirmative, that is, that IREP is worthwhile and possible for South Africa, and IREP methodology begins to be implemented in a formal way, a mechanism will be needed to enable a decentralised government tier (district level, for instance) to extract energy information from a general, multi-sectoral development planning process. If this is the case, establishing 'IREP Cells' in addition to the centralised IREP Unit may be called for.

IREP Cells would need to focus on database development. Although basic energy demand and supply analyses may be possible, most important is for this cell to collate and manage energy data from the various data collection mechanisms. It would need to coordinate the energy data collection processes and to record which mechanisms are effective and which are not. The centralised IREP Unit driving the overall process at the centralised level would then need to synthesise this information intelligibly. If possible, the IREP Cell could also supervise the operations the potential rural energy centres, assess impact of interventions already implemented and investigate local preferences towards interventions that may potentially have been implemented. These units could be modelled roughly on FAO's suggestion of establishing 'planning cells' at cluster-of-village level which form part of a larger administrative structure (section 2.4.2). The IREP Cell should be located at a level that is not too centralised that its task of collating data becomes too onerous, but neither too decentralised that an excessive amount of such units are required; the district tier seems appropriate. Of course, operation of the IREP Cell (or any similar mechanism) would need to be properly built into the general development planning process, so that the cell operates effectively and duplication of tasks by other agencies are prevented.

The involvement of rural development agencies in other sectors is also recommended, and drawing such agencies into an energy planning framework will require well-designed pilot exercises. In addition, an IREP initiative would need to work in close cooperation with Eskom at all levels, which would require, in the very least, that Eskom's planning processes are made transparent. Pilot IREP exercises can be designed in conjunction with Eskom's rural electrification programme. As part of the initiative of drawing Eskom into an integrated energy planning framework, Eskom should also be drawn into the development planning framework. It is noted that when cooperating with Eskom, care not to neglect the biomass and the off-grid electricity sub-sectors is essential.

The implications of driving an IREP investigation either nationally or provincially are considered below. Each option would entail establishing an IREP Unit at the respective level, and in each option, IREP Cells at a district or local level may be appropriate in the future. The same requirements regarding the characteristics of the unit, as described in section 5.3, apply in each case. A worthwhile alternative is a combination of the two. A combination of national and provincial government involvement would be in agreement with the discussion of NEC (1990) (section 3.2.1) as well as the considerations in the investigation of the Region F energy planning initiative (section 3.2.2).

A nationally-driven IREP initiative

An IREP Unit at national level would take the general form of an 'IEDP II' (section 3.2.2). It would again require participation from energy agencies and suppliers like DMEA, Eskom and oil companies, development funders such as DBSA and IDT, research institutes such as EDRC, as well as other government departments of relevance, such as DWAF and Agriculture. However, there would be differences with IEDP I. Institutional reform since then is relevant: RDP could play a pivotal role in an IEDP II, as could the National Energy Policy Forum if it is established as proposed in Energy Green Paper (DMEA 1995a, p28).

Also, because of the experience of IEDP I, certain mistakes can be avoided. Most important is the need to house the IREP Unit in a formal institutional setting rather than an ad-hoc, irregular forum with no particular agency obligated or willing to drive it. A unit housed in the DMEA appears to be an appropriate position for such an initiative. This unit could be accountable to an IEDP-type forum that consists of representatives of the above-mentioned agencies. The difference with IEDP I would be that a formal unit – with an office and full-time personnel – would be called upon to implement tasks, and a small, streamlined IEDP forum would provide regular supervision and arms-length guidance. Support for the IREP Unit from the RDP is desirable, as is the active involvement in the IREP Unit's operations of line departments, particularly the rural-based Departments of Agriculture and Departments of Water Affairs and Forestry. In this regard, an alternative to establishing a single IREP Unit is to model the insitutional setup of IREP on the FAO's recommendation (section 2.4.2) of establishing a combination of units in different national-level bodies, so that the provision of political support, the production of rural energy plans, and the implementation of rural energy programmes can each be performed in the most suitable institutional context.

Wherever the IREP unit is placed, consideration of the necessary finances and human resources for the unit is necessary. Since financial trade-offs are inevitable, a long-term life span rather than an extensive personnel base should be sought, because it is from a long-term perspective that changes in energy conditions is best observed. The experience of IEDP I also showed the danger of an ambiguous definition of its mission and a short-sighted pilot project strategy. A new initiative will need to define concrete outputs, and design a pilot programme (of experimental exercises at various institutional tiers) with foresight and caution, for if this initiative fails or is inconclusive, an integrated energy planning approach will likely never to be adopted: there is meagre hope for an IEDP III.

In addition, good communication links should be established with provincial governments, for it is at this level that rural development will be coordinated and that a more contextual perspective of the development process will be possible. Also, a mechanism to coordinate its investigations with the rural electrification planning process will be necessary, because the status of electrification in villages will significantly affect residents' openness to non-electricity options. Some mechanism is needed to encourage cooperation from other agencies, such as Eskom, other departments and provincial government. The mechanism could either be a carrot or a stick – an incentive or a regulation – but what is clear is that a formal arrangement is far superior to an expectation of voluntary involvement.

A provincially-driven IREP initiative

An investigation as to the potential of IREP and the resolution of rural energy problems driven from provincial level would have the immediate advantage of being closer to the problems than with a nationally-driven initiative. Provincial governments are familiar with their rural areas, and would thus be more aware of conditions therein. Provincial government has the responsibility to coordinate rural development, and energy planning could thereby enjoy good integration with other economic sectors. Also, provincial government is more accessible to rural people. This may entail a body at national level providing broad coordination of the process while an IREP unit at provincial level could perform most of the IREP methodological procedures, as advised by Pereira (section 2.4.2). The scope for this strategy depends on the efforts of provincial government in question: for example, in some provinces, even people in remote and isolated villages are encouraged to (and do) write to the provincial RDP office for assistance, but in others contact is sparse. One may expect exemplary provinces to lead the way in rural development methods, covertly compelling slower provinces to emulate them. It is sensible, then, that an initial provincial Energy Initiative should be placed within one of the leading provinces.

Similar requirements to an initiative at national level apply to one at provincial level. A formal institutional home is necessary so that the investigation can be driven proactively. Finances, time horizons and personnel for the unit are important considerations. A mission statement must be defined unambiguously, with concrete outputs by definite dates. As with the national initiative, good, arms-length supervision by an intersectoral forum for the unit would be advisable, with the assurance of regular, timely feedback. A national-level IEDP-type forum may be suitable, but an equivalent forum at provincial level seems more logical. The forum would link sectoral departments like Agriculture, Environment, the department responsible for

land reform, energy suppliers like Eskom and BPSA, funders like DBSA and IDT, relevant NGOs and CBOs, research institutes such as EDRC, as well as representatives from relevant national departments, like DWAF and, of course, DMEA. The unit could be housed in a line department, preferably one as multisectoral and rural-focused as possible. A pivotal role could be played by the Provincial RDP Office, with their strong influence and intersectoral linkages, to encourage these agencies and departments to play an active part in the initiative.

Arguably, a provincial initiative would have less capacity, in terms of skills and resources, to investigate a rural energy strategy than a national initiative. Administrative skills and financial resources at provincial level are likely to be lower than what would be available at national level, but the understanding of the local problems and ways to address them are likely to be better. With rural energy, in contrast with the energy sector in its entirety, the technical aspects of IEP such as modelling and balancing are less important than a hands-on feel of *what to do*. Moreover, national level can provide a provincial initiative with support, in both skills and resources.

While an energy database should arguably be *managed* nationally as Bhatia advises (section 2.3.2), provincial government seems well placed to coordinate data *collection* effectively. This is also in accordance with the former NEC's suggestion that energy database development be implemented as a national/provincial cooperative (section 3.2.1). While national government involvement can help bear some of the costs, provincial government involvement is valuable to link with the development programmes in other sectors, which are mainly implemented from this level (for example, land reform, the agricultural BATAT programme, and environmental management). Furthermore, the emphasis of local participation in most of these programmes a participatory database process to be implemented. A data collection process should not be energy-focused, but energy data should constitute an integral part of a broader development database programme. Existing processes that allow participation by local communities should be utilised, and gaps in this regard should be filled. As with national government, but more applicable in provincial government because of its focus on rural development, is the need for an awareness campaign regarding the energy dimension in other sectors.

5.5 Pilot exercise strategy

The original intention was to include in this dissertation a set of criteria for selecting pilot integrated energy projects, and to make specific recommendations as to actual pilot project sites. However, after review of the theory of IREP (specifically the principle of community-driven planning) it does not seem appropriate that an individual, desk-based researcher select pilot projects, the results of which may have pivotal impact of whether an IREP process is implemented in the country or not. Project selection needs to be the concerted effort of a wide spectrum of stakeholders: rural people, energy suppliers and government. Local government in particular could play an essential role in this regard. With such an approach, there would be greater awareness and support for the programme, and it would be more able to take into account conditions such as political strife and on-going institutional fluctuations.

Furthermore, upon investigation, a set of integrated energy projects on their own does not seem to hold much promise. Certainly, projects are an important component of an investigation into the worth of an IREP process for South Africa, but alone they are unlikely to provide the information which a comprehensive investigation requires. To assume that isolated projects will expand into a larger energy planning process is a short-sighted strategy and a confused interpretation of IREP methodology. What will have greater impact than local level integrated energy projects is a campaign to reform rural development administrators' *perception* of the energy dimension in their existing activities. Awareness of IREP could enable an integrated energy perspective to be born out of the general development framework.

Integrated energy projects such as the one in Umvoti Valley (section 3.2.2) are badly devised because, simply, energy is an unnatural lead sector in development. Rural energy projects are undoubtedly a valuable component of an integrated energy strategy, but only if they are aimed at rural people indirectly. Energy is invariably not an expressed need, and rural energy interventions are thus more likely to be effective if they are disguised as aspects of other development programmes. It is for this reason that, rather than several pilot 'projects', a strategy

should be devised whereby pilot IREP-oriented 'exercises' be implemented at different institutional levels. Those devising the exercises must carefully allocate the inevitably scarce resources to exercises that will be most effective in informing the investigation as to the worth of an IREP process in South Africa.

Two pilot exercises in particular at the centralised levels would be valuable. Firstly, an 'energy awareness' campaign is necessary. This initiative would seek to understand how rural development agencies understand energy issues, how they would respond if they were informed of its significance in their sector, and to what extent they would be open to the implementation of an energy planning initiative in conjunction with their current operations. The campaign would also call for the consideration of energy dimension in rural development and in rural electrification. The means by which this campaign is 'waged' may entail convening national or provincial workshops to propagate the IREP perspective, and/or it may include employing an Energy Officer and giving him or her the mandate to inspect and modify the terms of reference of various departments' planning process. For example, terms of reference for planners of a small-scale agriculture development programme should consider the energy demand in agricultural activities, such as energy for tractor engines, irrigation pumps and crop processing, and conditions of relevant energy supplies, such as those of diesel oil, paraffin, biomass cover, solar energy and grid electricity, to meet the sector's energy needs. The Energy Officer could possibly double as an Integrated Development Monitor, since energy pervades all economic sectors. The campaign could extend to local levels as well. The (national or provincial) IREP Unit would be responsible for coordinating this campaign, although support from a more influential institution such as the RDP may be required.

Secondly, a participatory energy database process should be developed. Participatory techniques such as those of RRA (section 2.3.2) are especially relevant for rural energy planning because of the importance of gaining a textured understanding of local conditions. The process should also experiment with various mechanisms to achieve data collection. One option is the utilisation of information centres (section 2.4.2): rural people seeking information can be encouraged to provide information at the same time. Such information could include demographic, social, and economic details of their living and working conditions, as well as directly energy-related data such as fuel preferences, conditions and prices of energy supplies, extent of multiple fuel use, and significance of energy problems in comparison with other development needs. General information centres seem more appropriate than centres that focus on energy issues, and staff could be given training regarding energy issues. Another possible mechanism for energy database development is to provide Community Development Facilitators (section 4.3.2) with energy training. Another possibility is encouraging local schools to feed back information via local government, on condition that information collected in this way is for a clearly defined purpose, such as data of biomass consumption and conditions of biomass resources which is notoriously difficult to collect. Of course, these various mechanisms are not exclusive, and a combination of them and others is advisable. What is important is that the conventional techniques of data collection which concentrate solely on quantitative, questionnaire-based surveys is unlikely to prove effective because of the complexities and dynamics in rural energy conditions. Through experimentation mechanisms which even seemed far-fetched could turn out to be very effective.

Pilot energy planning exercises at district and local government levels would also provide interesting information, but only those areas where decentralised government is already operating effectively would be appropriate. Local government could be requested to implement various energy-related tasks. These may include investigating the potential to broaden the scope of electricity committees, inquiring into the different perceptions of biomass problems and their solutions, and exploring ways of improving rural people's understanding of energy efficiency and energy safety. A useful pilot exercise at district level may be the extracting of energy needs from the lists of prioritised needs for general services and infrastructure which villages have been encouraged to compile. If no sufficiently competent district government is available, such an exercise can be performed at provincial level of a particular district.

Pilot 'integrated energy projects' would also constitute a component of a pilot exercise strategy. It is noted that results of such projects can be misleading, especially when many people misinterpret integrated energy projects for IREP. IREP is a planning perspective, a way of viewing the development planning process, within which sub-sectoral energy projects happens

to constitute a part. A value of pilot projects is to demonstrate that the IREP perspective has legitimacy. If this is the intention, much care is necessary to ensure that such demonstrations are at least partly successful, otherwise it may be better to avoid them altogether. Besides the criteria that projects must be effectively planned, implemented, monitored and evaluated, it is crucial that, for the maximum success of pilot projects, they are cautiously selected, and with extensive consultation with a variety of stakeholders.

Even though the selection of pilot projects should entail extensive consultation, certain general criteria are applicable. The IEDP (section 3.2.2) arrived at an extensive list of such criteria (IEDP 1993, Annexure II):

- Link with existing initiatives and form part of a wider programme
- Willingness of local community to participate
- Projects that are implementable and replicable
- Use existing institutional capacity and infrastructure on the ground
- Must add value to total output
- Must respond to demand/needs
- Need to be representative (demonstrating the problems of the area)
- Balance the portfolio spatially and economically & take cognisance of different demand categories – households, services, and small businesses.
- Availability of local community leadership structure and local resources (such as local labour)
- Suitable project benefits compared to costs
- Economically sustainable
- Positive environmental contribution

Certainly, these criteria are apt and useful. However, they are insufficient. When one considers that in the Umvoti Valley – the first project selected from the above criteria – the community is relatively wealthy overall, biomass conditions are not a problem, and it had already been in contact with Eskom for more than two years and were thus impatient for access to electricity services, its selection as a representative site for an integrated energy project indicates that other criteria are more relevant. Its selection is also indicative of a shortsightedness on the part of the IEDP. If the sincere intention is helping people to meet their energy needs – rather than dumping on them a conceptual invention called ‘integrated energy’ – then a proactive search for suitable project sites is necessary rather than passively accepting an existing prospective customer of Eskom. This affirms the need to draw on the input from a wide spectrum of stakeholders with regard to project selection.

The question ‘Where would results be most significant?’ is a crucial issue in this regard, for it is these communities that should be targeted first. There seem to be three main possibilities. Firstly, communities with little chance of receiving electricity for a long time – and are suitably communicated of this – would naturally be amenable to alternative energy options (including off-grid electricity) to meet their energy needs. These would include communities in very remote rural areas, communities with very dispersed households, and communities in areas to which it would be very difficult to extend the grid because of geomorphological conditions. In addition, communities who receive only partial grid electricity through a load-limiting scheme may be open to additional assistance with energy services.

Secondly, communities which have already received electricity are likely to continue to lack certain energy services, particularly the more energy-intensive services since they result in expensive electricity payments. Remaining post-electrification energy needs are likely to be most noticeable to the poorer households and women who will continue collecting fuelwood; if this is so, and if their needs can be voiced and heard, an integrated energy approach would be appropriate.

Thirdly, poor communities that have critical energy needs, such as dire shortages of biomass energy, are automatic targets for an integrated energy strategy. Also in this category would be communities that operate on a predominantly subsistence economy. Such communities are unlikely to afford most electricity services. An appropriate strategy here may be combining non-electricity energy options with the provision of off-grid electricity (which would be capable of providing the same electricity services which most people would use had they access to grid electricity anyway). Since this strategy would likely raise political controversy, in the context of

the political rhetoric of 'electricity for all', much public debate would be needed. This would be fostered by giving the electrification planning process the transparency the public deserves.

It is noted that communities whose access to grid electricity is imminent would also likely be open to combining electrification with additional energy interventions – such as was the case in the Umvoti Valley project. However, the impact of this option does seem hopeful because community residents are likely to envisage themselves using electricity for all their energy services, thereby distorting the accuracy of the expressed demand for other energy sources. After electrification, when the reality of the cost of electricity and electric appliances sets in, residents would then be more eager to investigate other energy options. Nevertheless, electrification planners should not give up hope: a strategy that would address this situation, and potentially resolve it, would be to launch a pilot programme of taking representatives from communities expecting imminent connection to the grid to other communities who have had access to the electricity grid for some time, and yet continue to meet many of their energy needs with non-electricity fuels. Who knows – the impact could be extraordinary, with the respective communities considering additional energy interventions to meet their more energy-intensive needs. If this is the case, it would be a valuable opportunity to allow electricity-specific considerations, such as when, to whom, and at what level electricity should be supplied, to become part of a broader energy planning process.

An additional strategy which could potentially prove highly successful links IREP-oriented exercises onto existing rural development initiatives in progress in other sectors. The reader is reminded of the recommendation of Sinha *et al* (section 3.1.1) that integrating energy interventions with local economic development is more important than integrating interventions in different energy sub-sectors with each other. 'Piggybacking' energy interventions onto existing initiatives is a means of putting this recommendation into practice, with the added advantage of reaching communities indirectly – a useful factor in gaining local approval for non-electricity energy intervention. The land reform programme (section 4.3.1) is a prime opportunity, as its strategy is to perform an integrated planning approach towards the development of a pilot district in each province. The emphasis on integrated planning indicates that integrated energy planning could be naturally included in a useful way. Furthermore, since the land reform projects are blessed with the Presidential Lead Project label, they enjoy good financial and political support. Also, pilot districts rather than specific pilot communities (like Umvoti Valley) are being tackled at the outset, which lends itself well to an energy planning approach: not too local that a broad perspective of energy flows is neglected, but not too broad that a disaggregated perspective is lost. In addition, these projects create a situation in which the ability of provincial government to implement intersectoral cooperation (so essential for energy planning) is being tested.

Other Presidential Lead Projects are also important 'piggybacking' opportunities for IREP. The extension of municipal services is an example, but perhaps more interestingly is the small-scale farmer development programme BATAT (section 4.3.2). This could be useful in building energy planning capacity at decentralised levels and simply to address the energy dimension in small-scale agriculture, as well as potentially launch an agroforestry initiative. An energy component within this programme would help resolve the tension between energy for production and energy for consumption needs. Other rural development programmes are relevant as well. Social forestry projects are a possible aspect of an IREP initiative, but caution is required here because the growing of trees does not necessarily result in increased production of biomass energy (4.1.3). In general, rural development initiatives serve a useful opportunity for IREP to gain a foothold, but at the same time such initiatives would be enhanced by incorporating the energy dimension into their planning activities.

Since this report recommends that pilot exercises at different institutional levels be implemented, it seems sensible that exercises be selected in one region rather than dispersed haphazardly throughout the country. An integrated energy initiative needs to pool all available resources so that the danger of an inconclusive answer from an IREP investigation is minimised. If IREP is shown to be profitable in one province, for instance, it will be easy then to instigate a similar process in other provinces. Therefore, district-level exercises should occur within one province, local-level exercises within one district, different village-level exercises within one local area. This will facilitate the investigation in that one government at each tier would be involved rather than several. The suggestion that the involvement of different governments

would enable a comparative study is not sensible in the context of energy planning struggling to gain a foothold at all. A significant criterion in the selection of pilot exercises, along with the considerations of electrification status and conditions of biomass supply and socio-economic characteristics, is therefore projects within areas that are represented by governments that seem most advanced along the path of integrated, people-driven planning.

From a cursory investigation, it appears that Mpumalanga Province is a good possibility for pilot exercises, since there has been surprisingly rapid progress in institutionalisation at all levels for the predominantly rural province, and because it has some experience in energy planning from the operation of the former Region F Energy Task Group (section 3.2.2) – bearing in mind that many individuals who were involved on this forum are still employed in Mpumalanga Government. Moutse District of Mpumalanga could be a useful district within which to implement decentralised pilot exercises, considering that this is the pilot land reform programme for the province. Moutse has the advantage of being part of the rural-based Mpumalanga Province, while still allowing fairly close access from Gauteng. However, these areas are mentioned merely in passing rather than as specific recommendations. If Mpumalanga is selected, Mpumalanga Government should be engaged in the appropriate manner so that they take ownership of the initiative.

5.6 Conclusions and shortcomings

It has been pointed out that if Integrated Energy Planning is possible for rural areas of South Africa, then benefits – to both rural people and to the overall rural economy – could be considerable. A far-sighted, adequately-funded investigation into this question is certainly justified. The investigation need not focus on IREP methodology specifically, but rather on IREP principles of employing an end-use-oriented, people-centred perspective, integrating energy sub-sectors from a resource conscious perspective, and contextualising energy planning by integrating it with the broader development planning in other economic sectors. It is necessary to focus on the problem before consideration of the solution is appropriate. Most important, though, is the requirement that a formal institutional unit be established to drive the initiative. The existence of such a structure will help ensure coordination of the process, monitor it so that experience is recorded and lessons thus learnt, and allow for the process of experimentation to be an on-going one.

Instead of an investigation focused around community level pilot projects such as the Umvoti Valley Integrated Energy Project, a set of pilot exercises at different institutional levels is relevant for such an investigation. Pilot exercises may include extracting energy data from an existing process (district or local level), balancing energy demand and supply and devising energy interventions (provincial or district level) and coordinating the overall initiative (national or provincial level). Exercises could be structured so that, if IREP is later implemented on a wider scale and in a more methodological way as a result of the investigation, much of the institutional and procedural requirements will already exist. In addition, an 'energy-awareness' campaign could span many institutional levels, from local to national levels or part thereof. At local level, pilot exercises should focus on accessing rural people indirectly, because of the nebulousness with which local people perceive the concept of 'energy'. This would include the important possibility of 'piggybacking' onto existing rural development programmes, notably that of land reform, as well as building an energy dimension into the data collection processes in other sectors.

Various shortcomings of this report are worthy of mention. Firstly, because its scope was of a very broad nature, only a limited depth was possible. Various issues should be expanded in subsequent inquiries into this matter, including in particular (a) definite mechanisms for rural energy database development; (b) a more comprehensive review of the rural development process in the country; (c) an analysis of the financial implications of implementing IREP; and (d) more extensive institutional investigations of an IREP process at various government tiers, such as necessary human resources and more details as to how initiatives at different tiers should be structured internally and linked externally. In addition, the timing of this project was perhaps somewhat premature, considering that since there is still much uncertainty of the institutional framework at all levels, clarity as to the way forward is lacking. (On the other hand, the project is timely in that it may contribute to the debate around rural development and the

energy sector before the institutional structures implicated by IREP are firmly established and are thus still open to modification.)

IREP is a planning methodology, but it is also a way of viewing the world of rural development – perceiving energy as a sector in its own right, becoming aware of its pervasive presence in the economy, and recognising the need for a genuine community-driven approach if problems are going to be resolved. Even if the detailed IREP methodology does not gain support among the practitioners of rural development, there is no reason why the IREP perspective should not be adopted, for its essence is the indisputable verity that rural energy users deserve more attention in the New South Africa, and that the complexity of their energy needs requires an integrated approach in meeting them.

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