

Surrey Energy Economics Centre

**THE FUTURE CONDUCT OF ENERGY POLICY
IN THE THIRD WORLD**

Edited by: P J G Pearson

With papers by:

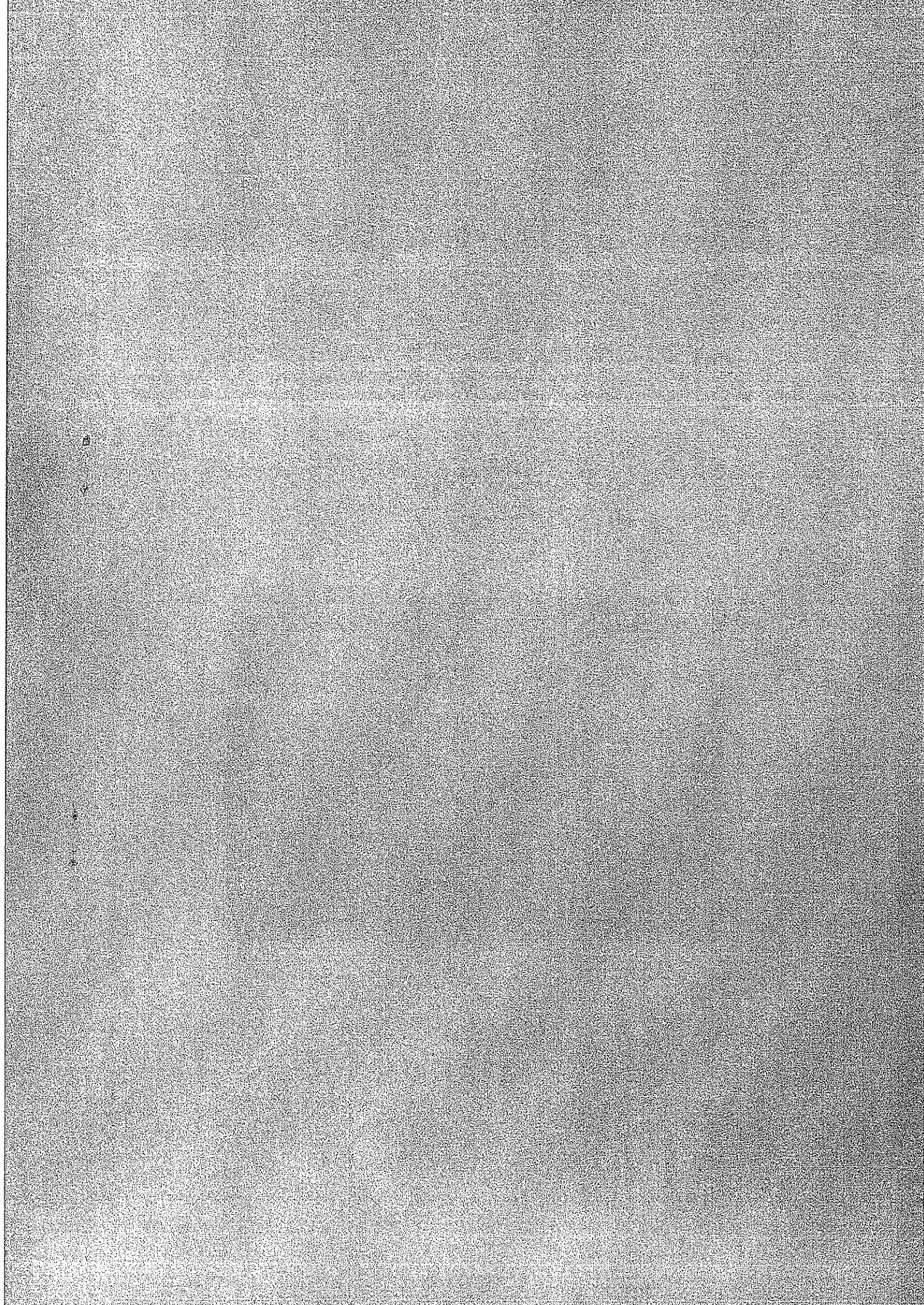
**P J de Groot, D O Hall, M M Hedger, G MacKerron
P O'Keefe, A de Oliveira, and J Soussan**

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PREFACE

The influence of energy on the quality of individual lives, the high opportunity costs of fuel supply and use, and the important - but only partly understood - relations between energy policy and economic development, mean that Third World energy policy deserves regular appraisal. While few Third World countries had any effective energy policy-making systems before the first oil price shock of 1973-74, by the third shock of 1985-86 most of them had in place some form of planning system. Moreover, these systems were no longer concerned solely with 'modern', often imported fuels like petroleum. Partly because of the identification of the 'woodfuel crisis', they had begun to embrace and even sometimes to integrate the treatment of traditional fuels. They had also started to fill the gaps in training, data and analysis that had been so cruelly exposed by the energy crises of the 1970s.

Whilst these developments indicated that some of the key problems of Third World energy policy-making had been addressed, they did not - of course - mean that they had been 'solved'. The papers reproduced here focus on a number of the outstanding current issues relating both to overall energy policy strategies and to detailed policy formulation and implementation. In particular, they deal with the following areas: overall energy planning and its relation to sustainable development in Africa (Phil O'Keefe and John Soussan); the effectiveness in practice of recommended ways of organising national energy planning systems (Merilyn McKenzie Hedger); electricity planning, efficiency, privatisation, competition and regulation (Adilson de Oliveira and Gordon MacKerron); the design, appraisal and implementation of local energy-related projects that put the principles of sustainable development into practice (Peter de Groot and David Hall). While the papers by O'Keefe and Soussan and de Oliveira and MacKerron examine critically general strategies and principles of policy, the papers by McKenzie Hedger and de Groot and Hall reflect on the lesson that specific experiences of energy planning and project implementation have to teach.

The papers reproduced here arose out of a meeting of the Third World Energy Policy Study Group. The organisation of the group is based at Surrey Energy Economics Centre (SEEC) in the Department of Economics, University of Surrey. The Group's activities have received financial support through grants from the UK Economic and Social Research Council. This meeting was held in September 1989 in the Department of Engineering at the University of Reading. It was organised by Joy Clancy and Rhoda Phillips at Reading, with assistance from Peter Pearson, Paul Stevens and Sally Silverman at Surrey. The final word-processing of the text of this Discussion Paper was carried out by Isobel Hildyard.

Peter Pearson
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AFRICAN ENERGY POLICY: ISSUES AND APPROACHES

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SUMMARY

This paper looks at issues which must be considered in any discussion of African energy policies. It has three objectives:

- To review past experiences in energy policies in Africa.
- To outline objectives and directions for future African energy policy.
- To establish criteria for programme formulation and project identification in the energy field, and to outline an agenda for activities necessary to support the development of future policy directions.

In fulfilling these objectives, we analyse the following issues:

- The development and environmental context of energy policy, based on an analysis of end-uses and the goals of sustainable development.
- The structure of energy planning institutions and their ability to operationalise new approaches to energy policy.
- Energy policy issues associated with rural end-uses.
- Directions for energy policy to meet urban and industrial energy needs.
- Policy issues associated with energy supplies.

1. INTRODUCTION

1.1 The purpose of this paper is to inform and stimulate the debate on the future direction of energy policies in Africa. There is a wide awareness that the context of energy policy has changed in recent years, change hastened by falling oil prices, the acceleration of environmental problems in Africa, the acknowledged failure of many past policy directions in energy and the call for sustainable development strategies. These changes have caused many major donors to pause and reflect on their contribution to future policy directions. There is a need to re-appraise the role of external assistance in the formulation and execution of energy policy. This paper, and the discussions and consultations which accompany it, are a part of that process.

1.2 This draft has been prepared after a series of interviews with key actors in the energy field in The Netherlands, as well as a number of experts in the EEC and elsewhere and after reviewing a large number of documents on recent project experiences. It will be circulated for comments to key people in Europe and to a selected group of African energy experts. The African experts have been invited to a review meeting in Africa, where the issues the paper throw up will be discussed in detail. Following this review process the comments advanced will be incorporated into a redraft of this paper where appropriate.

1.3 The interviews conducted to date illustrate well the scope of the current debate, as well as the uncertainty which surrounds future energy policies. There was also a surprising amount of consensus on a number of key issues; most particularly where we are drawing on past experiences. In this draft we attempt to illustrate where consensus was strongest and where the debate is most open. In doing so we necessarily simplify and summarise the valuable contributions of the experts we consulted. Whilst we have attempted to take account of the opinions offered, the views expressed in this draft paper are, of course, ultimately those of its authors alone.

2. THE DEVELOPMENT AND ENVIRONMENT CONTEXT OF ENERGY POLICY

2.1 The building of energy policies in Africa must be based on a development trajectory which strives towards growth which is sustainable in environmental and economic terms and takes account of constraints imposed by an unfavourable economic climate and environmental resource limits. Much uncertainty surrounds the meaning of sustainable development. In essence, it is a call for policies which maximise growth without jeopardising the position of vulnerable people or depleting the future viability of the resource base. It seeks to redress the dominant policies of the past, which have sought growth alone, but is also not anti-development. Sustainable development

recognises that existing production systems cannot survive unaltered in a changing world. They must adapt to new circumstances if they are to continue to provide for the needs of the majority of Africa's people.

2.2 Population growth and urbanisation are changing the ways resources are managed, but both are driven by rural poverty and insecurity. Real and secure increases in rural standards of living are fundamental development goals if poverty and environmental degradation are to be addressed. There is some debate over the significance of population growth rates. Fears were expressed about the survival of the biomass resource base, but such fears tend not to take full account of the significance of urbanisation processes in Africa. Urban growth rates of up to 10 percent per year are the norm in Africa, and what were rural societies are becoming increasingly urban-focused. Urban populations will outstrip rural ones in much of Africa within a generation and in many areas rural populations will grow only marginally in the future. Already many areas face key labour shortages in agriculture, a pattern which will become more widespread whilst rural opportunities continue to be so limited.

Resource pressures do exist, and are a critical constraint in particular in semi-arid environments. These pressures are more to do with livestock populations and the alienation of rural communities from land resources than simple demographic growth. The spectre of widespread environmental collapse associated with demographic trends can be discounted. The corollary of this conclusion is that urban energy demand is of increasing importance, and for some countries may become the dominant energy policy issue in the near future.

2.3 Africa's economic crisis is a vital conditioning factor for energy policy development. Real tensions exist between these long-term development goals and short-term economic necessities. Capital and foreign exchange are scarce, economies are small and vulnerable to international economic cycles and institutional and human resource capabilities are weak. Above all, the burden of debt servicing undermines many other policy hopes and directions. The responsibility for this debt burden lies with the First World as much as with Africa. Volatile interest rates, changing foreign exchange regimes and the misguided development policies of the past have all contributed to the debt burden. The current fashion for rigid conditionality and imposed structural adjustments make things worse by undermining long-term development potential in order to cope with short-term economic crises.

That fully effective national energy policies cannot be developed until the debt crisis is solved is not questioned, nor is the need to seek solutions at a political level. What is a matter for fierce debate is whether energy policy can contribute to this process. International initiatives around energy and environment issues certainly have a role, in demonstrating the consequences of current directions for the future of vulnerable people

and environments. These issues are inherently cross-border and multi-sectoral. In creating international initiatives we can take advantage of these characteristics to encourage cooperation which has wider implications. That adjustments, and a sense of economic realism, are needed is undeniable, but cures which kill the patient are no way out of Africa's current crisis.

2.4 Energy sector investments, such as large power schemes, which were based on false assumptions about economic growth and which have consistently under-performed play no small part in this. These past mistakes must be avoided. This requires a realistic approach to energy investments. Their role in development trajectories needs to be clearly laid out, and where uncertainty exists caution needs to be exercised. Energy policies must be seen as part of the total development process. Individual projects should be viewed in the light of their contribution to energy transitions defined around the development process. This necessitates a dynamic, strategic perspective. To judge energy projects simply in terms of their internal viability is to replicate the mistakes of the past.

2.5 There is agreement that the different circumstances of different countries, and localities within countries, make generalisations about African energy policies problematic. Our goal is to draw out common issues and processes, not to outline firm "blueprints" for energy policy. Policy formulation must be sharply focused to take account of the locally-specific nature of energy use and problems, viewing them as a component of integrated local production systems. The planning of interventions and research agendas must be similarly sharply focused, to understand and build from the constraints and opportunities of locally-specific economy-environment relationships.

2.6 The environmental dimension is central to energy policy. Biomass fuel use cannot be distinguished from other forms of biomass resource exploitation, and is associated with problems of land degradation throughout Africa. Energy policies can play a key role in arresting this degradation. Fuels burnt in the household are key factors in health and safety problems, particularly affecting women. At a global level, fears of air pollution and climate change are tied to current and future energy use. All these and other environmental impacts must be fully accounted for in energy policy directions. They are externalities which must be internalised into policy choice and project evaluation. Decisions must be based on the real cost of energy use, not current market values which typically reflect significant degrees of externalised costs. Part of this, and a factor of wider significance, is the need to generate energy policies which are based on a long-term perspective. This requires a commitment on the behalf of donors to provide long-term support at both the policy and the project level. Without such long-term commitments energy policy will have little to contribute to true sustainable development.

2.7 The role of the state and of market mechanisms is a key area of policy debate. There is general consensus that the state does not have the capacity to take a dominant role in energy provision or, in particular, distribution. The role of the private sector in energy production and market mechanisms in distribution needs to be clearly established. The limited capacity of the state suggests a central role, but the extent of control over market mechanisms is a key area of debate. Throughout much of Africa the market has been no more successful than the state in providing for energy needs. The extent to which this is due to restrictive state legislation is a contentious issue, but whilst the private sector has a greater role to play care is needed to avoid embracing unrestricted market mechanisms on the basis of ideological assumptions as ill-founded as those which in the past placed prime responsibility on the state. At the very least market mechanisms need a considerable amount of nurturing and control if they are to provide for Africa's energy needs.

The role of the state is to create an environment in which markets can operate effectively, but this will require a considerable level of intervention. Within the private sector small-scale enterprises (small farmers, local entrepreneurs and traders and so on) should take a leading role. For this to happen they will need considerable support and protection. The state should be the leading actor in areas such as infrastructure provision, ensuring safety and product standards, enforcing acceptable levels of environmental quality and providing technical and managerial expertise where required. These issues are as yet far from resolved. We return to them in a number of places below, but clearly the extent to which the state should regulate and participate in energy production and distribution will continue to be contested in the future.

2.8 The focus of energy policy must be in the context of defined development goals to achieve efficiency of energy production, equity in access to energy resources to satisfy basic needs and to strive towards self-reliance in energy provision at local and national scales. All of these factors need some level of qualification.

Efficiency is a key energy issue, and sectors such as transport and industry have considerable potential to increase their efficiency of energy use. Across all sectors, the notion of efficiency should be seen not just in energetic terms, but in terms of the contribution of energy measures to the overall efficiency of economic activities. As such, the goal is not to save energy, but is rather to strengthen the viability of energy-using enterprises. The energy-intensiveness of development is a central issue here for energy policy, which should seek to encourage development paths which achieve growth with lower energy use than in the past.

Equity is a contentious issue. Clearly, many people in Africa are faced with development problems which are unacceptable. Energy problems are just part of their struggle to survive, but energy policies can contribute to the improvement of their overall situation. This problem-based focus must be balanced by a recognition that the likely

effectiveness of investments which target the poorest of the poor tend to have very poor returns. Their very poverty defines out a range of energy uses which can contribute to the wider development process. Such energy initiatives are better focused on areas which have the best potential for their successful introduction. Energy policy must seek to harness opportunities as well as solve problems.

At both local and national levels self-reliance is a desirable goal, and indeed is a central tenet of sustainable development. This goal should not be used to justify policies which are clearly not viable in other terms, however. Self-reliance is important but is in itself insufficient grounds for an effective energy policy.

3. ENERGY INSTITUTIONS AND POLICY MECHANISMS

3.1 A critical issue for energy policy is the identification of the institutions which should be involved in policy formulation and identification. There is a level of agreement on the principles which must be behind institution choice, but considerable uncertainty over how these principles can be translated into an institutional structure which will provide a mechanism to achieve policy goals.

There is little doubt that institutional reforms are necessary. Existing planning capabilities are too weak and wrongly orientated. These structural weaknesses are particularly acute for management capabilities, which across all sectors of energy activity in Africa are a critical constraint upon the implementation of effective policies. Technical capacities are less of a problem: in many places they are surprisingly good. What is lacking is an effective management structure in which these technical capacities can operate. This is reflected in the widespread failure of past energy policies in Africa. Conventional, large-scale and supply-side dominated energy policies have at best been expensive and inefficient. At their worst they have been economically counterproductive and environmentally destructive, and always they have failed to take account of the opportunities and constraints of specific places.

3.2 We can identify the following basic principles for energy institutions:

- 1) They must be responsive to energy needs/demand. This requires an end-use approach in which energy production capabilities are driven off defined needs. As part of this there must be no pre-definition of technical choices and as much flexibility over timing of interventions as is possible.
- 2) They must contain effective channels for the participation of energy users and providers in the planning process. In particular, they must allow effective bottom-up participation in all stages of planning for local communities who are the intended beneficiaries of energy projects. Large organisations such as oil companies also have a role to play, in providing expertise, knowledge of market conditions and cooperation to agreed goals.

- 3) They must permit multi-sectoral cooperation. It is expected that energy ministries will continue to take a lead role in the planning process, but in many cases other institutions (and in particular ones with extension capabilities) will be the most appropriate executing agency.
- 4) The principles of sustainability, in environmental, economic and institutional terms, must be fully integrated into the procedures of energy planning institutions. In many cases policies for sustainable energy development are accepted, but insufficient attention has been paid to changing the procedural operations of executing institutions to account for the new policy directions.
- 5) The role of the state as a facilitator means that effective decentralisation, in which control over local resources is given to local communities, is needed.
- 6) Positive action to create effective management structures and enhanced management skills is needed to counter the negative impact that poor capacity in this field produces. These initiatives should not be confined to governmental institutions but should encompass parastatal, private and non-governmental organisations. Where management skills and market structures are weak in the private sector action is needed to improve them.
- 7) The role of external donors also needs re-evaluation to ensure that their operations facilitate the creation of sustainable planning procedures. This means that existing practices such as the pre-definition of technical solutions, external control over expenditure decisions and so on must be reformed.
- 8) Energy planning must be more flexible, frequently seeking indirect strategies and building a partnership between local communities and planning institutions. Central to this is the integration of indigenous technical knowledge into planning. It is an essential complement to the traditional expertise of national and external personnel.

3.3 Many problems arise in putting these principles into practice. The most serious is that they challenge the position of existing institutions. These must be willing to give up control over decisions and resources. They are also required to restructure their operational procedures. African institutions are already under-resourced and overstretched. To expect them to undergo such a radical transformation without considerable external assistance is unrealistic. External donors have a key role in providing this assistance. Paradoxically, the weakness of existing institutions offers an opportunity in itself, as they are not already locked into powerful structures which are likely to resist reform. The strengthening of energy planning capacity in Africa is consequently a priority area for action, but only if the strengthening is based on the principles outlined here. Simply putting more bureaucrats in place will make matters worse by putting up greater barriers to effective participation and procedural reform.

3.4 The creation of institutional channels for effective participation is one of the greatest challenges facing energy policy makers. Such channels cannot be driven off energy alone; they must be part of a wider development initiative which seeks locally-defined, sustainable solutions. Making government institutions more responsive to local needs and priorities is a first step, but some form of community organisation is also required to act as a link between local people and external institutions. Energy, which is essentially multi-sectoral, is well placed to take a leading role in the creation of these channels for participation. The exact form of local community organisation will be strongly dependent on local conditions, but they must be built around real issues and possess real control over resources and decisions. Care must be taken to ensure that they do not produce greater and more entrenched inequalities within local areas, but wherever possible traditional forms of communal organisation and resource management should be used and strengthened to cope with the changing circumstances different areas face. Care must also be taken to evaluate traditional forms of local community organisations which can be undemocratic and reactionary.

3.5 An area of particular interest is the scope for multi-country cooperation within different regions of Africa. There is little consensus on the scope for the organisation of such cooperation. Programmes to share experiences, assist in policy development and provide assistance in training and the development of management capabilities have much to offer. The mobilisation of regional cooperation around environmental problems, which are by their nature cross-border in effect, is also an area for policy development. Where possible these should be built from existing organisations such as SADCC and CILSS, and should be temporary and tailored to clearly-defined objectives. A case can be made for some form of permanent institutional structure for such programmes, but the disadvantages of this approach probably outweigh the advantages. This issue certainly requires further investigation, and where opportunities exist external assistance should be provided to facilitate such regional programmes.

Other spheres for cooperation are less clear-cut in their potential. The theoretical scope for cross-border cooperation on electricity production and transfers, shared refinery capacity and joint resource development is great, but practical programmes face many problems, such as the need for infrastructure, the setting of tariffs and political suspicions. Much the same is true for issues such as cooperation on pricing, marketing and so on. Experience to date on cooperation of this sort is not encouraging. Avenues for such cooperation should be actively explored, but are more suited to bi-lateral action than regional initiatives.

These areas of activities centre on government to government cooperation. The scope for regional initiatives which include NGOs, private sector companies and even local people should be explored. Experiences of Networks based on individuals and NGOs such as ZERO, ENDA and the FWD are particularly encouraging and should be

developed. The scope for bringing together entrepreneurs is also an interesting possibility in light of the likely role of the private sector in future energy provision.

3.6 The new approach to energy policy outlined here requires new planning mechanisms. In some spheres, such as natural monopolies like the power sector, the state will continue to be directly involved in energy provision. For most sectors, however, the direct involvement of government agencies in energy production and distribution will be limited to a facilitator role. Even where parastatal companies operate, they need to be free to get on with the job without the burden of excessive regulation and interference from the centre. Local communities and private sector companies should as far as possible be free to take decisions on resource management, production schedules, prices and so on. In particular, artificial pricing mechanisms such as electricity tariffs which do not even cover marginal generation costs, fuel subsidies and so on have had a negative impact on the development of energy markets and investment decisions. Of course, the state has a right and duty to manage economic activities, but such interventions should be for clearly defined development goals, and should be removed when their objectives are reached.

4. END-USE APPROACHES

4.1 Putting energy policy formulation in the context of the development potentials of specific local places is best achieved by adopting an analysis which starts from demand end-uses, rather than the supply-side perspective more conventionally adopted. An end-use approach is also better for identifying real energy needs and priorities, and for specifying where and why multi-sectoral and indirect initiatives are desirable. It reflects how energy is used in the real world, and makes it possible to identify policy priorities which make sense to local people. It is essential if effective vehicles for community participation are to be developed.

5. RURAL END-USES

5.1 The development context in rural areas is the promotion of sustainable development strategies which enhance the security of vulnerable people and fragile environments through maintaining and strengthening rural production systems. Increased self-reliance is central to these strategies, as is increased equity of access to the local resource base. Energy policies will frequently be indirect, and must be tailored to the specific characteristics of different localities. In rural areas energy cannot be considered separately from other development issues. It is just one of the problems people face, and is often not an important priority. Rural energy problems exist nevertheless, and effective policies to address these problems should form a central plank of any national

energy policy.

These policies will be effective where they are integrated into the existing production system. Where resource stresses are felt rural people respond in a variety of ways. Many of these responses, such as conservation and improved management of local resources, contain the seeds of sustainable change. Rural energy policy must build upon these responses, strengthening those which are desirable and finding ways to mitigate the effects of those which are not. The key is not increasing fuelwood production, but is rather increasing the productivity of the biomass resource base as a whole. An urgent task for the planning system is to remove legislation, such as prohibitions on tree cutting or the demarcation of woodlands as state land, which inhibits the local management of biomass resources. The role of the state is to provide the support needed for local people to manage their resource base.

The contribution of rural fuelwood use to environmental degradation, and in particular deforestation, has been the source of debate for some time. Fuelwood use has little impact on the resource base where it is gathered for local use, and the contention that growing population will lead to resource depletion is questionable. Declining biomass resources are a product of changes in land use, and in particular agricultural colonisation. These changes result in a structural change in biomass availability to a new, relatively stable, level. The notion of an inexorable depletion of wood resources until the last tree is felled misunderstands the nature of rural land use systems. As land is converted to new uses in an area existing resources are not completely destroyed, and indeed many agricultural landscapes contain large numbers of trees, bushes and other fuel sources. These trees outside the forest are the most important fuel source for rural people, but have been ignored by foresters and agriculturalists alike.

5.2 This approach has as its central tenet local control of the resource base. Where land has been alienated from local people, as is often the case for woodland areas, control must be returned to them. Similarly, where traditional systems of resource management are being eroded action must be taken to strengthen and sustain them. These systems are extremely complex and locality-specific. Our understanding of their operation is poor, and research into them should be encouraged. To an extent the ignorance of outsiders does not matter, however, what is important is that local people understand them, which of course they do. Their management strategies are based on risk-minimisation through the harnessing of all available niches in the local resource base to meet a range of needs. The key is diversity, with both common and private lands used to produce a wide range of products, of which fuel is one, for the market and subsistence needs. This diversity is why past policies which have focused on fuelwood production as a single end product, have such a poor record of achievement. Rural people have little interest in growing fuelwood trees, but are actively interested in trees which produce fruit, fodder and poles or which provide environmental protection; all of which produce fuelwood as a by-

product. As such, the end-use approach must not just look at energy; it must look at the totality of resource use within local production systems.

5.3 All of this means that there is little point in trying to pre-determine the form of technical intervention appropriate for rural areas. Some basic principles can be identified, but little more. Where increased production of biomass resources is the objective, and especially where it involves new forms of production, then individual farmers should be the starting point. Where improved management of existing resources is the goal, this is usually best achieved through communal management. This is particularly true for the management of natural woodland areas, which in much of Africa are the main source of fuel. Put simply, biomass is produced individually but managed communally. Recent calls for the privatisation of communal land miss this vital relationship, and such a policy will do no more than replace land alienation by the state with land alienation through the market. It will result in the marked deterioration of access to biomass resources for many rural people and, in all probability, produce management practices which are less efficient or sustainable than the communal ones they displace. This bankrupt policy must be avoided at all costs.

5.4 Household energy, which is dominated by the use of biomass fuels for cooking, is by far the largest component of rural energy use, and indeed in many countries dominates national energy balances. The importance of this sector must be recognised in energy policies. These fuels are overwhelmingly gathered freely from the local environment, and for most areas there is no alternative to their continued use for the foreseeable future. Energy policy must recognise this, and where household fuel supplies are under stress develop strategies to ensure their availability. In most parts of Africa women are the main providers of fuel, and their inclusion at the centre of any policy initiatives is essential if they are to prove effective. Central policy issues are the productivity of and access to land resources, with greater equity as a main goal. Policy options centre on resource management as part of the wider production system, whether the objective is enhanced supplies through improved biomass productivity or greater efficiency through improved energy management. Local control of resources is the key to this, and care must be taken to ensure that the needs of disadvantaged groups are provided for.

5.5 Energy use in agricultural production is extremely limited, and indeed in places is a limiting factor on improved agricultural productivity. The key issue is the role of energy in maintaining and increasing agricultural output. Of particular importance is energy availability for activities such as irrigation or crop processing which can increase income without land colonisation. The potential role of new and renewable sources of energy is an important policy issue here, but their development must be based on cost-

effective criteria. In many places commercial fuel technologies such as diesel engines are cheaper, more durable and, crucially, easier to service and maintain. A critical constraint is the absence of developed market structures for commercial fuels. There is a need for positive action to provide the infrastructure and management needed for these distribution systems to develop. Poor fuel security is one of the main reasons why rural energy use is so limited in much of Africa. Production activities above all require secure energy availability, and will typically be willing to pay a higher price to ensure this security. If the potential of renewable energy technologies for agricultural production is to be realised their record of reliability and maintenance must improve considerably. Until they do they will not meet the needs of farmers and are consequently not appropriate.

5.6 Energy for general development, whether it be for service provision, such as clinics or schools, or rural industries, is an area in which increased rural energy use should be encouraged. In many cases these will be new uses of energy which must be promoted if the developmental trap of rural areas is to be broken. Their introduction is decided by development goals outside energy; the role of energy policy is to make it possible to realise these goals. Again, efficiency and self-reliance are important goals, and new and renewable energy sources have much to offer if their maintenance problems can be overcome. These are a specific energy niche in which the potential of new and renewable sources of energy may at last be realised. Such activities have positive development benefits which spread far beyond their own limits, and as such cost effectiveness is a less important issue than for other energy uses. If a high cost energy source is the best way to ensure that such activities are successful then energy policy should be willing to provide the subsidies needed. The total quantity of energy required is very small, and the potential development benefits of activities such as health and education facilities are so profound that their success must be ensured.

6. ENERGY FOR URBAN AND INDUSTRIAL USES

6.1 We have seen that the most rapidly growing area of energy demand is in Africa's urban areas. Current urbanisation trends are such that urban energy use will have overtaken rural energy within the next few decades. This urbanisation process is causing a structural change to the energy economy of African countries which must be recognised and accounted for in energy policies. In these sectors we are concerned with fuels as commodities, whether they be wood and charcoal, fossil fuels or electricity. The closely integrated energy systems of rural areas, in which fuels are produced and consumed locally, are not possible in urban areas. Urban energy policy must be driven off the urbanisation process, accepting as inevitable that rapid growth will occur and recognising the need to provide for the energy requirements of all urban sectors. Past policies have

concentrated almost exclusively on the needs of the well-off and the formal sector, with electricity provision in particular dominating investment. The needs of the small-scale sector, which is the most dynamic component of the urban economy, and of the poor, many of whom are recent and temporary migrants, should move to the centre of urban energy planning efforts.

In cities a number of different energy sources are available for different end-uses. They are in direct competition through their relative prices, but there is more to it than a simple price relationship. Consumers choose between fuels on the basis of their cost, their availability, their convenience and the cost and availability of the appropriate appliances. These factors combine to drive energy decisions by urban consumers. The degree of substitutability is very limited for some end-uses; for example, transport, where oil fuels are the only real choice. The range of fuels which can do the job is far greater for activities such as cooking, where consumers can use a number of fuel/device combinations.

The range of energy-using activities is also far greater in cities than in rural areas. Urban areas contain more industry, a greater range of services and better transport facilities than rural areas. Urban households also tend to use energy for a wider range of uses; reflecting in part their higher incomes and in part the superior availability of many goods in cities. This means that in some ways urban energy planning is more complex than in rural areas. This complexity is mitigated to an extent by the fact that we are dealing with commercial relationships in cities, and that the degree to which policy must be integrated into the production system as a whole is lower. What it does mean is that urban energy planning will use different mechanisms and involve different institutions to rural energy planning. There is a need to ensure that there is adequate coordination between these sets of institutions around issues, such as urban fuelwood or rural commercial fuel markets, which link cities to rural areas.

6.2 Urban households, which in Africa frequently rely on wood or charcoal but which may also use commercial fuels such as kerosene and electricity, are a major policy focus. As in rural areas, the largest energy use is for cooking, but urban households tend to use energy for a number of other activities. This tendency increases with higher incomes, and urban energy policy must take account of this. The concept of an energy transition is central to any understanding of this sector. As urbanisation proceeds there is a tendency for household energy use to increase, diversify and switch fuels from wood and charcoal to commercial fuels. A hierarchy of fuel preference, with wood at the bottom, through charcoal, kerosene and LPG to electricity appears to exist.

Over time there is an observable tendency for households to move through this transition (although it is not a rigid rule; exceptions of all sorts can be found in different places). The speed of the transition is variable, but it can be extremely rapid. The stages are typically not discrete, it is common to find several fuels being used for the same job

within urban households. This is particularly true for cooking, which is the largest component of household energy use. This means that urban household energy use is extremely variable and dynamic. Policies for this sector must take account of this, and in particular must seek to build on existing trends wherever possible.

What drives this transition is unclear, and indeed is likely to vary from city to city. The evidence available is patchy, but it suggests that fuel costs alone are not the determining factor. More important appears to be fuel availability and the cost and availability of appliances. Wood is widely used not because it is cheap, but because it is available in places and quantities which fit in with the life of the urban poor. Urban woodfuel markets are highly-developed and effective distribution systems. The same is not true of distribution systems for commercial fuels such as kerosene or LPG. These suffer from shortages, black market pricing and tend not to reach many peripheral areas where the poor live. Commercial fuel market systems are poorly understood, and their study should be encouraged. Their improvement is a priority for urban energy policy.

In the urban household sector policy concerns are the cost of fuel provision to the urban poor, security of fuel supplies and the impact of urban fuelwood markets on rural supply areas. For the very poor any expenditure is a problem, and in particular few have money available to pay for fuel on anything other than a daily basis. Many migrants to the city are only temporary sojourners whose commitment to urban life is low and who are unwilling to invest in expensive appliances even when they have the cash available. For them, remittances to their rural families are their main priority. As such, the form of payment and appliance costs are as important as fuel costs in influencing energy use patterns.

Security of fuel supplies is a more serious problem than their cost. The poor development of the market systems for many fuels outlined above means that urban households adopt strategies, such as multiple fuel use or using less preferred fuels like wood, which ensure that some energy is available. Insecurity characterises all commercial fuels. In many cities electricity blackouts are a way of life, LPG bottles are often not available even when the fuel is, kerosene is cornered by black market dealers and used to replace diesel fuel and so on. These availability problems also apply to stoves for commercial fuels, which are often harder to get than the fuel itself. Few countries manufacture kerosene or gas stoves themselves, and imports are irregular and expensive.

The impact of urban fuelwood use on rural supply areas is well-established and few commentators would disagree that the consequence of urban wood markets is environmental deterioration and greater pressure on rural fuel supplies. Urban wood dealers do not pay the full cost of the wood and extraction techniques are damaging. Profit margins are typically high, with wood prices reflecting the cost and availability of alternative fuels rather than wood supply and demand conditions. There can be no doubt that growing demand and diminishing resources means that urban fuelwood use is unsustainable in many parts of Africa. Action to mitigate these impacts is an urgent

priority if urban energy is to be provided and rural environments preserved.

The key to policy in this sector is the relative price and availability of different fuels, and both conservation and fuel switching options are attractive. Where sustainable fuelwood supplies can be provided then they should certainly be encouraged, but the potential of wood and charcoal as major long-term urban fuels is limited. Stove programmes in urban areas have a good track record, and whilst wood continues to be used can mitigate its impacts. They also produce substantial improvements to the household environment and the health of women, and this is probably their main role. The future lies with commercial fuels, however, and in particular with kerosene and gas. Electricity will continue to be an elite fuel, both because of the costs involved and because of the problems of provision to mobile populations in often temporary housing. Urban energy policy should seek to assist the transition from woodfuels to fossil fuels as rapidly as possible. The mechanisms to do this are through improvements to market systems and action to ensure the availability of fuel supplies. Subsidies are not usually needed and have other distorting impacts which are undesirable. They should only be used, if at all, as a short-term catalyst to encourage changes in fuel use patterns. Action to improve stove supplies is also needed, preferably through the development of production facilities within the country. In some cases the provision of subsidised stoves for a period is a policy option, as this will produce a critical mass of demand for fuel and stoves which make marketing systems viable.

6.3 The energy needs of the informal sector is again a neglected area. The promotion of small businesses, which are labour intensive, efficient users of capital and highly responsive to local needs and opportunities, is desirable. They operate in similar energy markets to urban households, and face similar problems. This sector is particularly seriously affected by shortages of commercial fuels and electricity black-outs, as this will interrupt their operation and undermine their viability. Energy provision to this sector should be judged on the basis of its contribution to their overall operational efficiency.

The informal sector also has another role, as the means by which energy markets can be improved. The efficiency, consumer responsiveness and flexibility of this sector provide a basis for making up the serious failings of the state and the formal sector in providing for the energy needs of many people in both urban and rural areas. The level of unmet demand is such that small entrepreneurs would be faced with few risks in entering into these markets. This sector can also produce the stoves which are a major constraint on urban energy transitions. The potential for domestic capital accumulation, with wider development implications, is particularly great, and should be encouraged. The main factors which restrict entrepreneurs entering this sector appear to be supply shortages, regulations which proscribe challenges to state oil companies and shortages of appropriate equipment and managerial skills. This issue needs serious investigation, as

the potential of such policies appears to be considerable but our understanding of the processes involved is poor.

6.4 Large industries and commercial activities rely on commercial fuels, and often dominate their availability. It is the needs of this sector which have driven energy policies in the past. In particular, the concentration of investments on the power sector has been justified by the key role the formal sector was assumed to have in the development process. The continual under-performance of these activities has led to a re-assessment of their role and current development strategies assign them a less dominant place. Their role in the development process must be clearly identified and their energy needs incorporated into national energy policy. Past experience shows that the promotion of energy efficiency has considerable potential for many of these activities, and has a short pay back period. Policy directions should centre on efficiency rather than the provision of greater power capacity which cannot be justified by the performance of this sector. The pattern of the past, where the effect of the dominance of the needs of the formal sector was such that other sectors were subsidising it, must be reversed and realistic tariffs charged for electricity, infrastructure, liquid fuels and so on. If energy subsidies are to be provided they should go to the most needy or the most efficient, not the most privileged to cushion their consistent poor performance.

6.5 The final type of energy use to consider is transportation. Energy (and especially oil) use in transport is a major component of national energy balances, and improved transport is a key development goal, and yet this sector has been consistently neglected by energy policy makers. Few alternatives exist to oil for transport, and supply shortages are a major problem in some countries. Demand for transportation fuels is growing rapidly throughout Africa. It presents a problem for energy policy makers, as these fuels are the largest component of the oil imports which are still, despite falling crude prices, largely responsible for much of Africa's trade deficit. Policies which push up the costs of public or goods transport are undesirable for wider economic reasons, but better infrastructure and increased efficiency could improve the situation in many places without significant increases in energy costs. Capital and technology availability are major constraints in this sector, and should be addressed. Private transport is increasing rapidly, and action to curb its use is desirable but difficult to enforce through energy mechanisms. The most appropriate tools are financial levers such as car ownership or road use taxes, excise duties or taxes on gasoline (though private diesel vehicles present a particular problem).

7. ENERGY SUPPLY ISSUES

7.1 Any consideration of energy supply sectors must be driven off the end-use derived issues listed above. A clear picture of resources, supply potentials and economics is needed, but they must be related to defined needs and development goals around issues of efficiency, equity and self-reliance.

7.2 For fuelwood the key issue is the maintenance and enhancement of sustainable supplies within the context of local production systems. Problem areas occur in different environments, but high potential areas around cities and some arid environments are particularly under stress.

The best interventions to date suggest that indirect project approaches that recognise the multiple use of tree products and therefore the need for multiple species, the integration of woody biomass into local production systems and therefore the need to address the land questions, the difficulty of identifying access to existing woody biomass and therefore the importance of defining loose project boundaries and, most importantly, the critical role of women in the production systems and, therefore, the need to let them define technical innovation.

To avoid failure, it is important that supply-side strategies are not strategies which assume that non-market goods, such as wood collection from common resources and open-fire technologies, can simply be turned into high-value commodities. Banks and governments cannot create markets, people do. Most importantly, fuelwood must be seen as a complex problem to which there is no single, simple solution.

7.3 Electricity is a high cost, elite fuel, but has an important role in the development process. Policies must concentrate on improving efficiency in electricity generation and enhancing distribution networks, including through regional cooperation where appropriate.

The first necessity is to move to a realistic costing of electricity. This will require tariff adjustments to, at minimum, cover the marginal costs of generation and transmission. Without such a move, electricity utilities will not be able to generate sufficient revenue for staff development, maintenance and future investment in generation and transmission capacity.

The lack of control over revenue has led to a situation in which electricity supply performance has been poorly planned. Individual utilities reflect government planning preoccupation which emphasises large-scale generation facilities that assume economies of scale and unrestricted growth in demand. This problem of poor planning is exacerbated by problems of poor management where, bluntly, the management and maintenance of existing systems is a secondary consideration to the design and building of new systems. Furthermore, given the reliance on single donors to finance such large-

scale projects and, in turn, donors insistence on recipient countries using donor country equipment, there is a need to standardise equipment in the generation and transmission sectors. Without standardisation, maintenance and efficient operations are difficult goals to achieve.

There is an urgent need to plan for the extension of electricity in an integrated fashion, moving out from the urban areas. The problem of electrifying rural areas is difficult but, where possible it should be attempted through expanding the grid; where grid extension proves too expensive isolated systems, relying on diesel generation or photovoltaics, can provide the necessary technology.

Electricity is highly desirable but much of Africa is not in a position to afford it. Electricity by itself is a necessary but insufficient pre-condition for development. Investment in this sub-sector needs to parallel investment in other development sectors.

7.4 Oil and gas are critical fuels. Supply insecurity is a major problem at both national and local levels but improved infrastructure and distribution systems are needed. Exploration and development of indigenous supplies are essential in a drive towards greater self-reliance.

The balance of payments' problem still exists but oil, in particular, remains the vital fuel for transport and the commercial fuel for household consumption by poorer households. As quickly as possible, it is necessary to move to real consumer pricing for these critical products, not least because real prices will encourage efficient use. Tax concessions and subsidies can be defined for specific purposes after oil reaches a price that reflects global market price. Without accurate pricing, it is difficult to develop the markets for oil products which are poorly developed at the moment because of a combination of restrictive government legislation, political uncertainty, a lack of domestic capital that can be converted to foreign exchange and the small individual national markets.

The role of the oil companies remains a contentious issue. They are key actors who must be involved in policy decisions but their power, not least their ability to provide capital is suspect to countries intent on nation building. The difficulty, however, is that the alternative form of organisation, state monopoly, has a poor track record, not least because the monopoly is of a small market which is frequently defended from global price change by government legislation.

There is an over-capacity of refining capability in Africa but this over-capacity is with technologies that are inefficient in production and provide an inappropriate fuel mix. This over-capacity, combined with management and maintenance of the facilities, means that locally refined fuel is more expensive than that which could be obtained on the open market. However, until security of supply is assured, it is unlikely that individual countries will dis-invest in obsolete capacity. One direction that could encourage such dis-investment is improvement in the capacity for strategic storage within

individual states.

Defining oil and gas at global price level and dis-investing in obsolete technologies of refining are the necessary steps to determine oil and gas planning. In the long-term, the supply price of oil is unlikely to rise. Any short-term price rises are likely to be due to political factors and will be temporary. If such an event occurs, there is a case for donor support to ease balance of payments problems. In the long-term, there is no substantial resource frontier for oil - it is finite but not scarce. The major area where a market scarcity might emerge is with kerosene which serves simultaneously as a household fuel and as jet fuel.

The level of Africa's indigenous resources is unknown, not least because of the low level of exploration. In general, oil companies are willing to explore if there is potential production for export. Exploration is not premised on local need, on domestic markets. There is a potential scope for assistance to individual countries in the highest exploration phase and a potential for regional cooperation to lower risk.

7.5 Coal and new and renewable sources of energy (NARSE) have poorly defined roles but considerable potential. A clear definition of their contribution to development processes is needed.

Coal will chiefly be utilised in electricity generation. While Africa has substantial reserves, the export market for coal is relatively depressed and other continents provide the resource more cheaply. Consequently, there is a low level of demand which, in turn, means that the management and capital for winning and utilising this resource is unavailable. Most importantly, the technologies for controlling the negative environmental impacts of coal before, during and after combustion, are only recently available and comparatively expensive. With certain notable exceptions, Africa's use of coal for electricity production is likely to remain low.

NARSE has a disappointing track record but this essentially because the role of NARSE has been misconceived. NARSE must be defined from a development end use not defined as a simple supply replacement for wood or oil. It can be cost-effective in specific activities in remote locations where the key problem is to identify the energy need, not resource availability. Simplicity and familiarity are the key considerations to ensure maintenance of the technology. Solar and wind are the two technologies with the best track record.

8. FROM POLICY TO PROGRAMME TO PROJECT

8.1 The development of an energy policy along the path outlined above is an essential first step to any resolution of Africa's emerging energy crisis, but on its own will be just so much good intention. For it to have any impact it must first be translated into implementable programmes at the national and regional level.

8.2 These programmes must in turn be translated into specific projects which achieve the goals of a sustainable energy future. Such projects must be based on the characteristics and participation of specific people in specific places. Criteria for project identification and institutional mechanisms for project implementation need to be developed.

8.3 This flow from policy to programme to project necessitates a strategic approach in which energy planning institutions are central, but not the only, actors. A truly sustainable energy future for Africa cannot be achieved on a project by project basis, and in its creation the state must play a leading role.

8.4 To date, Africa has more of a weather policy than it has an energy policy. It cannot develop an energy policy by confusing an instrument, the market, with energy use. It cannot develop an energy policy by substituting price for need, private capital for public investment. Without an energy policy, increasing poverty will produce increasing environmental damage which, in turn, will destroy the possibilities of a sustainable future. Energy policy needs to address a series of problems, sometimes discrete but sometimes interlocking. It is not surprising, therefore, that there is not one single, simple answer, one straightforward institutional mechanism that planners can "take down from the shelf". The energy planning challenge is to plan to maintain diversity of energy supply and consumption.

THE BARINGO FUEL AND FODDER PROJECT

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SUMMARY

Most development projects fail. The Baringo Fuel and Fodder Project (BFFP) in the semi-arid central area of Kenya is clearly different. The project's original aims were to provide fuelwood and fodder while rehabilitating denuded land and controlling erosion by revegetating with useful species. So far the BFFP is an acknowledged success, producing short term benefits of fodder, fuelwood and thatching that have won the project the strong support of local people, while beginning to meet the longer term aim of restoring degraded lands. Although it has now operated for 8 years, there is still much urgent work for the project to do, and long term sustainability cannot be unequivocally guaranteed. In this report we look at BFFP policies and how they have evolved, and attempt to discover why, when so many flounder, this project is a rare exception.

Several factors appear to contribute to success. A major strength of the BFFP is that it does not operate according to a paradigm conceived in some faraway planning office. It first takes the trouble to understand local environmental and social needs. Only then does it formulate a mode of action. At first the BFFP has operated on a relatively small scale. Larger scale action is only proposed when the methodology is right.

The BFFP has always believed that for successful and sustainable development projects they must have the full support of local people. It is almost unique in having a locally born Project Manager with a detailed knowledge of the Baringo area and its problems, and a sociologist who has made a special study of the several ethnic groups living in the locality. The project has developed a good understanding of the needs and wishes of local people through developing and maintaining good channels of communication. Residents are always involved in planning decisions, and have control over the opening of project fields for use by local people.

Although the long term aim of the BFFP is to rehabilitate the badly denuded land in the Baringo area by replanting land with trees and grasses useful to local people, it also aims to satisfy basic needs where possible. This has led to a broadening of the project's responsibilities. It now thinks of itself not in terms of a single issue development project whose main objective is to combat erosion and degradation, but as a catalyst for development in the broadest sense. The project is now involved in other activities that create short term benefits for locals, from building pan-dams for water collection to low key advice on family planning. The eventual creation of a livestock industry that it now envisages will involve the project in many social and economic issues.

This method of proceeding, learning as it goes, has meant that the BFFP has never had fixed targets to be achieved within a given time frame. Goals evolve as they become possible, and with experience. Such a method of operating would never have been possible without initial funding from the Beijer Institute, and subsequently the enlightened support from its donor, the Royal Netherlands Government, which has provided 7 years of funding amounting to around \$1 million. Unlike many major funding bodies, the RNG has not asked for a project proposal that involved target oriented objectives, nor has it applied a system of accounting that expects a measurable, economic return within a given period. Instead it has provided long term support that has enabled the BFFP to establish a solid base of information without pressure of too rapid implementation. This first research phase has allowed the project to iron out technical, social and economic problems which would have proved disastrous if it had been required to move straight into an implementation phase. The RNG has recently indicated that the BFFP is viewed favourably by themselves and by the Government of Kenya, and that they are willing to provide funds for a further 4 years to a level that will enable the project to enter the next phase of wider dissemination, training and implementation on a large scale.

The BFFP is not without its faults, but it usually acknowledges them without letting the problems interfere too drastically with the long term aims of sustainable and locally managed development. The almost unique conditions under which the donor has allowed the BFFP to evolve have produced a rare kind of project with an unusual flair for success. There are many lessons to be learnt from the example of the Baringo Fuel and Fodder Project.

1. INTRODUCTION

In Kenya's National Development Plan for 1974-1978, the Baringo District was singled out for special attention as an ecological emergency area. Over the past 16 years, aid agencies from many countries have lavished millions of dollars on projects that aimed to alleviate the rapid erosion and degradation of the land. Despite the many and varied efforts to conserve the soil and to rehabilitate the land, the erosion continues apace. Today (1989), the livelihoods of Baringo's increasing population is in greater jeopardy than ever before. The development initiatives for the Baringo area have for the most part largely failed.

Paradoxically, if the Baringo Fuel and Fodder Project (BFFP) had been assessed according to the criteria used by many development organizations, it would have been abandoned several years ago in its early stages. This Report suggests some reasons why the BFFP is making an impact where others have failed, and attempts to analyze its significance for other projects. One quality of this project is that it is intimately connected to the physical, climatic, social and economic background of the locality in

which it operates. It can never, therefore, be used as an exact blueprint for other projects; rather it is the principles that are important.

2. THE PROJECT

The BFFP operates in semi-arid, degraded lands around Lake Baringo in central Kenya. Its primary, long term objective is to halt the excessive erosion in the area by revegetating with trees valuable for fodder and fuel, and grasses useful to local people for feeding livestock and thatching. Rehabilitated areas will be managed locally by representatives from the families who live nearby and use the fields. At the start, the priority was to identify the most suitable species, develop suitable planting methods that made deficient use of the scanty and erratic rainfall, and investigate suitable growing and husbandry techniques. The aim was to ensure that the long and short term goals of the project were kept flexible, and always took account of the knowledge and desires of the local people.

3. BACKGROUND

The Baringo District is situated in the central part of Rift Valley Province some 80km north of the equator, and covers about 1 million hectares. The District encompasses a wide diversity of ecological zones, ranging from fertile, well watered highland to semi-arid lowland plains.

Rainfall

The yearly average rainfall varies between 1000 and 1500mm for the highland areas, and 300 to 700mm for the arid and semi-arid lowlands. However, average figures are misleading. Rainfall is erratic and unpredictable, with the greatest variability found in the dry season. Furthermore, rain often falls as intense, localized storms lasting 2 to 4 hours. Such storms produce large amounts of runoff which exacerbates erosion. The data available for the past 60 years suggests that droughts occur on average every four years. (Rowntree 1984, 1986; Wahome 1984; Evans 1988).

Vegetation

Up until the beginning of the present century the vegetation consisted of luxuriant grasses, as thorny scrub was kept out by periodic fires. The grasses grew so high that it is said that a European explorer had to stand on a table to shoot elephant.

With the European settlers, the herding practices of the indigenous pastoralists changed considerably. The settlers took over the fertile farmland of the highlands, forcing displaced peoples onto the lowlands, and introduced new livestock management practices. Higher stocking densities and the restricted movement of livestock, combined with prolonged periods of drought, led to over-grazing. These factors together were probably

responsible for the decline in the growth of grasses. The lack of grass fires and changed grazing practices led to the encroachment of thorn bush, which became thick and impenetrable in some areas.

The past 15 years has seen further dramatic changes in the vegetation. In the lowlands, where the BFFP operates, the dominant vegetation is predominantly Acacia bush, with annual drought resistant grasses. The bush has been cleared for agricultural land, mainly south of Lake Baringo to grow maize and beans, and cut to make charcoal for sale (Rowntree 1986, Wahome, 1984). After the rains grasses and herbs do appear, but these species do not last long (Evans 1988).

Soil Erosion

The devegetation of the Baringo area, caused by overstocking and natural climatic and ecological cycles, is responsible for very severe soil erosion which affects the whole district, except for the thickly wooded highlands. The damage appears to have occurred only in the past 80 years, as reports suggests that as late as 1914 there was no shortage of grazing land in Baringo, even in the dry season (Anderson 1981, from Rowntree 1984).

A report produced by the Kenya Rangeland Ecological Monitoring Unit (KREMU) highlights the severity of the loss of top soil in the Baringo District. The study distinguishes seven classes of erosion, from Class I: severe sheet erosion to Class VII: highland forest area, with no perceptible erosion. A summary of the results of this report is given in Table 1.

TABLE 1: EROSION IN THE BARINGO DISTRICT

	Area (km ²)	% Total Area
Severe Sheet and Gully erosion	2894	37.6
Moderate Sheet and Gully erosion	2315	21.6
Total Erosion	5209	59.2
Land with Potential for erosion	3069	28.7
Total Eroded or at Risk	8278	87.9

(Source: Adapted from Wahome 1984)

All the land currently under the BFFP comes under the category of severely eroded land. Here, massive erosion of topsoil has exposed poor subsoils, which are generally rocky, compacted and impermeable. As a result, water penetration during

rainstorms is severely restricted, and runoff is high. Natural regeneration of vegetation is limited. Little grows on this hard and infertile soil except thorn scrub, mostly Acacia reficiens. Local people wish to eradicate A. reficiens in favour of more useful and manageable species. Wind erosion is also a serious problem, especially in the lands around Lake Baringo.

Lake Baringo

Lake Baringo is the most important source of water for the people living in the semi-arid lowlands. As such, it is an invaluable resource. LANDSAT pictures clearly show the destruction of the lake through silting. The mud and silt washed into Lake Baringo has halved the average depth of the lake from 20 to 10 meters.

A report by the engineering consultants PENCOL, Nairobi, estimates that the depth of the lake has decreased by 0.4 m over the past 12 years as a result of the deposition of 64 million cubic meters of silt. PENCOL estimate that at least 5 million m³ of sediment are removed from the catchment area of 5000 km² each year. The report states that if the sediment continues to accumulate in the lake at this rate, Lake Baringo could become a marshland in about 20 years time. If this happens, the effect on the local people's livelihood will be irreversible.

4. FEATURES OF THE PROJECT

The Baringo Fuel and Fodder Project is quite exceptional for two reasons. First, it was inspired, and is now managed, by a local born resident, and second, the people who it aims to help take a large (and increasing) part in all aspects of running it. The aims of the Project remain flexible to incorporate the shifting needs of local people. In a land bristling with development schemes, this makes the Baringo Project refreshingly unique. Initially, the aim was to grow trees and grasses for fuel, fodder and thatching, and thereby rehabilitate eroded land. The objectives have evolved over the 8 years as it adapted to needs and wishes of local people, and the emphasis is now to combat the rampant erosion in the area.

The lowlands of the Baringo District were not always barren. With European settlement came increased grazing pressure from larger herds of animals confined to smaller areas, and the grasses dwindled. Without the periodic natural grassland fires, bush species rapidly took over. More recently, agriculture and charcoal-making has caused a rapid clearance of the bush itself. This gross exploitation of a delicately balanced ecosystem has caused erosion and devegetation. A locally born Kenyan, now the project manager, saw the pressing need to provide basic needs for local people, and tackle the erosion that has got progressively worse in recent years. He obtained initial backing from the Swedish Beijer Institute, and then long term funding from the Dutch Government.

Under the auspices of the Kenyan Government's Ministry of Energy, work begun on a tree nursery late in 1981 on family land, while the project proper started early in 1982.

An enterprise will flounder if the project does not see the problems as they are perceived by the local people. Donor and recipient must also speak the same language. All too often, however, there is often considerable pressure to obtain speedy, tangible results. Aid agencies will pour money into project for a few years in an effort to make it work. Short term gains are also often essential for development banks, who usually require to see a return for their investment in about 10 years. But this is not the stuff that successful projects are made of. The Baringo Project has gone to great lengths to understand and communicate with the several different tribes in the area.

The project has a sociologist on its staff who has lived in the area for over 10 years. One of her tasks is to sound out local feelings and opinions. Having lived with local residents, and with her understanding of the local languages, she has developed an intimate knowledge of the peoples and tribes in the region. Perhaps not surprisingly, she found that younger residents appear to show little concern for environmental degradation. As she says, the children in particular have always known the Baringo lowland to be semi-arid, and see no urgent need to rehabilitate an area that has never been terribly productive and, in their eyes, probably never will be.

On the other hand, older local inhabitants are disturbed by the changes they have witnessed in their lifetimes, particularly . The grass is normally mentioned first. Although the people of Baringo are used to cycles of drought, there was usually enough local grazing for livestock. One woman remembered being chased by a rhinoceros through the long grass near her homestead. However, the days of trees and thick scrub are long gone, when you could "leave a pot boiling inside and just break off branches from nearby trees when more wood was needed". Older people also noticed that gullies are now more readily formed when it rains, washing mud into the lake. Although fishermen remark that the lake is getting shallower, it is the quality of the water that is most commented on. "People get sick if they drink the water from the lake these days: before, it was sweet to drink".

Although these residents are aware of the environmental changes, they very often do not understand why they occurred, or what, if anything, to do about them. As in the West, concern for the environment centres largely around current needs. The needs of even closely related peoples are diverse and changing and have to be understood against a particular cultural background and history.

Even so, about 90 per cent of the population of the Baringo District are dependent to a greater or lesser extent on their livestock, and all require fuel and building material. The initial problem was to find practical ways of growing useful plants on badly degraded land, which first meant getting local support.

The initial meeting with local residents and officials was held early in 1982. The Project asked for two badly eroded plots of land on which to begin planting. Enthusiasm for the general idea was tempered by scepticism that anything could ever grow on this

land. However, agreement was reached that the BFFP could use the land for an initial period of 3 years, with the proviso that local labour was employed.

The Project developed a micro catchment system that has proved exceptionally efficient at stopping runoff. First, using a mechanical digger a series of 36 cm high embankments 4 to 10 metres apart is created along the contours of the field. Machines are more efficient at this stage, and can create stronger, more uniform banks. The catchment area is then formed by adding 20 cm high side embankments, running at right angles to the contoured embankments, and spaced every 6 to 12 metres. After the next heavy rain, between 5 and 10 saplings are planted according to the size of each catchment area, and the fields are sown with grass. All the trees come from the BFFP nursery, while grass seed is collected locally, and supplemented with bought seed. By preference, the project uses solar powered electric fencing to keep out wandering livestock and wild animals.

The particular species of trees and grasses planted are limited by the severe climate, the requirements to grow fuelwood, fodder and thatching, and by the availability of seeds. The Project continues to try out drought resistant, fast growing plants, and has set aside areas to test new species and varieties, as well as to determine the best spacing for planting, and the optimum size for the water catchment areas. The project is now endeavouring to plant more indigenous species. As conditions in the area vary so much, research is needed for each field to gauge the most suitable species to plant, and the best form of management to enable their survival.

People value the work of the project, and there have been no serious abuses. The fields are recognised as a form of imposed but acceptable control. Locals know that the fields are still theirs, but, more importantly, they also understand that "the food inside the field is theirs". Apart from the strict understanding that no local individuals are excluded, decisions concerning field use are made almost entirely by local people, and endorsed by the Project at local public meetings. How these decisions are reached depends very much on the local culture, but so far local leaders are resolute that overall control of the fields should remain in the hands of the Project.

The reputation of the Project spread as people saw grass and trees actually growing, and locals benefitting in times of hardship. The fields now regularly supply animal fodder at times when grazing is scarce in the dry season, as well as thatching and some charcoal. More than anything else, it is these conspicuous benefits that are probably responsible for fostering the undoubted support the Project enjoys among the local communities. But the Project is valued in other ways too.

After field use, employment is regarded as the most valuable spin-off. The money is welcome as modern life depends on some traded goods, and children's education is very expensive. The labour needs average around 45 people in slack periods, but rises up to 200 in a busy season. Project machinery is used to construct earth dams in order to contain run off water. Local people take responsibility for the dams, which provide water for people and livestock. The rural access roads, created in order to establish and maintain

fields, make travelling easier. The BFFP is becoming increasingly involved in education, extension and training. Finally, the Project is also involved in community development work, assisting women with family planning issues, for example.

The Project can therefore justly claim a list of short term benefits which are greatly appreciated by the local people. It is only through these shorter term benefits that any project can hope to gain the support of the local communities and so fulfil its longer term aims. Flexibility is one of the positive qualities of the BFFP, demonstrated by the changes in the goals of the project over the past 8 years.

5. CHANGES IN THE GOALS OF THE BFFP

The Project Fields

To begin with project fields were typically around 10 hectares, with the largest field planted 109 hectares. As the project enters its second phase the emphasis will be on rehabilitating denuded land on a greater scale. The project is now talking of rehabilitating 1,000 hectares annually. Large scale rehabilitation is seen as essential, given the urgency needed to curb environmental degradation.

Economic Sustainability

It was thought originally that the project would be self financing from money generated through the sale of charcoal, seeds and seedlings. However, rehabilitation of large areas will require the use of machines, and some form of project centre is seen as necessary to promote large scale rehabilitation in the Baringo area, and possibly dissemination to other semi-arid areas as well. Some form of donor support will be needed, therefore, for the foreseeable future. Rehabilitated areas will, it is hoped, become locally managed, and will even generate income for residents.

Fencing of Fields

The intention of the BFFP was to keep fields fenced only until the trees were mature enough to withstand grazing by goats. Then local people would take over the responsibility for managing rehabilitated areas themselves by means of Management Field Committees. However, people at present insist that fields remain fenced. They feel that a more rigid control of the fields is necessary if they are not to deteriorate back to the denuded state. This is perhaps a reflection of the uncertainty that people feel with the encroachment of outside influences, and the gradual breakdown of traditional authority structures. Nonetheless, to be requested to police the fields on their behalf is unexpected, and interesting position for the BFFP to find itself in.

Species Planted

Initially, exotic species were widely planted, and some have been remarkably successful. The exotic species selected had the great advantage that they were generally fast growing, thus encouraging support from local people. The project is now concentrating more on indigenous species, which tend to be slower growing, but are found to have far greater resistance to pests, and are better adapted to the longer term climatic variations. For the time being, the project will continue to plant a mixture of exotic and indigenous species, as both are seen to have valuable properties.

The Integrated Community Development Approach: Extension Activities

Single issue development "packages" are not enough, and will fail to gain the backing, involvement and commitment of local people. The project is becoming more involved with extension activities than was originally envisaged. Besides education on environmental issues, training for land rehabilitation techniques and field management, and the installation and maintenance of electric fences, project personnel are becoming more involved with questions of access to water, health care, family planning and livestock management. The promotion of training and extension, and the development of a suitable infrastructure are now seen as essential for the development of a sustainable and locally managed project.

The Fodder Component of the BFFP

The production of fodder has taken on a greater significance than envisaged when the project began. This is partly because trees have taken longer to mature than expected due to prolonged droughts, which have impeded their growth. However, the main reason that fodder has become more prominent is that for the people living on the semi-arid lowlands of the Baringo District, the raising of livestock has been, and may continue to be, the main viable, long term means of subsistence. The BFFP is now convinced that the future lies in livestock.

6. CONCLUSIONS

Aid projects should provide catalytic support and motivation for the process of sustained development, which might otherwise evolve slowly. The changes involved with development cannot be imposed over the long term on an unwilling population - this is as true for the people in Baringo as it is for the people living in developed countries. Transformations in existing values and lifestyles, however small, may first need to be accepted as necessary, and to be seen as such, by the people concerned.

It follows that any development project must work within the local environmental and social landscape. Both are necessary. Even an environmentally based project with superb methodology designed to generate sustained development is doomed to fail if it lacks the

short-term support and long-term commitment of local people. To win local support, it is necessary to assimilate and to understand the immediate needs and wishes of people living in the neighbourhood. This is not an easy task, and requires an ability to listen and to learn, and then to adapt to what has been heard.

Progress, then, is made through adaption to experience. The project does not arrive with a detailed blueprint for action and payback, but with a "soft agenda" that is constantly re-written until agreement for appropriate action is reached by local consensus. This open ended, step by step approach is essential if a project is to promote sustainable development, especially where it is difficult to quantify short-term economic returns, and it does not fit in easily with the bureaucratic structures of many funding bodies.

All too often, donor organizations require a rigid work plan, where objectives are reached according to a strict timetable. Furthermore, the assessors often require that a project should demonstrate its achievements through an accounting process that estimates the worthiness of benefits in purely monetary terms. It may even be required that the project produces a return on its investment. It would seem that under such a system, local people are at the bottom of the list of concerns. If the BFFP had been required to operate under such conditions, it would have been terminated in the first three to four years, and would have inevitably joined the long list of disastrous development projects. In such cases, it is better if the project had not been started in the first place, as they often do more damage than good.

The BFFP show what can be achieved if a development project is allowed to grow and mature according to the needs of the local people and environment. Sadly, it remains one of the few, but hopefully it can serve as a lesson.

The Baringo Fuel and Fodder Project is a precious accomplishment amidst the many abysmal failures that are often promoted by political and commercial self interest. Its success lies in the fact that it is in all senses a grass roots project. It has taken the time to step back and listen before giving advice. The counsel it has given has evolved as understanding has grown. These processes have taken time, but their success is demonstrated by the support and trust that the Project now enjoys. After 8 painstaking years, local people are beginning to enjoy the benefits. However, 8 years is a short time for a development enterprise. The BFFP deserves continued backing from its enlightened donors, without whose support it would surely wither. The Baringo venture can serve as a blueprint for other development projects.

REFERENCES

Anderson, D., (1981). Grazing, Goats and Government: Ecological crisis and colonial policy in Baringo. University of Nairobi, Department of History, Staff Seminar Paper No. 6, Kenya.

Chambers, R. (1988). Sustainable Rural Livelihoods: a Key Strategy for People, Environment and Development. In: Conroy, C. and Litvinoff, M. The Greening of Aid: Sustainable Livelihoods in Practice. Earthscan Publications in association with the International Institute for Environment and Development, 3, Endsleigh Street, London WC1H 0DD, UK.

Evans, M.I. (1988) Conflicts Between Socio-Economic and Technical Factors in African Social Forestry: Lessons from Kenya. End of Grant Report, Research Scheme R4241 ODA/ESCOR. (Present address, University of Oxford, International Development Centre, Queen Elizabeth House, 21 St. Giles, Oxford OX1 3LA, UK).

Note: The views expressed in this report are those of the author, and should not be taken as representing the opinions of the British Government.

PENCOL Engineering Consultants Ltd. (1981) Central Baringo Water Development Plan 1983-2003. Preliminary Design Study, 4 volumes. Ministry of Water Development, Nairobi, Kenya.

Rowntree, K.M. (1984). Baringo Erosion Survey - The Research Area. Baringo Erosion Project - Working Paper No. 1. Kenyatta University College, Department of Geography, Nairobi, Kenya.

Rowntree, K.M. (1986) Annual, Seasonal and Storm Rainfall on the Njemps Flats, Baringo, Kenya. Baringo Erosion Survey - Working Paper No. 3. Department of Geography, Rhodes University, Grahamstown 6140, South Africa.

Teel, W. (1984). Pocket Directory of Trees and Seeds in Kenya. Kenya Energy Non-Governmental Organisations (KENGO) P.O. Box 48197, Nairobi, Kenya.

Wahome, E.K. (1984). Soil Erosion Classification and Assessment Using LANDSAT Imagery: A Case Study in Baringo District, Kenya. KEMRU Technical Report No. 105. Ministry of Finance and Planning, P.O. Box 47146, Nairobi, Kenya.

PAST CONSTRAINTS ON FUTURE POLICY: THE CASE OF ECUADOR

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INTRODUCTION

This paper examines the recent conduct of energy policy in Ecuador to reveal existing weaknesses in approach and thus identifies what future change is required. It seems to be an appropriate time to do this as the changes instituted after the heady ferment of the seventies have now worked through but yet again a period of readjustment is underway.

The paper arises from work undertaken in Ecuador between 1981-88 on rural energy problems. This was initiated at micro-level but in seeking to understand how approaches could be improved the focus moved upwards to the macro-level. It follows that this paper embodies a domestic sector perspective on national policy.

In the wake of the energy crisis of the early seventies many governments instituted energy as a new and separate area of public policy, established a central energy authority and embarked on the preparation of energy plans using integrated energy planning technology.

The paper contends that in the case of Ecuador too much has been expected of the new national energy institute and its Master Plan for Energy. The "tabula rasa" approach has not led to successful action on key energy issues because of the legacy of policy and existing entrenched institutions namely, the electricity institute (INECEL) and oil corporation (CEPE)¹. Rather, greater attention should be paid to identifying the major policy challenges, and tackling them within an incremental change perspective whilst acknowledging sectoral constraints. Such an approach has impacts both on institutions and mechanisms for the generation of policy.

There are four parts: the first is a brief introduction to the institutionalisation of energy policy in Ecuador and the second outlines what has and has not happened since. Most of the paper is directed to explaining the imbalance in these recent events in relation to the role and functioning of the national energy institute (INE) and the forestry directorate (DINAF). Finally conclusions take the form of comments on ways forward.

1. INSTITUTIONALISATION OF ENERGY POLICY

Fortuitously oil production from the Upper Amazon fields came on stream in 1972. In recognition of the importance of oil, the Ministry of Natural Resources had energy

¹ In September 1989 CEPE was restructured as PetroEcuador.

added to its title (in 1973) but its energy work until very recently has been focused on oil and oil derivatives. (Although entitled Natural Resources, forests came under the Ministry of Agriculture, of which more later). The main changes occurred at the end of the seventies and were chiefly a response to a rise in internal consumption of oil derivatives which was threatening the exportable surplus. During the seventies oil consumption increased by an average 13%/yr, unchecked by price increases (prices had not been changed since 1959). By 1980 there was estimated to be only 13 years of proven reserves left. Furthermore as internal refinery capacity was limited some fuels were imported at vast expense. The National Development Plan (NDP) in 1980 reported that in February 1980 the state was importing petrol at 41.7 sucres/gal and selling it for 4.6 sucres/gal.

In response to this situation the government did several things.

First on policy - the new Development Plan of the new democratic government set out a new energy sector of public policy, reduced oil and electricity to sub-sectors and introduced a new sub-sector on "non-conventional energy". (That term was used as large-scale hydro-power fell within the electricity sector.) The Plan spoke of the need to integrate, coordinate and develop the three different sources of energy and presented three "complementary" programmes for them. Specific areas of policy development and research were identified for a new National Energy Institute (INE).

The principal institutional move at this time was the establishment of INE. This was pre-eminently intended to be a "scientific and technical" institution with responsibility for preparing energy policy and a Master Plan for Energy (for approval by a council headed by the Minister and composed of representatives of key institutions). As part of this planning function INE was also charged with preparing energy balances, undertaking an inventory of energy resources and also coordinating the activities of all the energy sector organisations including CEPE and INECCEL.

INE was also charged with developing non-conventional energy, (it was established at the time when the interest in these was at a peak) and specific action on the different technologies was even itemised in the NDP.

Overall therefore the response in Ecuador broadly followed the ideal model of "integrated national energy planning" which was being advocated at this time. The state had instituted measures to develop an integrated approach to energy sector planning, rather than uncoordinated planning in different sub-sectors. It had also rationalised the institutional structure and set up a central energy authority to undertake this planning and work towards the preparation of a Master Plan for Energy.

So what then has happened?

2. RECENT CHANGES IN THE ENERGY SECTOR (1980-87)

Following the institution of energy policy in 1980 the key change obviously has been the oil price falls. These have not only resulted directly in a substantial reduction in state revenues, and consequently investment in energy developments, but indirectly contributed to a virtual collapse in external confidence and the creditworthiness of the country. The most serious consequence of this has been the dramatic fall in the value of the sucre. Ecuador had not been a country of hyper-inflation: between 1900-1980 the value of the currency only declined to one-tenth in dollar terms. However whilst in 1980 25 sucres bought one dollar, in 1989 550 sucres are required. This has meant that what have been internally swingeing increases to fuel prices have often scarcely kept abreast of the falling sucre/dollar ratio.

The country has also suffered from several exacerbating natural disasters. In 1982/3 the coastal region, where the key export crops (cocoa, bananas, coffee) are grown, was subjected to unprecedented climatic variation so that a state of emergency for drought was translated into a state of emergency for floods. Finally a major earthquake in 1987 destroyed key oil installations and following this the government suspended payments on loans to private creditor banks.

Nevertheless, the energy sector has not experienced uniform constraints and depression during this time. The oil and electricity sub-sectors and their key institutions have developed and enlarged substantially (although not as much as they would have wished) whilst "non-conventional energy" (RET's and wood) and indeed energy planning as a whole has virtually stagnated. To depict recent developments a selective indicator format is adopted in each of the NDP sub-sectors: oil, electricity, RET's and wood, on problems and achievements between 1980-88.

OIL

Achievements

- (a) Maintained level of proven and probable reserves.
- (b) Doubled refinery capacity - reduced imports of petrol, stopped imports of kerosene.
- (c) Repaired oil pipeline 9 months (cost \$97 million).
- (d) Construction of Secoya plant to process associated natural gas (ANG).
- (e) Changed law to re-encourage exploration by foreign oil companies (34 investing in 1988).
- (f) Reduced subsidies on transport and domestic sector fuels.

Problems

- (a) CEPE debt doubled between 1980-86 (\$321 million) representing 4% of the total public debt.
- (b) Total cost of subsidies on fuels 1980-87 estimated to be c.\$10,000 million (1987 prices [No official statistics available]).
- (c) 10% of internal sales of oil derivatives estimated to be smuggled to Colombia and Peru.
- (d) Legal constraint on fuel pricing.
- (e) Consumption of LPG trebled between 1980-86, 35%/yr imported. Over 90% of ANG wasted, yet Secoya plant functioning only maximum 50% of capacity.
- (f) 17% petrol, 11% diesel still imported.
- (g) Planned investments by CEPE (to meet internal demand and oil exploration and development) up to 1992 would mean its deficit would reach \$200 thousand million by 1992.

ELECTRICITY

Achievements

- (a) Installed generating capacity doubled from 812 MW to 1795 MW, 1979-85.
- (b) Switched from generating 72-28 thermal-hydro in 1980 to 80-20 hydro-thermal in 1986.
- (c) Reduced tariffs: between 1981-86 average tariff prices fell by 25% in real terms.

Problems

- (a) "Redundant" (new) thermal generating plant; maximum demand is only 60% of installed capacity.
- (b) INECEL debt (\$350 million absorbs 60% of revenue; income from tariffs only 13% of total income, 1986).
- (c) Plan for additional \$927 million on investment in generation in 1987-96.
- (d) Investment in rural electrification between 1980-86 (only 5% of \$785 million total by INECEL); 62% of rural households still not connected in 1986.

"NON-CONVENTIONAL ENERGY" (RETS AND WOOD)

Achievements (up to 1987, unless stated, figures refer to total invested)

- (a) 3,000 portable metal wood-stoves distributed (\$.7 million)
- (b) 65 biogas plants in use (\$.9 million)
- (c) 16,000 solar panels installed.
- (d) c. 10 community/social forestry schemes.
- (e) One agro-forestry project operating.
- (f) R & D on geothermal (\$.9 million) wind, and solar (\$4.5 million).
- (g) New state scheme for private sector reforestation launched in 1986: 27,000 ha planted (\$.9 million) (or 7,747 ha planted and \$3.5 million?, or 4,000 ha planted?).

Problems

- (a) State reafforestation rate 12,000 ha/yr
Overall deforestation rate 182,000 ha/yr ?
or, deforestation rate 340,000 ha/yr (WRI).
- (b) Wood energy used by 74% of rural households for cooking (1982).
No national up to date figures available.
- (c) Fuelwood and charcoal prices increased ten-fold 1982-88 (kerosene increased five-fold but LPG only doubled).

(Note: ? indicates doubt about official statistics)

Summary of Problem Issues

1. Financing of future investment and funding of past debt of CEPE and INECEL for sustaining and increasing the supply of hydro-carbons and electricity.
2. Fuel subsidies on some fuels, i.e. for some groups.
3. Management of the rural/traditional sector.
4. Role of RET's.

All these are familiar and not unique to Ecuador, nevertheless their restatement is revealing as it signifies that there has been little change and development since 1980. Why is this?

The management of the energy sector will now be reviewed.

3. WEAKNESSES IN MANAGEMENT OF THE ENERGY SECTOR

It is being suggested that Ecuadorean experience shows that the concept of a new and distinct central energy authority charged with responsibility for energy planning is a theoretical ideal and may even be unhelpful. Overall INE seems to have been used by government as a convenient mechanism to hive-off contentious issues and as a means of avoiding confronting the key energy problems. Governments have neither provided adequate resources for its work nor limited the autonomy of other bodies to create a secure operational niche for INE.

Material on three different aspects of INE's role and functioning will now be presented: first on its overall position vis-à-vis CEPE and INECEL, second on its role in energy planning, and third on its limited power on wood energy in relation to the forestry directorate (DINAF) of the agriculture Ministry.

Financing of INE has been through annual allocation by the Ministry, unlike CEPE and INECEL which have received earmarked tax funds as well as direct revenues from sales of products. With the fiscal crisis (following the oil price falls) INE's budget has been squeezed. Yearly budget allocations have fallen from \$1.5 million in 1980 to \$440,000 in 1987 (at 1987 prices) for all its work, including RET development. General financial insecurity has meant that INE has not taken up aid monies and staff suffer from recurrent shortages of basic items such as photocopying paper. Salaries are low and whilst INE has been able to recruit keen graduates they have used it as a route to overseas training and then left for better paid jobs (in CEPE, INECEL and OLADE).

Although it is one of the smallest public sector institutions (it has only ever had a maximum of 40 professional staff) the Director is still a political appointment so that it has had 8 in 10 years. Worse, when staff leave (at all levels) they tend to take their work with them.

INE was supposed to be coordinating the work of CEPE and INECEL but it has however not established *modi operandi* with these long-established institutions to secure its corner. It is in a difficult position as representatives of the oil corporation and the electrification institute are on its Technical Council whilst it is not represented on their Boards. It was only under pressure from the World Bank, that all 3 institutions started joint working on energy projections (previously they had all done different versions). With only a handful of professional staff engaged on energy planning INE has been dependent on the substantial planning divisions at CEPE and INECEL for much of its data base.

Whilst it has sympathetic friends in the Ministry in practice many of its reports have laid unread on shelves and the Ministry has not devised mechanisms whereby the role of INE is enhanced vis a vis the other institutions in the sector. A proposal by the World Bank that it be re-positioned within the Ministry to act as a think-tank to the Minister appears to have found little favour in any quarter (apart from INE).

From the outside and to an extent inside, INE's responsibilities for the development of RET's are seen to have served to undermine its work on energy planning. The first Director, who was one of the longest in post, vigorously pursued these and at the time (before the oil price falls) such action seemed appropriate and promising. Nevertheless very little has been achieved (as was indicated above). Basically this is due to the continued subsidisation of other competing fuels and also as most basic materials for these (including metal) have to be imported. A proposed credit scheme was never established. There has also been an understandable tendency not to start from technologies developed elsewhere but to develop Ecuadorean-produced designs. Although in 1983 the governing council for INE decided that much of the basic work would be transferred to the universities, staff within the Institute are still directly involved in technology development. Criticisms are levelled at INE that it is not being effective in this area of work. It suffers from being centrally located in Quito without any regional structure. Although INE has been able to work with regional planning agencies and NGOs in different areas, it was significant that GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit) in 1988 forsook INE as a working partner on its metal portable stoves programme and moved into the Ministry of Agriculture as that does have a presence throughout the country.

Most INE staff vigorously defend its close involvement with RET's as being one area where its hegemony is unchallenged. To date however that has not been an

effective power base. Furthermore, were RET's to have serious potential (ie within a changed fuel pricing policy) INECEL would rapidly move in. Studies on RET's were made within the preparation of the Master Plan for Electrification, and INECEL has its own projects on small-hydro (30 kW to 2000 kW) with the Chinese government, inter alia.

Some comments on INE's work on energy planning will now be made.

It was indicated earlier that work on energy planning was outlined at the inception of INE. Its conduct in this area has however been constrained and inhibited by the absence of a clear remit from government on the policy framework within which the Plan is intended to work. Government seems to have a blind faith in the emergence of a technically feasible, least cost configuration which will somehow be politically neutral and inoffensive. In the first few years INE's efforts were concentrated on compiling energy balances. Attention was then turned to the preparation of the Master Plan and the first emerged in 1986. Staff do not pretend that this is not principally a listing of resources and a compilation of existing programmes rather than a plan. Because of the enormous gaps in data, particularly relating to wood energy (which is effectively the traditional sector in Ecuador) the Plan largely presents CEPE's and INECEL's corporate plans and resource assessments, programmes and projections. The fundamental assumptions on which their programmes are based are not however questioned and tested within the quantitative analysis. For example, despite the evident need for substantial real increases in electricity tariffs, INECEL's projections on electricity consumption are adopted. These only assume tariffs will rise in line with inflation. This leads to the "need" for additional major investment in more mega-hydro power projects (feasibility work on which is already being funded by hopeful foreign companies) and despite the fact that the World Bank has been trying to brake hydro-plant construction since 1984. There is a brief airing of policy issues at the end of the Plan but it is evident that the conceptualisation of these has moved little from the 1980 NDP.

As elsewhere, the major problem facing the energy planners is the absence of information on the "traditional sector" and disaggregated demand, particularly on the important residential sector. However Ecuador does seem to have some enormous data gaps to fill, relating to the consumption and production of wood energy, switching to LPG and kerosene, and more recently from kerosene to LPG. The only national data available is from the census, undertaken every ten years. Although INE has worked on some limited rural energy surveys with other organisations these have been undertaken only in one of the three regions - the sierra. (Andean region).

Because of the inherent pressure to quantify and produce equivalent base data on the sub-sectors within energy planning technology, there has been a mixing of "good" and "bad" data. For example the energy balances assume all wood is used as

fuelwood and totally ignore the important charcoal component. Within the energy plan confident assessments are made about wood production and deficits in spite of the absence of information about forest cover, deforestation rates and tree growth in the diverse ecological zones of the country.

The major problem in the traditional sector is that wood is basically perceived in Ecuadorean public policy to fall within the responsibility of the forestry division.

The division seems to have inhibited if not actually impeded INE's work on wood energy. To achieve joint working between government ministries, a cumbersome procedure is necessary leading to a formal agreement. These take several months to organise and the division delayed signing these in the early eighties. More recently it has itself become more directly involved in various projects involving a fuelwood component, which have been initiated (particularly by USAID in the days of the last administration). Direct action by DINAF now seems to inhibit INE.

The forestry division itself has always suffered from endemic under-resourcing. Although there have been moves to remove it from direct control of the Ministry of Agriculture and reconstitute it as a separate body, ascribed to that Ministry, these have come to nothing. The division (currently entitled a Directorate) has been subject to frequent reorganisations and changes of Director but has always experienced budgetary starvation. In the period of the last government alone (1984-88) there were nine different directors.

Its location within the Ministry of Agriculture has not led to a satisfactory mutual accommodation of interests. Although Ecuador has now apparently got one of the best legal frameworks established in Latin America for protection of its forest resource, this has happened too late and anyway is not enforced. Trees are basically perceived to be barriers to agricultural development and cleared land is still worth more than natural forest. Furthermore, rights to ownership and protection from agrarian reform legislation is afforded to those who are using land in a technically efficient way. Inefficient traditional multi-cropping systems with tree elements are regarded as ripe and legitimate targets by those concerned with increasing agricultural productivity and for selling fertilisers, machinery etc, for which the National Development Bank will give credit.

Many of the trees and timber residues removed during conversion to agriculture are used for wood energy. No one knows however what's gone or what's left.

This information gap is not necessarily surprising. What is however of concern is that it is not acknowledged and recognised in government departments. Rather than admit the deficits and their serious implications, which are more about a lack of funding rather than a lack of technical effectiveness, both DINAF and INE seem content to re-use out of date information which was anyway of dubious quality. (When for example I was in Quito in September 1988 I saw information on "current"

forest resources being prepared for FAO's TFAP seminar which was dated seven years previously but is actually older than that. The seminar had already been postponed due to the absence of base information.)

4. CONCLUSIONS

Although the establishment of energy as a "new" and discrete sector was possibly an inevitable reaction to the dramatic changes in the seventies, there have been several consequences. There has been an under-rating of the pervasiveness of past commitments and practice and an underestimation of the difficulties of getting new institutions to work. The measures taken have not produced either effective mechanisms for developing and implementing strategies on the critical policy issues or even resulted in the institutionalisation of research necessary for generating alternative approaches. But the institutional changes which were made are apparently seen to be sufficient so that the lack of a coherent energy policy can and is conveniently blamed on INE. Energy planning leading to a Master Energy Plan is also perceived to be an appropriate mechanism for the analysis of policy issues.

Some changes are now occurring. One of the first actions of the new Energy Minister last year was to establish a new Directorate within the Ministry on Electricity to exert more influence over INECEL. Somewhat conversely, but with the same goal of efficiency improvement, the new government has recently released controls on the oil corporation which has now been entirely restructured as PetroEcuador. The Minister has also aired the LPG vs kerosene vs wood issue recently, not least because the costs of LPG imports are being acknowledged as more than a temporary phenomenon as there is little prospect that capital can be raised for the development of the latest planned gas processing plant. But whilst he has now acknowledged deforestation as a problem, he attributes its causes to fuelwood cutting (rather than agricultural development) and no action is still being effectively implemented in that quarter.

For the future it is clearly necessary to tackle the electricity sector problems; evolve a sustainable approach to fuel pricing; decide whether RET's are to have a role in Ecuador and to initiate coherent and effective action on wood energy within the Ministry of Agriculture as part of its strategies for agriculture. These crucial matters cannot be left to a small, weak and under-funded institution, which furthermore has absolutely no effective influence on the Ministry concerned with rural resources and has itself no regional structure.

It would seem too that a flexible and speedy evaluative mechanism is required to identify the impacts (political, economic, social and environmental) of the energy policy options as alternative policy packages and thus to reveal the need for political decision-making and results of decision-avoiding. Such assessments could

be complementary to the longer term, more narrowly focused and introverted, energy supply and demand analyses which at present constitute energy planning in Ecuador.

RE-STRUCTURING THE ELECTRICITY SECTOR: DEVELOPING COUNTRY PROBLEMS, WORLD BANK PROPOSALS AND BRITISH EXPERIENCE

Adilson de Oliveira and Gordon MacKerron¹

1. INTRODUCTION

Increasingly a new consensus is emerging about the electricity sector of industrial countries: the 70s were a turning point in the long lasting historical trends of improving performance and declining real prices in this sector of the economy. (OTA,1985; IEA,1985)

Indeed, in those years improvements in productivity virtually disappeared, capital and fuel costs escalated and electricity consumption slowed down quite substantially. Arguably these new trends are likely to remain and in such a case the Golden Age of falling electricity prices and fast increasing demand will have come to an end. In the foreseeable future, the electricity sector is likely to face a period of increasing costs that will induce higher prices and consequently slow demand growth.

Supporting this view, there are strong indications that electricity costs are likely to increase further in the future.

This is first because the main past sources of increase in productivity are no longer available:

- the thermal efficiency reached a limit that is proving difficult to surpass (Shepard, 1986), although the emergence of combined cycle power may be opening a new window of opportunity in this area; (DoE,1987)
- the size of power plant equipment is already such that diseconomies of scale may be present (Williams/Larson, 1989);
- the interconnection of national grids - a substantial earlier source of cost reduction - is mostly completed, although opportunities for interconnecting national grids remain (e.g. the European Community countries).

Second, after the nuclear disasters of Three Mile Island and Chernobyl public perceptions of the environmental risks of power plants changed dramatically; public concerns about acid rain, the greenhouse effect and radiation obliged governments to

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introduce more stringent environmental regulations that are adding new costs to electricity supply.²

Third, the price of fuels used in power plants are likely to increase or, optimistically, to remain at current levels (Davis, 1989); there are no forecasts that fuel prices can go through a new period of falling prices of the kind that characterised the 50s and 60s.

Increases in costs have resulted in higher electricity prices which produced strong incentives to limit electricity consumption (OTA, 1985). Suddenly, the apparently predictable future consumption of electricity became very difficult to foresee, introducing a new set of uncertainties from the demand side to the already existing large uncertainties about costs and technologies on the supply side. This new environment changed market perceptions of the financial risks of power plants and coincided with a substantial increase in interest rates as compared with historical figures; both strongly reduced the attractiveness of long life-time investments in power plants.

Moreover, technologies emerged both on the supply and demand side like improved forms of cogeneration and conservation which offered consumers a new and more active role in the electricity sector; new players emerged in the decision making process such as non-utility electricity generators, large industrial consumers' associations, regulators, and conservation and environmental groups. These new technologies and new players, combined with advances in information technology, have broken up the traditional barriers that concentrated the decision-making process in utilities; this process has potentially moved much closer to consumers.

The monopoly of utilities, particularly as far as electricity generation is concerned, is increasingly under political pressure, and policies oriented to the introduction of larger scope for competition are demanded by consumers. The emerging strategy seems to be a reformed electricity system that can be sufficiently flexible to cope with the large uncertainties over its future (MuKai, 1989; IEA, 1985).

These profound changes in the electricity sector are forcing a comprehensive review of the institutional and regulatory frameworks that govern the electricity systems of many industrial countries. The privatisation of the British electricity sector is probably the most interesting case to analyse. Its radical proposals should have far reaching effects, but they are proving to be quite difficult to implement (Cheshire, 1989, MacKerron, 1989).

This paper reviews policies for the electricity sector of developing countries that are emerging in the World Bank. It compares these policies with policies that are currently implemented in industrial countries, drawing particularly on the experience of

² "Over the next 5 to 10 years many of Europe's utilities expect to expend as much on acid emissions as on building new power stations" (ICR, 1989)

the United Kingdom. It attempts to assess the soundness of such policies for developing countries taking account of the experiences of industrial countries.

2. THE CHALLENGES FACING DEVELOPING COUNTRIES' UTILITIES

Until the oil crisis the situation of the electricity systems of most developing countries was quite similar to that of industrial countries. They were growing steadily, and supplying a fast increasing demand at decreasing real prices (Mason et al, 1988). In fact, most improvements in performance experienced by the electricity systems of industrial countries were progressively introduced in developing countries although with some delay.

The underlying situation of the electricity systems of developing countries changed in the 70s but this was hardly perceived by consumers and, to some extent, even by utilities. Costs escalated but real electricity prices did not increase accordingly; social and political considerations induced many governments in developing countries to reduce the impact of rising electricity prices on consumers.³

Committed to supply electricity to match a fast increasing demand, and facing a reduced cash flow as a result of pricing policy, developing country utilities were persuaded to borrow heavily to finance their investments. They did this especially in the international financial markets where petrodollars were available at relatively low interest rates. However, in the 80s large devaluations of domestic currencies were undertaken by most developing countries to overcome the macro-economic problems that resulted from the interruption of the international flow of capital to developing countries and the simultaneous increase in interest rates produced by industrial country monetary policies; these devaluations enormously increased their utilities' debts and rendered most of them financially insolvent (OLADE, 1988).

Utilities that are mostly publicly owned could only rely on the treasury to solve their financial problems. However, the debt crisis destroyed the financial equilibrium of most developing country public accounts; the treasury was generally unable to subsidise utilities, and they were consequently obliged to postpone vital investments and critical maintenance expenditures. This further worsened their financial and

³ It can be argued that from the technological point of view many opportunities for improving performance remain in developing countries (interconnection of regional grids is not completed, power plant scale is still largely far below the levels of industrial countries, etc.), particularly because electricity consumption is still increasing fast, as a result of population growth and urbanisation. Such improvements might reduce electricity costs in the future and, therefore, increases in electricity prices could be avoided. However, other fundamental changes in the electricity sector pointed out earlier are at work; fuel and investment costs are escalating in developing countries, cutting back any cost reduction that can be obtained from further performance improvement. Consequently, electricity prices necessarily had to be increased to cover utilities' costs; otherwise subsidies were unavoidable.

technological performance. The service provided by utilities deteriorated; in many cases rationing of electricity supply emerged as an inevitable policy.

The challenge facing developing countries utilities in the 90s is to recover their financial soundness in order to invest to supply a still fast growing demand, and simultaneously improve their technological performance to standards close to those in industrial countries. This is obviously a substantial undertaking that cannot be achieved unless suitable policies are introduced both by their governments as well as industrial country governments.

Particularly important will be to re-establish a strong international flow of capital and technology to the electricity sector of developing countries. This issue will be largely decided by industrial country policies, although a review of developing country domestic policies will be needed as well. This review should bear in mind that developing countries have a few bargaining weapons that they can and should use to their advantage to attract foreign capital and technological expertise to the industry.

First, the share of developing countries in power plant markets is increasing rapidly. Contrasting with industrial countries, where electricity consumption is growing slowly, developing countries' electricity consumption is still growing relatively fast for reasons already pointed out. Between 1971 and 1986 electricity generation in developing countries increased by 8.7% yearly while it only increased by 3.5% in industrial countries (Table 1). More recently, there has been a slowing down in electricity generation growth in both developing and industrial countries but developing countries' annual growth remains 4.7% points higher than that of industrial countries.

These trends rapidly increased the share of developing countries in world electricity generation from 9.9% in 1971 to 14.5% in 1980 and 18.0% in 1986 (Table 2). More important, the shares of industrial and developing countries in the incremental generation of electricity have changed dramatically in the most recent years (Table 3); the share of developing countries is already close to 45% and it should increase steadily in the future. Therefore the international power plant market will mainly be a developing country market (Bell/Gill, 1988).

Second, developing countries still have large resources of conventional low cost energy that remain underutilised. For instance, only 16%, 13% and 4% of the hydropotential of Asia, Latin-America and Africa respectively are currently exploited; large resources of fossil fuels remain underexploited as well, particularly natural gas (WEC,1989).

It is worth remarking that the share of developing countries in the total increase in hydro-power generation is already twice that of the industrial countries, and increases in conventional thermal-power generation have only occurred in developing countries (Table 3). These figures suggest that developing countries may attract electricity-intensive industries from industrial countries that are losing their competitiveness as a result of rising electricity prices.

TABLE 1
Growth of Electricity Generation (Average annual %)

Region	Period		
	1971/80	1980/86	1971/86
Latin America	9.4	5.5	7.8
Africa	8.1	(0.7)	4.5
Asia	9.4	7.5	8.7
Arab World	13.6	11.3	12.7
Developing Countries	9.8	7.1	8.7
OECD	4.3	2.2	3.5
World	5.2	3.3	4.4

Source: IEA

TABLE 2
Share of Developing Countries in Electricity Generation (%)

Region	Year				
	1971	1975	1980	1985	1986
Latin America	3.1	3.5	4.4	4.8	5.0
Africa	0.6	0.7	0.8	0.7	0.7
Asia	5.4	6.4	7.7	9.3	9.8
Arab World	0.8	1.0	1.6	2.4	2.5
Developing Countries	9.9	11.6	14.5	17.2	18.0
OECD	68.3	65.5	63.0	60.0	59.3
World (Twh)	5 263.0	6 529.9	8 316.6	9 831.1	10 096.6

Source: IEA

TABLE 3
Increase in Electricity Generation (TWh)

Period		1971/80	1980/86
Fossil	(DC	420	203
	(IC	937	(752)
Hydro	(DC	241	174
	(IC	209	92
Total	(DC	685	611
	(IC	1 644	797

DC - Developing Countries
IC - Industrial Countries

Note: The total differs from the sum of fossil and hydro because nuclear, of limited relevance to developing countries, has been excluded from the table.

Source: IEA

3. POLICIES PROPOSED BY THE WORLD BANK

After World War II, multilateral and bilateral financial sources played an important role in the development of the electricity sector of most developing countries. They supplemented scarce domestic savings, and in many cases provided much needed technical expertise as well.

However, their role was substantially reduced after the oil crisis. For instance, the World Bank reduced its share of total investments in the electricity sector of developing countries from 10% in the 70s to 5% in the 80s. Conversely the role of private banks increased substantially; for instance in Latin-America the share of private banks in energy sector debt was 70.1% in 1987 (Table 4).

In such circumstances, multilateral financial organisations are reviewing their lending policies so as to find new ways of increasing their declining leverage on the development of the electricity sector of developing countries. Some are arguing that their funds are likely to reduce even further in the future as a result of the current policies of industrial countries towards multilateral organisations; therefore, their scarce financial resources should be concentrated in a few countries "responsive" to their

TABLE 4

Energy Debt by Creditors: Latin America and the Caribbean

Source	Sector Debt	% of Total
IDB	7 791	9.9
World Bank	7 408	9.5
Other multilateral Organisations	600	0.8
Bilateral	4 229	5.4
Private Banks	54 760	0.1
Suppliers	3 330	4.3
Total	78 118	100.0

Source: OLADE

policies. The success of their policies in these target countries will offer a model for other countries "unresponsive" to their policies.

This policy review seems to have its roots in the findings of a recent study of 300 power projects financed by the World Bank between 1965 and 1983 (Mason et al, 1988). The study concluded that it is questionable whether the pursuit of expansion of electricity supply is "possible or indeed desirable". This is supported by two main findings of the study.

First, developing countries have been quite successful as far as extending access to electricity to a larger share of their population is concerned. Indeed the average growth rate of connections has been 2.5 times the average rate of population growth, widening the opportunities for economic development; moreover, the rates of increase of developing countries' installed capacity, and per capita electricity generation, have both been substantially above GDP growth, reflecting both the increasing share of population supplied with electricity and the industrialisation process.

Second, developing country utility performance is deteriorating over time, and this decline in performance "has been paralleled by a shift towards large monolithic controlled electric utilities". Network losses are far above industrial country (8%) levels, reaching 21% in Africa: project delays are above 44% of planned construction time; demand forecasts are 20% above actual consumption; under investment in distribution generates bottlenecks, while over investment in generation produces supply overcapacity etc. These problems are largely responsible for the rapid deterioration of the financial situation of developing country utilities.

The study recommends that greater emphasis should be put on "efficiency and restructuring issues rather than concentrating on expansion". It recognises that such strategy will lead towards lower levels of electrification both in rural and urban areas, therefore reducing for many the opportunities for economic development; however it argues that it is not possible to sustain the expansion of the electricity system of developing countries if the current poor technological and economic performance of their utilities is not substantially improved. It is worth noting that such a strategy, if enforced by multilateral and bilateral financial organisations, is likely to harm especially the development of those countries that have not yet extended their grid to most of their territory and population; this means that low income countries are likely to suffer most.

The policy guidelines recommended by this study can be grouped under three main heads:

- a. Institutional Changes: developing countries should look for new institutional arrangements for their electricity sector that will strengthen the role of market forces; management of public utilities cannot resist the political interference that is a major source of inefficiency in this sector. Management of utilities should be free from day-to-day politics to run their business, although they must remain accountable for their decisions. Privatisation will eliminate government interference on management, will introduce competition and decentralise the decision-making process, thereby creating the necessary environment for the improvement of the financial and technological performance of developing country utilities.
- b. Financial Arrangements: prices of electricity will have to increase substantially to reflect marginal cost; this will ease the huge financial crisis of developing country utilities and will increase their level of self-financing. However, private funds both domestic and international will necessarily play a substantial role in the electricity sector. The World Bank estimates that 60 billion dollars will be needed yearly to finance this sector at the beginning of the 90s, increasing to 110 billion by the end of the 90s (Churchill/Saunders,1989); it estimates that at least \$25 billion of these financial needs are in hard currencies, but that only \$10 billion will be available from bilateral and multilateral organisations.

To attract private capital to this sector, the study suggests a set of incentives be offered by developing countries in order to reduce risks, particularly as far as foreign capital is concerned: tax breaks, easy access to land, exemption from import duties, security of (profitable) prices, guarantees that profits can be repatriated in hard currencies, etc... It also

suggests that future expansion might be primarily oriented to technologies of low capital-intensity, such as natural gas, to reduce the maturation period of electricity projects.

- c. Management Review: priorities of management should be re-oriented towards reduction of losses, reduction of demand and a careful assessment of links between the electricity sector and the macro-economic situation of the country. Therefore, maintenance, rehabilitation and distribution should receive much stronger attention from management; policies towards electricity conservation and load management must be introduced by utilities; reserve margins and engineering standards must be reviewed to adapt the electricity sector to the social and economic situation of developing countries. New tools are particularly needed to assess the macro-economic effects of the development of the electricity sector.

4. ELECTRICITY PRIVATISATION IN THE UK

Much the most radical reorganisation of an electricity supply industry (ESI) in the industrialised world has been taking place in the UK since 1987. It is as yet incomplete, but the main issues are now clear: its interest, for the purposes of this paper, is that the British privatisation represents an ambitious attempt to put into practice the major principles which the World Bank now advocates for developing countries (as outlined in the previous section). It is therefore of some interest for developing countries to see how far application of World Bank type principles seems likely to achieve desired results in the British case, and, in particular, to see how far there may be problems in the achievement of these results.

It is first necessary to outline a few general considerations which underly the ESI restructuring process in both industrialised and developing countries. As the first part of this paper makes clear, it is now widely agreed that the 'traditional' structures in the world's ESIs are in various ways inadequate and in need of reform. However it is important to distinguish between three separable sorts of market characteristic which existing forms of ESI organisation may embody. The three are:

- a. Centralisation and excessive size, which are most commonly supposed to lead to problems of inflexibility
- b. Monopoly which, in economic thinking, can lead to economic exploitation; and
- c. Public ownership, which leads to political interference.

In all three cases, various forms of inefficiency are expected to result.

Clearly all three market characteristics often exist together and the effects on performance may overlap to a considerable degree. They are however not only distinct in principle: various different ESIs exhibit differing combinations of them. The USA provides some good examples. There, utilities range enormously in size (hence the centralization and size characteristics will vary widely), and may be either publicly or privately owned. Generally it is only the monopoly characteristic which is found consistently across virtually all ESIs. But any attempt to solve particular ESI problems would benefit from an attempt to distinguish which, or which combination of the three characteristics is predominant.

It is also worth making explicit some familiar distinctions in the economics of market structure which are often overlooked in contemporary debate about ESI reform. The first is that private ownership of an industry (especially a utility industry) has no necessary connection with the existence of competition. The second, perhaps slightly less obvious but no less important, is that private ownership is no guarantee of an absence of political 'interference'. This 'interference' may of course be instigated by the industry or by the state: the state may well be interested in controlling a private industry, and equally a private industry may be interested in manipulating the state for its own economic advantage. The idea that private ownership is automatically to do with an arms' length relationship between industry and government is at best naive.

The unique feature of the British approach to ESI reform is that it tries to tackle all three of the industry's possible problems - centralisation, public ownership and monopoly. It is perhaps the first serious attempt, anywhere in the world, to introduce competition as a central principle in electricity supply. The main features of the changes in England and Wales are as follows:

- i) **Generation.** The state-owned monopoly generation and transmission company, the Central Electricity Generating Board (CEGB), is to be divided into two generating companies and a transmission company. Originally the nuclear generating assets were to be included within the larger of the two generating companies, but the current unprofitability of nuclear power, combined with its large and open-ended back end fuel cycle liabilities have made it impossible to sell to private interests (MacKerron, 1989). This has largely undermined the logic of the two-company generating structure: if nuclear power had been retained in the public sector from the start, a more radical division of generating assets, perhaps into five or six companies (each of around 10 GW) might have been contemplated.
- ii) **Transmission and distribution.** The new transmission company will be owned, more or less at arms' length, by the 12 distribution companies. These latter will correspond to the existing 12 state-owned regional distribution companies, and it was originally intended that they should

jointly have the obligation to supply, previously in the hands of the CEGB. Now it seems likely that the transmission company will take most responsibility for planning and supply obligations.

- iii) All ESI assets (except nuclear power) will be sold to the private sector, and provisions for competition will be introduced into all areas of the ESI except where there is a natural monopoly: everywhere, that is, except bulk transmission, and distribution to small consumers (ie those with a load below 100 kW).
- iv) A new regulatory agency, the Office of Electricity Regulation (OFFER) will oversee the industry. Its director has been appointed by Government, but it is intended to operate in terms of the Electricity Act 1989 and to be otherwise independent of Government. It will mainly be involved in the regulation of prices but will have responsibilities for the terms of contracts between generators and distributors, including their relationship with the transmission company.

What will be the effects of such far-reaching structural, ownership and operational changes? To answer such a question, it is of course necessary to have a clear view of the problems that reform is meant to tackle, and the problems of the British ESI do not correspond exactly to those characteristic of developing countries ESIs (as set out above). In particular, pricing structures in Britain have been broadly marginal cost-based, and the industry has been spectacularly successful in financial terms, for some years financing all its own investment and, in addition, paying back so much of its earlier long-term debt that it is now almost debt-free (Surrey, 1986). Nevertheless, there is a clear correspondence between some of the aims of the British government in its plans for ESI privatisation and those of the World Bank as a result of its diagnosis of developing country problems. In particular, the introduction of market forces in Britain is intended to have beneficial results in terms of cost disciplines and efficiency in general, and the more consumer-led structure is expected to lead to a more flexible and less costly set of investment decisions.

We therefore look specifically at market forces and investment decisions as particular focal points common to both British and World Bank objectives: we also treat a third area, demand management and conservation, because though not an explicit objective in British policy, it is an important issue, and the impact of privatisation on conservation in Britain turns out to be an interesting area for analysis.

4.1 Market forces and competition

If market forces are to mean more than simply private ownership, then competition is the touchstone of success. It is clear that the British Government has been entirely serious, and indeed radical, in trying to introduce competition into the UK ESI.

The first and most important single decision which will allow, and possibly encourage, competition is the removal of the transmission system from the control of the generators. The British Energy Act of 1983 had attempted to introduce marginal competition between the CEGB and new generators, but the complete failure of this policy is largely explained by the continuing control of the Grid by the CEGB. OFFER will undoubtedly be able to enforce fair access to bulk transmission for all parties wishing to use the system: whatever else may be true of the British privatisation, this freeing of the grid is unambiguously a desirable move.

But while open access to the grid is a necessary condition for the introduction of competition, it is far from a sufficient condition. Competition is envisaged by two main routes: between the generators, old and (hopefully) new in selling wholesale power to the distribution companies; and between generators and distributors in selling retail power to all but the smallest consumers.

The difficulty here is that competition does not necessarily arise spontaneously just because of private ownership, and/or the replacement of one generator by two. The market power of the two new generators - who are now unhindered by any obligation to supply - will obviously be substantial, and their capacity to collude, implicitly or explicitly, in order to drive out new generating entrants, or to avoid directly competing with each other for contracts with distributors, will be considerable. And insofar as they seek to compete against distributors for large retail customers, the resulting price cutting competition could clearly have serious price implications for the captive (household) segment of the retail market.

Of course the Government is alive to such possibilities, and because it is serious about competition it has been busily constructing a complex web of political/regulatory rules and deals to guard against the worst potential abuses. Because of the likely dominance of the new generators, most of the proposed rules are designed to give more power to the distributor/consumer end of the market. There has been an explicit hope that there will be a direct trade-off between competition and regulation; the more rapidly and comprehensively competition is introduced, the less need will there be for continuing regulation. While the Government has always espoused a 'light touch' in regulation, it has been willing to contemplate strong initial intervention in the interests of establishing the 'level playing field' in which competition will take place. The range of political/regulatory decisions needed is very wide indeed, and they are treated below under a few main headings, together with progress to date in the British case:

- a. The first main decision is how to split generating assets between the two new generating companies. If this turns out to be done badly, competition between the existing generators will not be real.

- b. The decisions about the type and length of contracts to be signed between generators, distributors and large customers for power sales, and the relationship between these contracts and the operation of the grid despatch system, have proved enormously complex at the technical level, and very controversial at the political level. Broadly, long contracts are good for planning, but bad for competition (the market is sewn up for a long period), while short contracts are good for competition, but risky for planning new capacity. The compromise reached for generator/distributor contracts, after lengthy wrangles between the parties, is that 12 GW of capacity will be sold on 4 to 8 year contracts, with the remainder contracted over shorter periods of 18 months to 5 years (Financial Times Business Information, 1989). Distributors are also to be offered protection against loss of large customers to generators selling directly. For four years, generators will be allowed to sell direct only to customers with a load above 1 MW, and to take no more than 15% of any distribution company sales. For the next four years, the load limit falls to 100 kW, and the proportion of total load rises to 25%. After eight years no restrictions on competition are envisaged. Finally distributors are also to be allowed to engage in limited generation of their own, to a limit of 15% of their total contracted capacity.

It has also been an important part of the Government's intention to reproduce, as far as possible, the economic efficiency represented by merit order despatch (so that, nationally, the cheapest marginal cost stations are always on load). It has proved extremely problematic to devise a system of settlements between the generators and distributors to compensate for situations where merit despatch does not correspond to contract terms. There is no need to go into detail in this complex area: but at present it remains unclear how the contract system will mesh with the settlement system, and further changes are likely.

- c. Given the scope for competition in the larger end of the retail market, the question of how sales to households are to be regulated is particularly important. Given that distributors will be competing for the larger customers against generators, the incentive - as a direct result of this competition reducing prices to large consumers - to raise prices to captive household consumers may be very strong. This 'regulatory interface' question, which arises when a single commodity is supplied in two market segments, one competitive, the other inherently monopolistic, is an important one. It is also a question that will not go away once the market settles down into its new operation. It makes the role of the regulator extremely important in the protection of captive customers. The

proposals are that regulation will mainly be by price: distributors will be allowed to raise prices by a so-called RPI - X + Y formula.

This means that prices may rise by less (X) than the retail price index, subject to pass-through of all costs (Y - mainly fuel) which are considered outside the supplier's control. The value of X (probably 1% initially) is to be determined by the regulator, as is the precise definition of Y. The Government also hoped initially to institute some 'yardstick' competition between distributors, in which there would be incentives for poorly performing distributors to reduce costs in line with at least average practice, but the contract proposals agreed will now make it difficult to apply, and it is now unlikely to go forward.

This brief treatment of the range and current resolution of issues surrounding the British ESI privatisation makes it very clear that the introduction of market forces - if understood in the proper sense of competitive behaviour - has to be carefully organised and closely regulated. An industry with such strong natural tendencies towards co-operation/collusion as electricity supply cannot spontaneously produce fair competitive behaviour because of changes in ownership combined with even quite radical structural changes. Of course if 'market forces' turns out to mean only private ownership rather than competition (as is perhaps more likely in most developing countries) then the above arguments about regulation apply even more strongly - private monopolies in electricity supply will need even heavier regulation than partially competitive ones. In other words there is indeed a trade-off between competition and regulation, and if serious regulation is renounced in non-competitive situations, there is every reason to expect exploitative behaviour on the part of those with economic power.

4.2 Investment behaviour and incentives

The World Bank view stresses the need for private capital to be attracted to power sector investment, and for technology to be less 'investment-intensive'. One entirely general influence on investment behaviour as a consequence of privatisation, in industrialised and developing countries alike, is that higher discount rates in the private sector will lead to reduced total investment (the 'hurdle' is higher) and to less capital-intensive forms of investment (low capital cost projects can produce quicker returns).

In the British situation, all new investment will by definition be private (except for nuclear power, which has officially been put on ice for at least five years (Hansard, 1989). Exactly how much investment there is, and in what technologies, will of course depend on the contractual framework between potential generators and potential customers (wholesale or retail). Clearly the general encouragement to competition and

short contracts for sales of power from existing plant will pre-dispose customers towards signing contracts as short as possible. This will reinforce the discount rate tendency towards low capital/high fuel cost projects which can produce revenues within a year or two of investment decisions being taken. Thus three planned projects for large-scale coal-fired stations have been abandoned, and the only serious current contenders for new investment are combined cycle gas plants, relying on currently low priced gas and their capacity to begin producing revenue within two years of funds being committed.

It happens that the centralising tendencies of the CEBG have led to a plant mix that is heavily skewed towards base-load plant (large nuclear, coal-fired and oil-fired). It is therefore rational, on system economics grounds that are entirely independent of ownership and competition, that the next round of ESI investments are of this low-risk, quick-return type. There is no doubt that the risks to generators of building any other sort of plant are too high in a competitive system of the British type: when it eventually becomes socially rational to build higher capital/lower fuel cost plant, it is not clear that the British system will give private incentives to do so. This point of course is likely to be relevant to developing countries with good potential for hydro, which tends to flourish only in environments where planning is long term and discount rates are low.

4.3 Demand-reduction and conservation

It is no part of the plan for a private ESI in Britain that the growth of electricity use be restrained. Efficiency in a general economic sense is of course the main objective, and it is likely that the new investment climate described above will not only lead to savings in the form of a reduction in the amount of new plant built, but, in the quest to cut costs, also to less gold-plating in the capacity that is constructed. High discount rates will also tend to give incentives to the refurbishment and life extension of existing plant. In relation to a given level of electricity demand therefore, the British proposals do indeed seem likely to achieve the kinds of objective outlined by the World Bank.

However, the incentives in relation to electricity demand levels are, in World Bank terms, likely to be perverse. The regulatory formula of RPI - X actually encourages electricity suppliers to sell as much electricity as possible. Provided the marginal unit of electricity costs less to produce than to sell, profit maximisation will lead the distributors to sell as much electricity as they can. This is in itself hardly surprising: in most businesses, more money is made by selling more of a product rather than less. The only way to overcome this would be by building in incentives for suppliers to restrain rather than maximise sales: in other words, by further regulation.

This could be done, for instance, by manipulating the price formula to an RPI - X - G form, where G is related directly to the rate of growth of sales. In such a formula the faster the rate of growth of sales, the lower the rate of growth of prices. A suitably chosen G could therefore lead to higher profits being made by restraining the

growth of electricity sales. An alternative, less satisfactory in a market-based system, but seriously considered in the British case, would be to build in a legislative duty to help consumers save electricity. This would however probably conflict with the economic incentive to increase sales. Either way, however, it is plain that the unaided market will not (as in the British case) promote electricity conservation: if conservation and demand reduction are desired, then there is further need for political intervention or regulation.

5. CONCLUSION

It is plain that the structures that dominate the world's electricity supply industries are overdue for reform. A combination of technological change and acute financial problems of their public sector make such changes particularly urgent in most developing countries. The World Bank's analysis of these problems makes public ownership the central question, though it is also concerned with centralisation and monopoly. Its analysis focuses on the need to attract private capital (especially foreign) into developing country electricity systems, assuming that it will bring decentralisation and competition as well. There is a general presumption in this analysis that privatisation will solve the financial crisis, restore the international flow of technology and introduce a more efficient set of profit-driven investment and management decisions.

Consideration of privatisation in Britain suggests that matters may be more complex than the World Bank view allows. On the positive side, privatisation can possibly solve the short term financial problems that the almost bankrupt treasuries of developing countries can hardly deal with. Moreover, it will almost certainly lead to more sparing and lower cost investment decisions that will ease future financial arrangements. And, if, as is the case in the British privatisation, privatisation also removes the grid from the control of the generators, it will almost certainly lead to favourable results in opening up the market to competition. This grid reform is however not directly linked to ownership (though it might, in Britain, have been harder to achieve in the absence of the radical climate of privatisation in which the decision was made).

But the British experience also suggests some negative results. First, private investors use much higher discount rates which thoroughly reduce the competitiveness of fossil fuel power plants; it is likely that in such circumstances non-tradeable energy resources like hydro-power will remain idle while fossil fuels will either be imported, or will not be exported. Obviously, this is a major economic disadvantage for most developing countries which still face large unbalance in the external accounts.

Second, higher discount rates mean higher electricity prices. In most developing countries electricity prices will have to increase substantially even if utilities remain in the public sector. Therefore, privatisation will force prices to go up even more

strongly, adding another political and social hurdle to the restructuring of their electricity systems.

Third, the British experience also suggests that the setting up and, in all probability the maintenance over time, of genuinely competitive behaviour requires a large state intervention, and calls on the state to develop and implement new political/regulatory skills. Private investors prefer low risks, and low risks tend to be present in more or less monopolistic rather than competitive structures. But, as we have already argued, private monopolies require an even greater regulatory effort than semi-competitive structures. Competition in the electricity sector needs above all to be organised, and there is likely to be a trade-off between competition and regulation, if socially efficient ESI behaviour is to be promoted. We doubt whether, in most developing countries, as much competition will be introduced as in Britain: this implies a need not for rolling back the state, but a large and novel state effort to set up new regulatory structures and limits.

Privatisation can possibly solve the financial crisis of many developing countries but the World Bank claims that privatisation will only succeed if a substantial set of incentives are offered, particularly to foreign capital, to reduce risks and increase profitability.

It will however, hardly introduce competition or "roll back the state" from the electricity sector. In practice, short term financial benefits of privatisation have to be compared with long term effects on fuel trade, increased electricity prices and a politically difficult set of incentives to be offered to foreign capital.

We do not conclude from all of this that some degree of privatisation of developing country ESIs is undesirable, and least of all would we argue that reform away from centralised monopolies is unwanted. The British experience suggests, however, that ownership may not be the only or central issue in achieving better performance, particularly as privatised structures require continued and novel forms of state activity, rather than (as in the World Bank View) a simple or linear removal of the state. In the absence of such new state activity the World Bank proposals look suspiciously like a recipe for foreign capital to earn substantial and secure profits from owning large tracts of developing country power systems.

REFERENCES

- M Bell/J Gill/A Barnett, Power Plant Manufacturers and the Growth of the power section in Developing countries : European Suppliers in a Changing Market, Science Policy Research Unit, Falmer, Sussex, 1988.
- J Chesshire, 'Electricity Privatisation: Proposed Structure and Unresolved Dilemmas', World Electricity Conference, London, November 1989.
- A A Churchill/R J Saunders, Financing of the Energy Sector in Developing Countries, Industry and Energy Department, World Bank, Washington, 1989.
- W K Davis, Conclusions of 14th World Energy Congress, Montreal, Canada, 22.9.89.
- DoE, Background Papers Relevant to the 1986 Approval of U.K. Energy Research, Development and Demonstration, HMSO, 1987.
- Financial Times Business Information, Energy Economist 96, October 1989, pp.2-6.
- Hansard, Statement by the Secretary of State for Energy, November 9 1989.
- ICR, 'SO₂ Control in Europe', International Coal Report, issue no. 231, 8.9.89.
- IEA, Electricity in IEA Countries: Issues and Outlook, OECD/IEA, Paris, 1985.
- G MacKerron, 'The Effects of Decommissioning on Nuclear Policy in the UK', SPRU, mimeo, December 1989.
- M Mason/J Gilling/M Munasinghe, A Review of World Bank Lending for Electric Power, The World Bank, Washington, 1988.
- J MuKai, 'The Twenty-First Century Energy Vision', in Annals of the WEC, Division 1, section 1.1, 1989.
- Office of Technology Assessment (OTA), New Electric Power Technologies, OTA-E246, Washington, 1985.
- OLADE, The Foreign Debt of the Energy Sector of Latin American and the Caribbean, Quito, Ecuador, 1988.
- M Shepard, 'Tapping Global Expertise in Coal Technology', in EPRI Journal, January/February 1986.
- A J Surrey, 'Government and the Nationalised Energy Industries', in A Harrison, J Gretton and G MacKerron (eds) Energy UK 1986, Policy Journals, Newbury, 1986.
- WEC, Survey of Energy Resources, World Energy Conference, London 1989.
- R H Williams/E D Larson, 'Expanding Roles of Gas Turbines in Power Generation', J B Johanson et al in Electricity : Efficient Use and New Generation Technologies, and their Planning Implications, Lund University Press, 1989.

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