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FINAL REPORT

THE GUYANA NATIONAL ENERGY
AUTHORITY

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BY: W. R. ASHBY,
INTERNATIONAL SCIENCE AND TECHNOLOGY
INSTITUTE
WASHINGTON D.C.,
AND
ENERGY/DEVELOPMENT INTERNATIONAL INC.,
WASHINGTON D.C., AND NEW YORK

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SUMMARY AND CONCLUSION

The Guyana National Energy Authority has been established by law, and initial staff have been appointed and have begun working.

An energy assessment of Guyana has been substantially carried out, and is due for final completion by September 30.

Guyana has significant energy resources, principally hydropower and biomass, which would substantially reduce the need for imported fuel by about 1990 and thereafter. But the utilization of these resources is subject to many constraints, including technology, manpower and organizational constraints.

The number of possible development projects in energy is beyond the capacity of the Energy Authority to handle, and there will be a need for careful selection according to appropriate criteria.

The energy Authority will also have a continuing need for training, technical assistance and other support, if it is fully to achieve its objectives.

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THE GUYANA NATIONAL AUTHORITY

1. Background:

In June 1979 the Guyana Government decided to establish a National Energy Authority, which would be a body charged with the formulation and coordination of energy policy in relation to the whole country. Subsequently, about September 1979, USAID were asked to provide assistance in the form of advice with regard to the structure and mode of operations of such an Authority.

In response to this request a reconnaissance mission visited Guyana from March 22 - April 1, 1980, comprising:

- Dr. Jerome J. Bosken, Deputy Director - Office of Energy
- Dr. Eric D.K. Melby, Energy Planner - Office of Energy
- Dr. Harold Klein, Department of Management Temple University

The report of this reconnaissance mission recommended, inter alia, that the Government of Guyana should engage the services of one or more consultants who would assist the NEA to :

- a) Establish an effective data gathering system on energy production and consumption;
- b) develop an energy balance for the country;
- c) design and install an energy planning process;
- d) identify NEA's staff requirements, including the need for recruitment, training and outside consultants;
- e) establish a system for acquiring information on energy programs in other countries, with emphasis on conservation and alternative energy technology;
- f) establish procedures to coordinate Guyana's involvement in regional programs such as those of Caricom and the Caribbean Development Bank; and

- g) develop operations and management systems for the NEU in line with its present and planned responsibilities.

Arising out of this recommendation, a contract was awarded in September 1980 to the International Science and Technology Institute of Washington, D.C. and to Energy/Development International of Washington D.C., and New York, on sub-contract to ISTI, to provide four months of consulting services to the Government of Guyana. The terms of reference for this contract, reproduced at Appendix I, effectively addressed themselves to points a), c), d), and g) of the above recommendations.

Simultaneously with this development, another USAID programme, this one a regional programme operated by the CARICOM Secretariat and the Caribbean Development Bank, was also being initiated. This programme had, among its objectives, to carry out energy assessments and identify long-term energy needs in all the participating territories, and Guyana was identified as one of the initial territories where these assessments should be carried out. Energy/Development International were awarded a contract to advise CARICOM in the conduct of these assessments, and hence the present consultant was asked to supervise the conduct of the Guyana assessment as well, this being part of the CARICOM programme. Although this dual arrangement at times created some confusion as to the relative responsibilities of all the parties involved, it did mean that all the recommendations of the initial reconnaissance team were being addressed, and the arrangement has on the whole worked satisfactorily.

The contract with ISTI was subsequently extended in March 1981 for a further 3½ months, to enable work in connection with the Guyana assessment to be pursued. At the moment of writing this assessment is still incomplete, but this report summarizes the state it has reached, and discusses the present status of the Energy Authority.

2. The Guyana National Energy Authority:

Enactment A draft Energy Act, for the purpose of establishing the Energy Authority, had been prepared as long ago as September 1979. An interim report under the present contract, prepared in January 1981, examined this draft legislation and found that it substantially embodied all the powers required by the NEA. This advice was accepted by the Guyana Government, the Act was passed by Parliament, with minor modification, in March 1981, and received Presidential assent on April 6. The Act stated that the Authority would come into operation on a date to be appointed by the Minister, and that date was subsequently fixed as July 15, 1981. Hence a major objective of this programme has already been achieved, in that a fully structured Energy Authority is now in existence, with the necessary legal status and powers.

- 2.1. Structure The Energy Authority, as established by the Act, consists of a Board, of not more than five members, who are responsible for advising the Minister on all matters relating to energy policy, and an Energy Advisory Council, comprising representatives of all major organizations concerned with energy use, and such other members as the Minister may appoint, who will advise the Board on any matter on which their advice is sought.

At the moment of writing the Board and the Advisory Council have been fully constituted, but have not yet held their first meetings.

The organization Chart for the Authority, as approved by Cabinet, is given at Appendix 2. In effect, the recommendations of the Interim Report have been accepted with respect to the professional staff of the Authority, but some slightly unusual features have been introduced with respect to the reporting relationships by which the professional staff, together with the other officers of the Authority carry out their responsibilities under the Chairman of the Board.

For one thing, the Authority is graced with both an Executive Chairman and a Director-General, the latter being a somewhat egregious title.

In addition, it will be seen that the Director-General, the Public Relations Officer, and the Secretary to the Authority, all report to the Chairman through the Vice-Chairman, who is also responsible for special projects. This arrangement stems from the belief of the Guyanese authorities that the position of Vice-Chairman must be given a substantial role to play in the organization, and not occupy the limbo of only acting when the Chairman is absent, as is the usual fate of Vice-Chairman. But it is acknowledged that the solution chosen is not necessarily the final one, and not necessarily the most workable in practice.

2.3

Director of

Staff: The Organization Chart as shown calls for a professional staff of 21 persons. Of these positions, at least one is redundant; that is depending on the qualifications of the Director-General, it maybe unnecessary to fill either the post of Technical Director or/ the Economic Division; hence the real staff complement is 20 persons.

Of these positions seven have so far been filled, including the posts of Public Relations Officer and Secretary to the Board. If this seems to be a relatively small staff, it is nonetheless all that is required in the beginning. This is so because the senior officers, although experienced persons, are themselves new to the field of energy planning, and hence it is necessary for themselves personally to pay attention to all the details of what is required of their offices and divisions and new staff should only be added as they are found necessary. If there were a large number of junior staff at the inception, they would receive no adequate guidance. However, given the magnitude of the work load that will be discussed below, it will not be long before additional posts must be filled.

If the initial staff are few and inexperienced, it must also be said that they are well qualified, able, and enthusiastic, and appear to offer the promise of doing significant work. But a reservation must be entered in respect of the Technical Division, where there is only one engineer in support of the Technical Director, so that the resources of this division appear rather thin.

In summary, the following positions have so far been filled:

Director-General (who is also head of the
Economic Planning Division)
Director, Technical Division
Energy Conservation Engineer
Statistician
Economist
Public Reation Officer
Secretary

3. The National Energy Assessment:

Simultaneously with the establishment of the National Energy Authority, a national energy assessment was undertaken, as mentioned, under the USAID/CARICOM programme. The objectives of this assessment are:

- i) To prepare a detailed energy balance for the base year 1979
- ii) To project this energy balance forward to the years 1985, 1990 and 2000, using economic assumptions provided by the planning authorities.
- iii) To assess the impact on these projected energy requirements, and hence on the balance of payments, of energy strategies relating in particular to a) hydro; b) conservation; c) biomass and other renewable energy sources.

3.1. Data Collection The first phase of this exercise was therefore a programme of data collection aimed at establishing an energy balance for the base year 1979. This was begun in November 1980.

The precursor to the Energy Authority, the National Energy Unit, consisted at this time effectively of only one statistician. Additional personnel for the assessment were provided by the CARICOM Secretariat, consisting at various times of from 1-2 professionals, and 2-4 data collectors. None of these personnel had any previous experience in energy assessments.

Due to this circumstance, as well as the sheer difficulty in obtaining information, the data collection phase took much longer than expected, and was not substantially completed until the end of June, 1981. In this phase, reports on energy use were to be prepared under the following headings:

1. Petroleum fuels
2. Domestic fuels
3. Electricity
4. Industry
5. Transport
6. Agriculture
7. Services (Principally Government and Commerce)
8. Household
9. Policy Issues

These reports have duly been prepared and submitted, with two exceptions. The report on the household sector awaits the completion of a household energy survey, which is still in progress; and no formal report was prepared on the Services Sector, since this proved to be too amorphous to deal with fully in the time available. Data was partly available for consumption in this sector, and it was otherwise treated as a residual after everything else had been accounted for.

A review seminar, held on July 9, served both to summarize the data collected and present it in the form of an energy balance; and also as a briefing for two energy analysts who had in the meantime arrived to carry out the analyses and projections based upon the data collected in this phase.

- 3.2. Analyses and Projections This phase of the assessment exercise seeks to construct a profile of energy requirements for the years 1985, 1990 and 2000, based upon the energy balance for the year 1979. For the period 1980-1985, the economic growth targets used are those agreed between the Guyana Government and the World Bank, and presented in a recent World Bank memorandum. For the period 1985-2000, different cases are considered, using a span of economic assumptions. The first part of these calculations was carried out by the analysts who were in residence for the period July 7-25. But since this subject will be dealt with fully in the final report on the assessment, it is not discussed any further in this report.
- 3.3. Energy Strategies and Scenarios The remaining work of the assessment is to estimate how energy conservation and the development of indigenous energy supplies can reduce the need for imported petroleum and improve the balance of payments position. The main options open to Guyana for reducing dependence on petroleum appear to lie in the following developments:
1. Hydropower (Several options available)
 2. Conservation in the bauxite sector

3. Conservation in the rest of the economy
4. Use of wood biomass in the bauxite sector
5. Use of biomass and other alternatives in sugar, rice sawmilling, transport and other activities.

The assessment will not in itself provide a definitive indication of the magnitude of these substitutions or their possible effects, for not all studies relevant to the quantification of these possibilities are available at the present time. To mention only a few of the important studies outstanding;

- i) A World Bank updating of the feasibility study for the Upper Mazaruni Hydropower project is just about to begin.
- ii) A feasibility study of the Tumatumari hydropower project has not yet been completed.
- iii) A study of the use of sawmilling wastes for Guyana Timbers Ltd covers only a portion of the wastes potentially available.
- iv) A feasibility study of the use of surplus bagasse for energy purposes is being considered.
- v) A projected study of the conversion of rice chaff to energy has not yet been carried out.

In addition, some of the more important possibilities, such as the use of wood in bauxite kilns or of wood farming for energy on a larger scale, have not yet been studied, even at pre-feasibility level, and will be addressed for the first time in this assessment.

In these circumstances, it is clear that the assessment will not provide definitive answers as to the possible impact of indigenous energy development. Rather, and more importantly, what it will do is to provide the Energy Authority with the capability to revise and update their own analyses periodically as more studies are completed and more accurate data is at hand. To this end, a most important target of the exercise has been that the Energy Authority have in place its own staff to act as counter parts to the experts carrying out the analysis, and this objective has now been fulfilled.

The assessment, however, does aim to provide expert analyses in five areas where information is not now available. These are:

1. Energy Conservation in the bauxite industry
2. Energy conservation in the other manufacturing and commercial sectors
3. Use of wood in bauxite kilns
4. Wood production and forestry management
5. Use of surplus bagasse in sugar industry

Of these studies, only the second has so far been carried out. There has been delay in concluding contractual arrangements between CARICOM and the consultants in respect of the other studies, and that is the principal reason why the assessment remains incomplete at the present time; though in fact it could probably not have been handled much faster in any case. But these studies are programmed to be completed by the end of August, and hence the final assessment report should be available by the end of September, 1981.

4. Policy and Implementation:

Though the assessment is still incomplete, it is nonetheless possible, on the basis of what has been done, to define the main lines of energy policy for the country, to indicate the projects and programmes which will occupy the attention of the Energy Authority, and hence to define the training needs of the Authority, and the cooperation which must be sought from other agencies. The completion of the assessment will merely lend quantitative support to some of the arguments now to be advanced.

4.1 Energy Policy:

It is reasonably clear that the objectives of energy policy in Guyana must be:

- i) To reduce the dependence on imported petroleum through
 - a: Energy Conservation
 - b: Developing indigenous energy resources;
- ii) To mitigate the burden of the high cost of petroleum through subsidies, when appropriate, to the lowest income consumers.

Some discussion of these objectives is now in order.

4.2 Energy Conservation:

The possibilities for energy conservation are determined, in the first instance, by a knowledge of what are the major energy-consuming sectors. The following table gives an approximate breakdown:

Sector	Energy Consumption	%
Bauxite	2073	35
Electricity	616	11
Transport	785	14
Manufacturing	1980	33
Household	200	3.5
Agriculture	157	2.7
Others	77	1.3
Total:	5888	100

Energy Consumption given in thousands of barrels of oil equivalent
Source: Guyana National Energy Assessment.

From this table it will be clearly seen that the greatest conservation opportunities, in terms of magnitude of impact, lie in the bauxite, electricity, and transportation sectors, with relatively smaller possibilities in manufacturing and other sectors. But although conservation opportunities may be small in the manufacturing sector, for example, it does not mean that they are not worth pursuing, since efficiency of production may make a considerable difference to the cost of particular manufactured items.

Let us then omit from this discussion the bauxite sector, which is an entity by itself, and the electricity sector, which has its own special problems, and discuss conservation policy with respect to the other sectors.

In fact we should not omit the Electricity Corporation altogether, for it will serve as a paradigm of what should not be allowed to happen to other sectors.

The net efficiency of the G.E.C. System is low, about 18% whereas it ought to be about 25%. This is so because equipment fell into disrepair, due to inadequate maintenance, culminating in the complete collapse of the largest generating station, and now requiring costly and lengthy rehabilitation.

In several other organizations it is equally clear that adequate maintenance has been impossible, due to the economic difficulties in recent times, and the consequent restriction on imports. In such circumstances operating efficiencies may well be low, and it is also meaningless to speak of energy conservation unless the possibility exists to carry out that level of maintenance which is normally associated with acceptable efficiency.

Therefore it appears that what is needed is to carry out studies in each of several major organizations, both public and private, concerned with manufacturing and transport, to determine:

- a) what the normal maintenance requirements of the organization are;
- b) whether this level of maintenance leads to reduced energy consumption;
- c) what investment cost, lead times and payback periods are associated with reaching these desired states of efficiency.

It is also clear that it will be necessary for the Guyana Government to seek appropriate funding to enable this programme of rehabilitation to be carried out.

But besides this programme of conservation investment, which necessarily has some lead time, there are always losses due to carelessness and bad management. These can be identified and eliminated, at relatively modest cost, and a programme of energy audits of such institutions should also be carried out, so that these opportunities may be identified, and the savings made.

- 4.3. Indigenous Energy Resources Much greater possibilities for reducing imported petroleum needs lie in the development of indigenous energy resources; but in general such developments will have even longer lead times than those associated with energy conservation.
- 4.3.1. Petroleum Exploration It will be obvious that the discovery of local petroleum resources would have greater immediate economic impact than any other development. Hence the priority which attaches to petroleum exploration. Drilling is due to begin soon in an onshore region which is said to have yielded very favourable indications in preliminary seismic surveys. But since it is not possible to anticipate what the outcome of this exploration may be, no more can be said about it at this stage.
- 4.3.2. Hydropower Guyana possess abundant hydropower resources. The total estimated potential is some 7,000 megawatts, compared to a total installed generating capacity at present of about 150 megawatts. This presents several options in terms of possible hydropower schemes, the most favoured being the Upper Mazaruni Development Scheme, whose initial installation of 750 MW would both enable and require an aluminum smelter project in order to make use of power on that scale. There is also contemplated a smaller installation, at Tumatumari, of some 20-50 MW, which is conceived of as supplying incremental power requirements until such time as a major hydropower scheme can be developed. In addition, there are a number of possibilities for mini and micro-hydro developments, for supplying power to localized communities on a small scale.
- 4.3.3. Biomass and other Alternatives The planning, and to some extent the institutional development for both petroleum and hydropower development are relatively well advanced. Neither much planning nor institutional coordination has been carried out in the case of biomass development, or other lesser alternatives. This is the third source of possible import substitution, and it is to this area that the Energy Authority must largely devote its attention in terms of carrying out feasibility studies and development projects. There are many possibilities to be considered, and the following is an outline of the principal ones, in approximate order of potential impact:
- a) Wood use in Bauxite Kilns This is the largest use of biomass energy which can presently be clearly defined. It is thought possible to substitute wood for up to 30% of the fuel oil used in calcining bauxite. This single substitution would replace about 7% of Guyana's total petroleum consumption. But to realize this possibility requires both technical development and also the means to produce wood on the scale required, which probably requires special energy farming. A lead time of about a decade seems to be required.
 - b) Methanol To convert wood to methanol for use as a general purpose liquid fuel would have major impact on petroleum consumption, probably even greater than in the case of bauxite kilns. But the technology for producing methanol on the scale required, which is small by normal industrial standards, has not yet been developed, and again a long lead time is indicated. Energy farming would again be necessary to provide the wood feedstock.

- c) Wood waste A considerable amount of wood waste is presently being generated, in connection with logging and sawmilling operations, amounting in total to about 70% of the total volume of timber felled. Much of this can economically be recovered, and used to provide electricity for sawmilling operations, with some excess for use in nearby communities, or the national grid. Another possibility for using wood waste is to convert it into wood-gas, which can then be used to power certain classes of vehicles. Long distance buses, ferries, and agricultural tractors are thought to offer the greatest opportunities for using wood-gas. Some initial studies in these areas have been undertaken.
- d) Bagasse About 965% of the bagasse now generated by the sugar industry is used within the industry as a process fuel, but there is a surplus of about 50,000 tons, mainly at two estates. There are a variety of options for using excess bagasse both for energy and for other products, such as particle board and cattle feed. The energy options might involve baling and storing the bagasse to generate electricity during out-of-crop periods. A feasibility study of these options is required.
- e) Rice Chaff Rice chaff constitutes about 20% by weight of paddy, but at present little use is made of it, except in one centre for parboiling. The possible uses of rice chaff include parboiling and drying rice, and generating electricity, probably for use within the rice mill. A feasibility study is expected to be carried out in the near future.
- f) Charcoal Export A relatively small quantity (858 tons), of charcoal is now produced, mostly for domestic consumption. An export trade in charcoal is possible, provided that the volume and efficiency of production are such that the production cost can match the price available. A feasibility study is required. Charcoal production is worthwhile, both as an export earner, and in order to develop the skill and expertise in wood handling that will be required if energy farming is to eventually be developed on the scale indicated earlier, for bauxite use or methanol production.
- g) Solar Energy The potential for solar energy is rather limited, but there are some projects worth carrying out. There is some demand for hot water in hotels, hospitals, restaurants and laundries, and this can most economically be supplied easily. There is some significant potential for solar crop drying mostly for food preservation, and photovoltaics may be considered as an energy source for supplying electricity to isolated communities which are without any other source of alternative energy, such as wood waste or hydropower. But the total amount of petroleum displaced by these uses will be quite small.
- h) Bioogas The same may be said of biogas. The conversion of animal waste into energy is significant as an energy source for livestock farms and farming households, but its total impact on energy consumption is not large.

- i) Wind This is also true of wind power. There may be some limited potential for water pumping in certain areas, but it is not clear that any area of the country possess sufficient wind resources to allow for electricity generation on any important scale.
- j) Peat Guyana appears to possess significant quantities of peat, but its quality and potential uses have not yet been investigated.

5. Training Requirements of the GNEA:

The energy development possibilities which have been outlined will now serve to define the training need of the GNEA.. These needs may be classified under four headings, namely (i) Conventional Energy, (ii) Non-conventional Energy, (iii) Energy Conservation, (iv) Energy Policy and Energy Analysis. We may discuss them each in turn:

- (i) Conventional Energy By this we mean training in respect of petroleum exploration and hydropower development. In both cases the training needs may be modest at the moment, but will escalate depending on whether petroleum is discovered, or a major hydropower scheme is launched.

In the case of petroleum exploration there is some need for training in several of the related disciplines, such as geology, geophysics, reservoir engineering, petroleum engineering and petroleum economics; the magnitude of this depending, as we have said, on the success or otherwise of the projects undertaken.

In the case of a major hydropower and smelter scheme, any such project will require a large and diverse array of skills, the development of which will surely tax the country's resources, and for which success may well depend on the importation of personnel. But these requirements need not be addressed at the moment, except in a preliminary way.

- (ii) Non-Conventional Energy By this we mean chiefly the biomass, solar, wind and biogas energy sources discussed above. Here the needs are more immediate, since, in general, a lower degree of technology is involved, and it is essential to involve local personnel in all phases of the development of these projects. The training required will cover all aspects of the conversion of biomass to energy, including combustion, pyrolysis, fermentation, and energy farming, as well as wind and solar technology. The scale of such training should be decided in relation to the possible impact of the technologies involved.

- (iii) Energy Conservation The principal need under this heading is to train a number of engineers and technical personnel in the techniques of energy auditing and energy management. Unlike most of the training so far described, these courses can be carried out in-country. But

there would also be a need for a few engineers at the planning level to travel abroad for familiarization with new developments in conservation technology.

- (iv) Energy Policy and Energy Analysis Training under this heading refers to the need to keep the staff of the GNEA, especially in the economic planning division abreast of the skills involved in energy data collection and analysis, project preparation, management and evaluation, and analysis of the impact of alternate energy strategies, such, for example, as is undertaken in the assessment now in progress. This may be accomplished through a combination of resident advisers to the GNEA, as well as sending selected personnel to appropriate courses, up to and including graduate degree programmes in energy planning and management. In addition, there is a need for the senior staff of the GNEA, and members of the board to keep abreast of international and general issues relating to energy development, and this can be accomplished through attendance at appropriate conferences, and by occasional study tours.

An initial training programme, in keeping with these objectives, has been proposed to USAID and GNEA for execution under the current bilateral manpower training programme between the Guyanese Government and USAID. It proposes a series of policy level study tours for senior members of the Authority, study tours and training courses in relation to biomass technology, energy farming and energy conservation. One in-country energy auditors course has already been held, and another is recommended.

6.

Requirements for Technical Assistance:

The energy development possibilities discussed above also serve to define the needs for technical assistance, including project funding.

For example, to undertake petroleum exploration clearly defines a need for assistance in developing leasing agreements, exploration or production contracts, as well as assistance in connection with any exploration the Government may decide to undertake itself.

Similarly, the hydropower project poses the need for massive funding, which is being sought from agencies such as the World Bank, and potential project partners.

This report, however, concentrates on the need for assistance in connection with biomass and other alternatives, and energy conservation. In this case a list of potential projects can readily be defined, since they are implied by the outline already given. Any potential project list would include:

- * Feasibility Study and experimental development of wood use in bauxite kilns
- * Feasibility Study and experimental development of wood farming
- * Experimental development of methanol production
- * Charcoal production for export
- * Feasibility Study and introduction of wood-gas engines in buses, tractors and ferries.
- * Electricity generation from wood waste at suitable logging and sawmilling centres
- * Use of surplus bagasse in sugar industry
- * Use of rice chaff in rice industry
- * Electricity production from mini - and micro-hydro sites

- * Assessment of peat resources
- * Installation of solar water heaters in hotels, hospitals and laundries, and solar stills for producing distilled water
- * Development of solar crop dryers
- * Installation of biogas plants or livestock farms
- * Installation of windmills for water pumping
- * Photovoltaics projects in rural communities
- * Energy audit programme for industrial plants and transport and commercial organizations
- * Studies to determine maintenance requirements of major energy-using organizations
- * Rehabilitation programme, based on these studies, to effect energy conservation opportunities

It will be obvious, merely by looking at this list, that the Energy Authority, as presently constituted, has nowhere near enough personnel to carry them all out, even though much of the work would actually be done by other agencies. For even the planning and monitoring of that number of projects would require a significant increase in the present staff.

Two things follow from this observation. One is, that if enough personnel are not available, then it will be necessary to choose, among possible projects, what it is feasible to do, according to some set of criteria. Such criteria should obviously include:

- * Visibility, or near-term impact
- * Total potential petroleum displacement
- * Investment cost
- * Lead time for implementation
- * Net foreign exchange impact
- * Technology availability

Therefore a careful appraisal will need to be made of the suggested projects according to these criteria, taking account also of available personnel and project finance, before an actual work programme for the GNEA and its associated agencies can be decided upon. But several of the projects suggested will be suitable for USAID financing, and discussions should be held to determine which are most appropriate.

Preliminary calculations carried out in connection with the energy assessment suggest that the total development of all alternatives, including hydro, might by 2000 replace about 40 % of what would otherwise be the petroleum import requirement in that year. These figures will need to be reappraised in the light of certain studies yet to be done, and continually reviewed thereafter; but it is clear that the energy resources of Guyana are considerable, even without taking account of the possibility of indigenous petroleum, and what is needed is the most effective strategy to bring about these developments.

The other conclusion which follows from the observation made above is that the GNEA will continue to need institutional support if it is to carry out its planning functions adequately. It has already been noted that the technical staff are rather thin, and this will probably continue to be the case. The need for training on the economic and analytical side has already been noted. Therefore assistance programmes should allow for institutional support in terms of resident advisers, in technology, economics and in overall energy planning; they should also include the more usual aids such as information and computing facilities.

The Guyana National Energy Authority, it would appear, has been well and truly launched. The prospects before it are fair, although the task is enormous. It will deserve all the assistance it can be given.

THE CURRENT STATUS OF THE NEA

The following is written in response to USAID's request for a fuller discussion of the present status of NEA in relation to the recommendations made for it, and to its need for future institutional support.

In terms of the realities of the Caribbean and Guyanese situation, the progress made so far in setting up the NEA is neither unreasonable nor unreasonably slow, but there are some features which do give genuine cause for concern.

Twenty-one staff positions have been written into the Organization Chart. The personal view of the consultant is that not more than fifteen are necessary, and to have filled half of these is quite a fair start.

There will be considerable difficulty in increasing this number. Of the seven staff members in place, three were already employed by the pre-existing NEU or by UMDA, two were transferred from previous responsibilities also involving energy and only two are new recruits. The difficulty in recruiting additional staff is illustrated by the fact that:

- a) The staff positions were advertised abroad through Guyanese Embassies, with no response;
- b) Two other persons in Guyana, an economist and an engineer, had expressed interest in joining the NEA on transfer from other governmental agencies, but these agencies have declined to release them.

In practise, therefore, it is likely that the NEA will mostly increase its staff through the recruitment of new and inexperienced graduates. Hence it is likely to take quite a long time before they work up to the full strength. But we should not overlook the fact that the people now in place possess significant ability, and one can do quite a lot of work with only six people. Some discussion of the initial staff is therefore in order.

* The Chairman of the Board is an experienced and highly able administrator and policy adviser. His many responsibilities do not allow him the time to become acquainted with all the details of energy analysis and energy technology. But in providing leadership and broad guidance to the NEA, and in representing its interests and advice in other circles, it is likely that he will continue to perform a forceful and effective role.

* The Vice-Chairman is a practising politician and a profession engineer. These qualifications give him a slightly anomalous role in the organization, which has not so far been fully defined; but no major difficulties are foreseen.

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* The Director-general is an economist, who, to an unusual degree, has set himself to understanding technology, including some energy technology. He has many years experience in planning positions, in the bauxite industry and in connection with the proposed hydro-smelter project. His recruitment is a major asset to the NEA; his management skill and attention to detail are likely to ensure that the NEA's programmes are effectively run within the limits of its resources. But he needs more exposure to energy technology, and to discussions of energy policy.

The major strength of the NEA lies in the calibre of this top management; it promises effective leadership. The remaining staff, though few and inexperienced, also seem capable of good work.

* The Technical Director is formerly the Chief Hydropower Engineer, and an experienced project manager. It is true that his aptitude for planning, as distinct from project management, has not been fully demonstrated, and that he is also in need of exposure to several of the new technical disciplines with which the NEA will have to deal. But he is certainly the best person currently available for the post.

* The Conservation Engineer is a new recruit, who formerly worked in the Sugar Industry. He seems a sound engineer, and displays enthusiasm, but has no experience in planning and little in conservation techniques, besides attendance at the local training course held recently.

* The Statistician has been in position for about two years, and has attended the Energy Management Programme at Stonybrook, New York. She has an adequate and increasing grasp of the nature and quality of energy data that are necessary for analysis and policy formulation.

* The Economist is a new recruit from within the Civil Service who has already displayed a distinct flair for the subject, and promises to make an effective energy analyst.

* The Secretary to the NEA is a capable administrator who has a great deal to do with satisfactory day-to-day operations.

If this estimate of the staff quality is accepted, then it will be seen that they are capable of effective work, although short in numbers and experience. In this connection, the training programme that has been proposed is specifically designed to address the immediate needs of the NEA staff, and some of the other agencies to be involved in energy projects; but with the proper orientation they should do well, though it is equally clear that they will soon be overtaken by a volume of work that is beyond their capacity to handle entirely.

These observations now lead to a discussion of the current preoccupations of the NEA, and how soon and well it is likely to tackle its designated tasks.

The NEA legally came into existence on July 15, and the staff have only just been assembled. Presumably it will require another six months or so in order to establish its presence fully. The current objective is to build an effective organization; that is, to have a staff who understand their own roles in relation to the purpose of the Authority; the nature and objectives of the policy it is proposed to execute; and to establish working relations with other agencies. At the same time, the NEA has come into being in the closing stages of an energy assessment which was largely carried out by outsiders, i.e. CARICOM staff and consultants. It is therefore necessary for the staff to assimilate the assessment experience, and to study its implications both for their data-gathering methods, and for the policies being formulated.

There have been frequent in-house discussions designed to achieve these ends, and these are likely to continue for some time.

Operational guidelines are being drafted by the same procedure. These will be referred to the Advisory Council for discussion before being accepted as national policy.

In other words the NEA is building itself from the ground up, and it will approach the task of coordination with other agencies in the same manner. The management is acutely aware that the Authority can succeed only by winning the cooperation and respect of other agencies through the quality of the work it does with and for them, and that Ministerial edicts and regulations will not make much difference.

In view of this, there is little point in trying to set out operations and management systems for the NEA, or a timetable of steps to be taken. The Chairman and Director-General are fully aware of what needs to be done, and perfectly capable of carrying it out. It will perhaps require six months for them to establish themselves; but there will be no difficulty in determining when they have done so.

One may have confidence in the top management of NEA. But the same does not apply to all aspects of its internal development, We have already shown that they will have great difficulty in recruiting adequate numbers of qualified staff. Therefore, for a long time it will be necessary to seek the services of expatriates under technical assistance programmes. The areas in which this assistance will be needed, as already pointed out, are economic analysis, overall energy planning, and several of the technical disciplines associated with the projects to be carried out.

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Precise definition of need therefore depends on the project list recommended by the Board. But it seems safe to predict that this list will include:

- * A programme in energy conservation
- * Short-term projects in biogas and solar water heating
- * Wood-gas use in transportation
- * Use of wastes in sugar, rice, and forestry industries
- * Long-term studies of biomass use, i.e. development of energy farms and the methanol production
- * Charcoal export

These, therefore, are the general areas in which assistance is likely to be sought. But it is up to the NEA to decide the precise form in which these projects should be carried out, and to advance specific requests for assistance and training.

The immediate future then, is that having been formally launched, the NEA needs a breathing space to establish itself and define its programme of activities. Having done so, further requests for training, project development and institutional assistance will be forthcoming. The immediate training programme however, is essential by way of orienting an inexperienced staff to their new tasks.

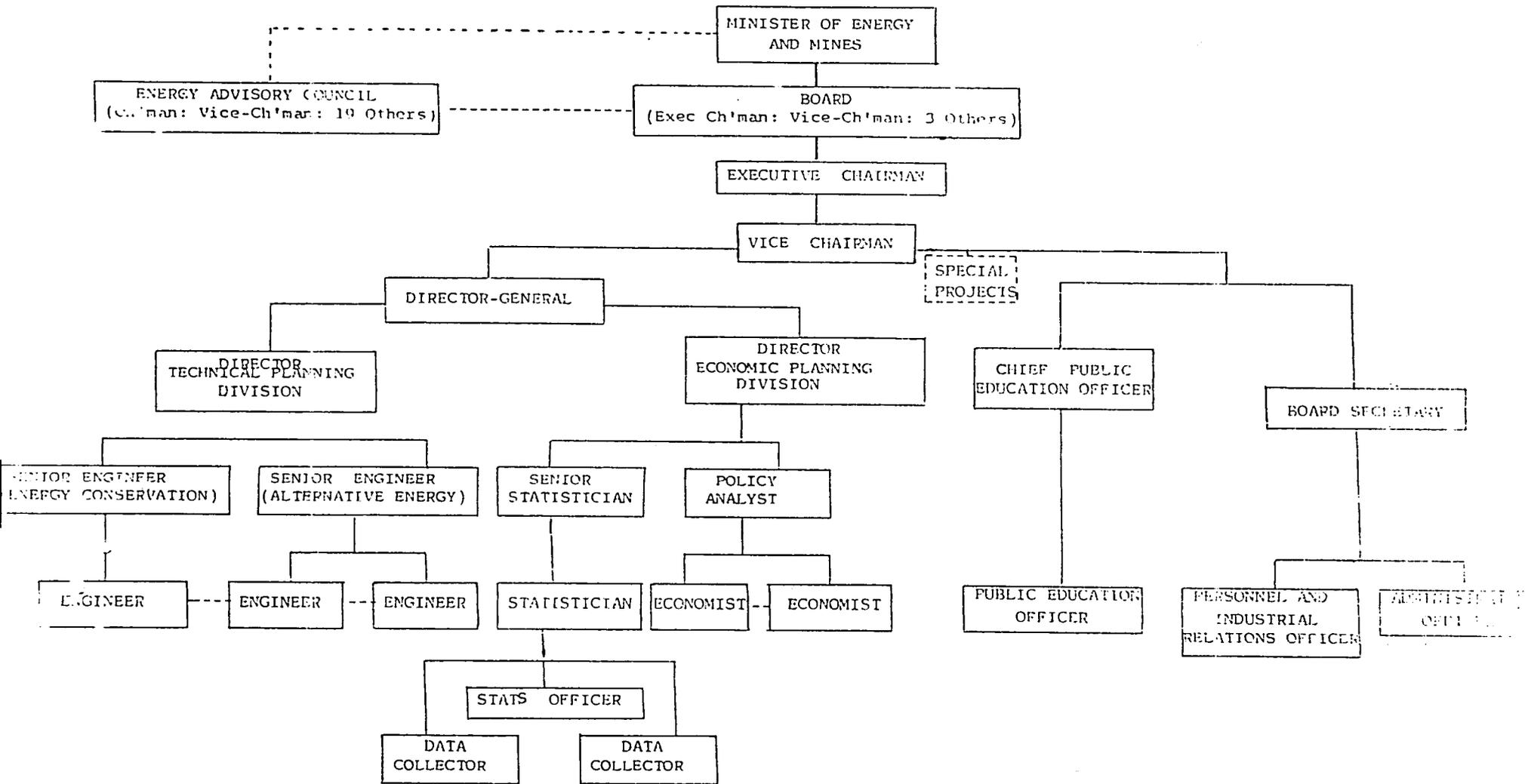
APPENDIX 1.

STATEMENT OF WORK:

1. To establish an effective energy data base and data gathering system on energy production and consumption consistent with methodologies in use in other countries in the region;
2. to monitor the progress of an initial national energy balance (conducted under CARICOM/CDB auspices) and to identify further studies needed to refine and improve energy balance analysis;
3. to design an energy planning process;
4. to acquire necessary information on energy programs in other countries, with emphasis on conservation and alternative technologies;
5. to establish procedures to coordinate Guyana's involvement in regional programs such as those of CARICOM and CDB;
6. to advise on institutional arrangements and roles for formulating and implementing a national energy plan;
7. to identify NEU's staff requirements including the need for recruitment, outside consultants and a manpower training program;
8. to develop operations and management systems for NEU responsive to present and planned responsibilities;
9. to maximize the inputs of other USAID funded consultants and advisors made available to NEU during the term of this contract. They will include those provided by AID/W-funded projects such as hydropower, bio-mass and solar and those provided by USAID/CARICOM-CDB projects such as planning, training and technology expertise.

ORGANISATION CHART (PRINCIPAL POSITIONS) 1ST JUNE 1981

02



THE OFFICIAL GAZETTE--11TH APRIL, 1981
LEGAL SUPPLEMENT--A

NATIONAL ENERGY
AUTHORITY



GUYANA

ACT No. 2 of 1981

ENERGY ACT 1981

I assent.

L. F. S. Burnham,
President.

6th April, 1981.

ARRANGEMENT OF SECTIONS

PART I

SHORT TITLE AND INTERPRETATION

Section

1. Short title and commencement.
2. Interpretation.

PART II

THE GUYANA NATIONAL ENERGY AUTHORITY

3. Establishment of the Authority.
4. Constitution of the Authority and responsibility of the Chairman
5. Salary and expenses.
6. Employment of the staff of the Authority.
7. Experts.
8. Rules.
9. Advisory functions of the Authority.
10. Power to compel information.
11. Preservation of secrecy.
12. Responsibility of monitoring compliance with subsidiary legislation.
13. Authority undertaking other tasks assigned by the Minister.
14. Relations with the Council.

PART III

THE ENERGY ADVISORY COUNCIL

15. Establishment and constitution of the Council.
16. Chairman and Vice-Chairman.
17. Expenses.
18. Secretary and other employees.
19. Meetings and procedure.
20. Duties of the Council.
21. Preservation of secrecy.

PART IV

POWERS OF THE MINISTER

22. Powers under this Act.
23. Powers under any other written law.
24. Provisions relating to subsidiary legislation

PART V

GENERAL

25. Bank Account.
26. Fund and resources of the Authority.
27. Expenditure.
28. Accounts and Audit.
29. Secondment or transfer of officers to the Authority.

SCHEDULE

A.D. 1981]

ENERGY

[No. 2

AN ACT

Intituled

AN ACT to make provision with respect to the nation's resources of and use of energy.

Enacted by the Parliament of Guyana :—

A.D. 1981

PART I

SHORT TITLE AND INTERPRETATION

1. This Act may be cited as the Energy Act 1981 and shall come into operation on such date as the Minister may appoint by order.

2. In this Act —

Inter-
pretation.

“Authority” means the Guyana National Energy Authority established by section 3;

“Council” means the Energy Advisory Council established by section 15;

“energy” includes power and fuel;

“plant” means fixtures, implements or machinery used in any industrial process;

“vehicle” means every description of vehicle propelled by means of a mechanism contained within itself whether constructed or adapted for use on a road or not, and includes a steam traction engine, steam roller and an aircraft.

PART II

THE GUYANA NATIONAL ENERGY AUTHORITY

3. (1) There is hereby established the Guyana National Energy Authority.

Establish-
ment of the
Authority.

(2) The Authority in the discharge of its functions shall be, except in relation to the contents of a report or recommendation made by it to the Minister, subject to the control and direction of the Minister.

Constitution
of the
Authority
and responsi-
bility of the
Chairman.

4. (1) The Authority shall consist of not more than five members to be appointed by the Minister, who shall appoint one member to be Chairman and one member to be Vice-Chairman.

(2) The Chairman shall be the chief executive officer of the Authority and, subject to the general policy decisions of the Authority, shall be responsible for the management of the Authority, including the organisation and discipline of the staff in accordance with the general terms and conditions of service established by the Authority with the approval of the Minister.

(3) If the Chairman is absent or is unable to act or if the office is vacant, the Vice-Chairman shall have and may discharge the functions of the Chairman.

(4) The Minister may at any time, by written notice to that effect to a member, terminate the appointment of a member of the Authority.

(5) A member of the Authority may at any time resign by written notice to that effect to the Minister.

Salary and
expenses.

5. A member of the Authority shall be paid a salary and expenses at rates determined by the Minister.

Employment
of the
staff of the
Authority.

6. The Authority, with the approval of the Minister, may employ at such remuneration and on such other terms and conditions as it thinks fit (including the payment of pensions, gratuities and other like benefits by reference to the service of its officers and other employees) a Secretary and such other officers and employees as the Authority may require.

Experts.

7. The Authority may, at any time, retain the services of experts and other professional persons (including consultants) having specialised knowledge relevant to the Authority's functions and responsibilities and may pay such persons such remuneration in respect thereof as the Authority, with the approval of the Minister, may determine.

Rules.

8.(1) The Authority may make rules respecting —

- (a) the sittings of the Authority;
- (b) the apportionment of the work of the Authority among its members; and
- (c) generally for the carrying on of the work of the Authority, the management of its internal affairs

and the duties of its officers and other employees, subject to the provisions of section 4(2).

(2) Notwithstanding section 21 of the Interpretation and General Clauses Act rules made under this section are not required to be published in the Gazette. Cap. 2:01

9.(1) The Authority shall study and keep under review matters relating to the exploration for, production, recovery, processing, transmission, transportation, distribution, sale, purchase, exchange and disposal of energy and sources of energy within and outside Guyana, shall report thereon to the Minister and shall recommend to the Minister such measures as it considers necessary or in the public interest for the control, supervision, conservation, use, marketing and development of energy and sources of energy. Advisory functions of the Authority.

(2) The Authority shall, at the request of the Minister, prepare studies and reports on any matter relating to energy or sources of energy, including research into alternative sources of energy, or the application of such research, and shall recommend to the Minister the making of such arrangements as it considers desirable for co-operation with governmental or other agencies in or outside Guyana in respect of matters relating to energy and sources of energy.

(3) In the discharge of its functions under this section the Authority shall, wherever appropriate, utilise agencies of the Government to obtain technical, economic and statistical information and advice.

(4) Studies and reports of the Authority made under this section may be made public with the approval of the Minister.

10. The Authority may require any producer, importer, distributor, processor, or consumer of energy or source of energy to provide any information in respect of his production, importation, distribution, processing or consumption of that energy or source of energy that the Authority considers necessary for the discharge of its functions under this Act. Power to compel information.

11.(1) Except for the purpose of the discharge of his functions or when lawfully required to do so by any court or under the provisions of any law, a member or officer or other employee of the Authority shall not disclose any information which he has acquired in the discharge of his functions. Preservation of secrecy.

(2) Any person who fails or neglects to provide any information when lawfully required to do so under section 10 or contravenes the provisions of subsection (1) of this section shall be liable on summary conviction to a fine of one thousand dollars and to imprisonment for six months.

Responsibility of monitoring compliance with subsidiary legislation.

12. The Authority shall have the responsibility of monitoring, and of submitting regular periodic reports to the Minister on, compliance with the subsidiary legislation made by the Minister under section 22 or 23.

Authority undertaking other tasks assigned by the Minister.

13. The Authority shall undertake such other activities related to energy management as may be assigned to it by the Minister. Without prejudice to the generality of the foregoing, such tasks may include the dissemination of information related to energy management including energy conservation and the development and utilisation of alternative sources of energy and also the formulation or implementation or monitoring of energy-related projects. The Authority shall submit regular periodic reports on any such activities to the Minister.

Relations with the Council.

4.(1) The Authority may refer to the Council any matter upon which it proposes to advise or to report to the Minister, for the comments of the Council thereon.

(2) The Authority shall refer a matter to the Council for its comments thereon if so directed by the Minister.

PART III

THE ENERGY ADVISORY COUNCIL

Establishment and constitution of the Council.

15.(1) There is hereby established the Energy Advisory Council.

(2) The Council shall consist of persons nominated, on the basis of one nominee for each organisation, by the organisations listed in the Schedule, and approved by the Minister, to represent the respective interests of those organisations, and such other persons, if any, from the Private Sector as the Minister, in his discretion, may appoint.

(3) The Minister may, by order, amend the Schedule.

Chairman and Vice-Chairman.

16.(1) The Minister shall appoint one member of the Council to be Chairman and one member to be Vice-Chairman.

(2) If the Chairman is absent or is unable to act or if the office is vacant, the Vice-Chairman shall have and may discharge the functions of the Chairman.

A.D. 1981]

ENERGY

[No. 2

(3) The provisions of section 4(4) and (5) shall *mutatis mutandis* apply to a member of the Council as they apply to a member of the Authority.

17. A member of the Council shall be paid expenses at *expenses* rates determined by the Minister.

18.(1) The Secretary of the Authority shall be *Secretary and other employees.* also of the Council.

(2) The Chairman of the Authority shall make available to the Council the services of such other staff and such other facilities as are necessary for the proper and efficient discharge of the functions of the Council.

19. The Council shall meet whenever necessary to ensure *Meetings and procedure.* the proper discharge of its functions under this Act or whenever directed by the Minister or by the Chairman of the Authority and, subject to the approval of the Minister, the Council may regulate its own procedure.

20. The Council shall, as soon as possible after receipt *Duties of the Council.* of any matter referred to it by the Authority, consider the matter expeditiously and communicate to the Authority in writing the opinions and comments of the Council thereon.

21. The provisions of section 11 shall *mutatis mutandis* *Preservation of secrecy.* apply to the members of the Council and to the officers and other employees referred to in section 18 as they apply to members, officers or other employees of the Authority.

PART IV

POWERS OF THE MINISTER

22.(1) The Minister may, for the purpose of formulating and *Powers under this Act.* implementing measures calculated to improve the situation in Guyana with regard to energy and sources of energy, make regulations:

- (a) regulating or prohibiting the production, supply, acquisition or use of energy or sources of energy;
- (b) respecting technical efficiency standards of plant, equipment, appliances and vehicles that consume or produce energy;
- (c) prohibiting or restricting the import of plant, equipment, appliances and vehicles that do not comply with a prescribed technical efficiency in

respect of energy consumption or production, or use a type of fuel which, in the opinion of the Minister, is inappropriate in the context of energy conservation or the utilisation of alternative sources of energy;

(d) respecting technical standards, procedures and guidelines for the storage, production, processing and distribution of energy and sources of energy, and for technical persons employed therein;

(e) respecting incentives, financial or otherwise, for the development and utilisation of alternative sources of energy including the conversion to an alternative source of energy of plant, equipment, appliances, vehicles or other energy-consuming machinery or for the modification thereof or of buildings for the purpose of reducing energy consumption;

(f) generally for carrying out the purposes and provisions of this Act.

(2) Regulations made under this section are subject to negative resolution of the National Assembly.

Powers
under any
other
written law,

23(1) The President may, by order, declare that any power exercisable by any other Minister or other authority under any other written law shall, in so far as that power relates to energy or sources of energy, be transferred to the Minister to be exercised exclusively by him for carrying out the purposes and provisions of this Act.

(2) Where an order transferring a power is made under subsection (1) any subsidiary legislation made by any other Minister or other authority from whom the power is transferred and in force at the time of the transfer shall continue in force until amended, repealed or replaced by subsidiary legislation made by the Minister in exercise of the transferred power.

(3) Subsidiary legislation made by the Minister under a power transferred to him under this section is subject to negative resolution of the National Assembly.

Provisions
relating to
subsidiary
legislation,

24.(1) Subsidiary legislation made by the Minister in exercise of a power under section 22 or transferred to him under section 23 —

(a) may be made so as to apply or operate throughout Guyana or a specified part thereof;

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- (b) may be made to operate for any time, period or occasion specified therein;
- (c) may be of general operation or limited, according to times, places, circumstances, conditions or restrictions specified therein;
- (d) may be made so as to apply either to persons or undertakings generally or to any particular person or undertaking or class of persons or undertaking;
- (e) may provide for the empowering of a person or authority specified therein to make regulations, rules or orders or give directions for any purpose for which the subsidiary legislation is authorised to be made; and
- (f) may provide for a penalty for the contravention thereof of a fine of one thousand dollars and imprisonment for three months.

(2) This section applies notwithstanding the provisions of the written law in which a power transferred to the Minister under section 23 is contained.

PART V GENERAL

25. The Authority may keep and operate a bank account. Bank Account.

26. The funds and resources of the Authority shall consist of Funds and resources of the Authority.

- (a) such monies as may from time to time be voted by Parliament for the purposes of this Act; and
- (b) all other sums or property that may in any manner become payable to or vested in the Authority in respect of any matter incidental to its powers and duties.

27. All expenditure for the purposes of this Act shall be Expenditure. paid out of the funds of the Authority.

28.(1) The Authority shall keep accounts of its transactions, Accounts and audit. including the receipt of moneys under section 26.

(2) All books of account kept by the Authority shall be subject to examination and audit at any time by the Auditor General.

(3) The accounts of the Authority shall be audited annually by an auditor appointed by the Authority with the approval of the Minister.

(4) The members, officers and employees of the Authority shall grant to the Auditor General or the auditor appointed under subsection (3) access to all books, documents, cash and securities of the Authority and shall give him on request all such information as may be within their knowledge in relation to the operation of the Authority.

Secondment
or transfer
of officers
to the
Authority.
Cap. 27:02.

29.(1) Where a public officer is seconded or temporarily transferred from a pensionable office within the meaning of the Pensions Act to an office with the Authority section 5 of that Act shall apply to him as if his services with the Authority were service in a public office.

(2) Where a public officer is appointed to an office with the Authority, his service with the Authority shall be other public service within the meaning of, and for the purpose of such provisions applicable in relation thereto as are contained in, the Pensions Act (including the Pensions Regulations 1957).

(3) Subsections (1) and (2) shall, as they apply in relation to a public officer, apply mutatis mutandis in relation to a teacher to whom the Teachers' Pension Act applies and who is employed by the Authority.

Section 15

SCHEDULE

ORGANISATIONS REPRESENTED ON THE ENERGY
ADVISORY COUNCIL

State Planning Commission.

Bank of Guyana.

Ministry of Trade and Consumer Protection.

Guyana State Corporation.

Guyana Sugar Corporation.

Guyana Electricity Corporation.

Upper Mazaruni Development Authority.

Guyana Consumers Association.

National Science Research Council.

Guyana Association of Professional Engineers

Trades Union Congress.

Guyana Mining Enterprise.

Guyana Manufacturers Association.

Georgetown Chamber of Commerce.

Linden Chamber of Commerce.

Berbice Chamber of Commerce and Development Association.

Shell Antilles & Guianas Ltd.

Esso Standard Oil S.A. Ltd.

Texaco West Indies Ltd.

Guyana Oil Company Ltd.

Institute of Applied Science and Technology.

Passed by the National Assembly on the 27th March, 1981

F. A. Narain,
Clerk of the National Assembly.