

PN-ACB-858

96291

Romania

Study of Options for the Long Term Structure of the Power Sector

Supplemental Analysis Of Issues

Prepared under Contract for:

United States Agency for International Development

DHR-0030-C-00-5016-00

**Energy Restructuring and Regulatory Reform in Central and Eastern Europe
and the Baltics**

In Cooperation with:

World Bank

Bechtel International, Inc.

March 1997



Romania
Study of Options for the Long Term Structure of the Power Sector
Supplemental Analysis Of Issues

1. *What is the purpose of this document?*

In March 1996 a report was prepared by Bechtel International entitled *Study of Options for the Long Term Structure of the Power Sector* (Options Report) and submitted to the Government of Romania (GOR). That report identified four basic options (described in more detail below) for restructuring the power sector.

- Option 1: Vertically Integrated Monopoly Model.
- Option 2: Single Buyer Model.
- Option 3: Open Access Model.
- Option 4: Competitive Market Model.

The amount of competition increases from Option 1 to Option 4. It was the consultant's opinion that Option 2 or Option 3 were the relevant choices for the Romanian context, and would set the stage for a more disaggregated structure and eventual privatization. Option 1 would do little to achieve the GOR's objectives for the sector, while the prerequisites to properly support Option 4, probably the ideal goal of industry restructuring in the long term, may not exist in Romania over the next ten years.

Since the submission of that report, there have been a number of changes in Romania and in its power sector.

- A new government has been elected, and has signaled its willingness to consider all the various options for restructuring the power sector.
- The European Union (EU) Electricity Liberalisation Directive has been issued, setting minimum standards for EU member nations.
- Requests have been received for further elaboration of the previous Report, and additional analysis requested.

Accordingly, the purpose of this paper is to address these new circumstances and questions, based on additional information and analysis conducted by the consultants. In it, the advantages and disadvantages of each reform model will be considered. We hope this supplemental analysis will be useful in clarifying the impacts of restructuring the power sector, thereby providing a more complete basis for selecting an appropriate restructuring option.

2. *What are the main characteristics of the models as initially proposed?*

In all cases we assume that Cernavoda and all nuclear power activities are split off to become a separate independent public entity within 18 months of its initial commercial operation.

Option 1. Vertically Integrated Monopoly Model. This is the traditional electric utility model characterized by integration into one company of the functions of generation, transmission, and distribution (including sales of electricity, also called supply or commercialization). RENEL would remain a state-owned, vertically integrated monopoly.

Option 2: Single Buyer Model. This is a variation of the vertically integrated utility with competition introduced at the generation level. The key feature is that a new entity is created - a Power Purchasing Agency - with responsibility for all buying of power from generators and all selling of bulk power in Romania. The agency would be government owned and would be a not for profit entity.

- IPPs would be permitted and encouraged to bid for new generation through the Power Purchasing Agency.
- Existing RENEL plants would have "economic lifetime" contracts with the Power Purchasing Agency. As the contracts expire, the plants could bid on tenders for new capacity or retire.
- Large industrial users (over 100 GWH/yr., equivalent to 15 MW at a 75% load factor) would be allowed to buy directly from the Power Purchasing Agency, but not from IPPs.
- RENEL distribution would also be required to purchase power from the agency and would supply power to all remaining (captive) customers.
- There would be no third party access
- RENEL would be organized as holding company with separate divisions for generation, transmission / national dispatch, and distribution. There would be separate accounting and an explicit methodology for setting transfer prices among divisions.
- Eventually RENEL would be corporatized as joint stock company with each division becoming a subsidiary.

Option 3: Open Access Model. The key feature of this option is the introduction of "open access" to the transmission and distribution grids, which permits large customers to buy power from any supplier they choose, including IPPs. With fair and open access to the transmission and distribution grids, there is competition in power generation. Fair and open access would have to be mandated by the GOR in the electricity law, as monopoly control over the

transmission access is generally considered to be the greatest single impediment to competition in the provision of electric power. Pricing and terms and conditions for non-discriminatory third party access would be established by a regulator.

- There is functional disaggregation of the vertically integrated utility into generation, transmission / national dispatch, and distribution. The transmission and distribution divisions of RENEL are required to transmit (or "wheel") power for all eligible customers at nondiscriminatory rates and conditions. Optimally there would be legal separation of transmission, but that would not be a necessary step in the initial disaggregation.
- Large industrial customers can negotiate and buy directly from those generators (IPPs or RENEL) who offer the lowest cost service.
- RENEL Distribution provides power at regulated, cost-based tariff rates for small (captive) customers and those large customers who choose to purchase electricity from it, while, at the same time, large customers purchase power under market-based contracts and prices (for generation only).
- Generation would be provided from four sources: RENEL's Generation subsidiary (which could be established as separate commercial companies); a separate government entity that owns and operates Cernavoda; IPPs; and imports. The IPPs would operate under a licensing regime.
- RENEL would be organized as holding company and would become a joint stock company. Generation, transmission / national dispatch, and distribution would become subsidiaries which could ultimately be separated into commercial companies.

Option 4: Competitive Market Model. This model would disaggregate the utility into separate independent companies providing generation, transmission, and distribution. There is full competition in both the production and purchasing of electricity.

- RENEL would cease to exist as presently structured. Its assets would be divested into a single transmission company and one or more generating companies and distribution companies.
- The transmission company and the distributors would retain monopoly characteristics and require regulatory oversight.
- Large industrial customers can choose to buy from either IPPs or the distributors
- A competitive power pool based on hourly bids will link all buyers and sellers of electricity. At the same time, long-term supplies of electricity to

customers would be based on long-term contracts, but the ongoing operation of the system would be managed by the pool.

- Fair and open access to the transmission and distribution grids would be mandated.

3. *What are the advantages and disadvantages of the models as originally proposed?*

The current power sector structure presents barriers to improving efficiency and attracting the capital needed to maintain the supply of electricity, a fundamental and vital part of the Romanian economy.

- The GOR still controls the sector. There is no profit incentive, and mixed objectives still guide the utility.
- In the absence of competition, there is little incentive to improve efficiency.
- Without transparent, objective regulation, there can be little certainty regarding return on investment or other basic requirements of business.
- Imposing GOR policies through cross-subsidies, price setting, and rationing creates distortions that complicate rational economic decision making and the introduction of competition.
- All of the above make attracting private capital difficult, and mean that Romania could not meet EU requirements as contained in the EU electricity Directive.

The most important consideration in determining what is appropriate for Romania is the clear need for substantial new private investment. Private investment in the Romanian power sector will not materialize without significant change such as that associated with a more competitive environment.

More competitive structures encourage private investment and promote the benefits of competition in the following manner:

- **Increased efficiency:** In a free market, individual sector participants benefit from any efficiency increases and cost reductions they are able to achieve. This provides the motivation to seek such improvements.
- **Price reduction:** A competitive market keeps prices at the lowest achievable level while advancing least cost principles. Sector participants who offer high prices will not be successful in winning competitive tenders, so they have an incentive to offer the lowest prices that cover their costs. Examples of price reductions through competition include the deregulation of telecommunications and airline industries in various

western countries as well as in the power sectors of England/Wales, Norway, Spain, Chile, Argentina, Australia, and New Zealand.

- Improved decision making: In a competitive market, prices meet actual costs. With the proper price signals, consumers as well as producers have incentives to make investments or other changes to control their electricity use to the appropriate level.
- Improved service: Sector participants compete not only on the basis of price, but also through service improvements.
- Security of supply: Market dominance can cause security of supply risks by allowing one or a few participants to distort the market and reduce diversity of resources. When there are many market participants, their diversification of interests and special capabilities aids in maintaining a secure and diverse flow of resources and power.

Furthermore, achieving full membership in the EU is an important objective and a clearly stated policy goal of the GOR, and more competitive structures are necessary for convergence with EU directives.

However, more competitive structures also make it more difficult to maintain national policies that the GOR has previously considered worthwhile, including uniform national tariffs, domestic fuels priority, a cross subsidy from electricity to heat, and a cross subsidy from industrial to residential electric.

Specific advantages and disadvantages include:

Option 1. Vertically Integrated Monopoly Model.

- This has limited competition in generation only, thus limiting its ability to attract private capital and obtain the benefits of competition.
- RENEL controls all aspects of the competitive process and would have an incentive to favor its own projects, reducing the interest of IPPs in competing for new generation.
- It would not meet the EU directive.
- However, the changes proposed to the current structure are relatively modest, so it would be the least disruptive Option to implement, and all the current national policies could be maintained.

Option 2: Single Buyer Model.

- This introduces full competition for new generation, which means that generation acquired on a competitive basis will eventually dominate the

market. Since generation is about 70% of the cost of delivered electricity, this is a major step.

- However, existing high-cost RENEL generation can be protected from competition.
- There is more cost and price transparency.
- There would be some private capital inflow, but the climate for outside investment would be less than optimal compared with opportunities in other countries.
- The structure provides some of the benefits of competition, but permits it to develop in an orderly manner, making it easier to manage or mitigate the impacts on affected parties.
- The national policies of cross subsidies from electricity to heat and from industrial to residential electricity consumers would be difficult to sustain.
- The economic lifetime contracts, the new Power Purchasing Agency bureaucracy, and other features would make the evolution of Option 2 into more competitive structures more difficult.
- The structure does not meet the EU Directive.

Option 3: Open Access Model.

- There is meaningful competition in the supply of electricity to large retail customers.
- Because only large customers could buy from IPPs, small customers may be left with an inequitable share of high cost generation.
- Option 3 puts pressure on RENEL to reduce its costs, rationalize its operation, become more efficient and customer-oriented, and improve its decision-making.
- The structure meets the EU Directive in all areas but the separation of transmission, but could be readily modified to meet it in that area without negative impact.
- The national policies of domestic fuels priority and the cross-subsidies could not be sustained.
- Open access would create a more vigorous competitive environment than Option 2. Because large customers could buy directly from IPPs, RENEL's high cost generators may not be able to compete. If RENEL's average cost of generation is above that of new IPPs, there is the prospect of IPPs

capturing the most desirable customers. There is competition for RENEL's existing generation as well as for new capacity.

- Unless carefully regulated, RENEL could engage in self-dealing. Therefore, independent and comprehensive regulation and enforcement mechanisms are essential to the success of this model.

Creating open access to transmission and distribution involves complex regulatory issues and tradeoffs, but results in an attractive investment climate and leads to compliance with EU Directives.

Option 4: Competitive Market Model.

- With full competition in both generation and supply, this structure provides the greatest potential for attracting private foreign capital and for obtaining the fullest benefits of competition.
- The potential for self-dealing is eliminated.
- It complies with the EU Directive without modification.
- None of the existing national policies mentioned above could be sustained, including uniform national tariffs.
- It would require complex commercial and administrative arrangements, have the highest transition costs, and require the greatest change to existing institutions, including significant regulatory changes.

4. *What course of action is recommended?*

For all of the reasons outlined above, it is the recommendation of the consultants and of USAID that the GOR should begin the process of restructuring its power sector as soon as possible, in order to create the most competitive system feasible.

The earlier report, issued in March 1996, recommended either Option 2 or Option 3 as an appropriate basis for restructuring the power sector in Romania, and noted that the successful implementation of either would set the stage for an unbundled competitive model in subsequent years. The positive and far-reaching changes in the intervening year suggest modifications to that recommendation.

At the time, Option 2 appeared to better meet one of the GOR objectives, which was to moderate the impact of radical change on the sector. As discussed in Question 2 above, Option 2 does this through the mechanism of the Power Purchasing Agency.

However, Option 2 would have to be modified to meet the EU Directive. Furthermore, Option 2 has certain features that are not mandatory in Option 3

or Option 4, such as the economic lifetime contracts and the creation of a new bureaucracy to accomplish the Single Buyer function. These and other features make the evolution of Option 2 into more competitive structures more difficult.

Since the GOR has adopted a goal of EU membership, it should at this time consider Option 3. It would provide the full benefits of competition, including significant private investment, more quickly and more directly, and is well suited for an evolutionary transition to Option 4. Policies and regulations should be adopted now to permit the implementation of Option 3, and should be designed to the extent possible to be able to accommodate a continuing transition to a fully competitive industry.

The main modification necessary for Option 3 to meet the EU Directive would be to make transmission/national dispatch effectively independent from RENEL. This is a desirable change in any event, and does not affect the main characteristics of the structure. This additional disaggregation eliminates the potential for a conflict of interest regarding transmission access and generation dispatch. It would make the power sector more attractive to potential investors and should be implemented.

Implementing the recommendations above will not be easy, but is necessary in order to realize the considerable benefits to the Romanian power sector, to Romanian industry as a whole, and to the quality of life of the citizens of Romania. Without an economically priced, efficient, reliable, and secure supply of electricity, the economy of Romania will suffer a considerable disadvantage in world markets.

5. *What are the implications of the EU Electricity Liberalization Directive for the Romanian power sector?*

When the Options Report was prepared the EU Directive had not yet been adopted. Accordingly, it is useful to first review the key provisions of the recently adopted EU Directive and then discuss the implications for the power sector. In general, the EU Directive provides for greater competition in the generation and supply of electricity and necessitates some unbundling of integrated electric utilities. The minimum requirements of the EU legislation are as follows:

- Establishment of a clear, objective and non-discriminatory authorization process for IPPs
- Clear, public criteria and appeal procedures for cases where authorization is refused
- Arrangements to allow eligible customers to purchase directly from independent producers

- Requirement that all consumers (i.e. large industrial firms) using over 100 GWH/year be included under the definition of eligible customers
- Establishment of a Transmission System Operator with managerial independence from generation and distribution entities
- Use of published prices for the transmission and distribution networks, either as a basis for access or as an indication of likely terms (in the case of negotiated access)

The existence of a monopoly either in generation or supply does not meet the requirements of the Directive. Accordingly, there must be provision for independent generation companies and for consumers to obtain supply from others besides the integrated company. A utility can retain vertically integrated features and still meet the requirements of the Directive, but there must be a minimum degree of unbundling with separation of accounts between generation, transmission, distribution and supply functions.

The Directive establishes the minimum proportion of each members' market which must be opened to competition. Markets are to be opened progressively over four years. Starting from 1999, the competitive provisions of the Directive must apply to 22% of Member States' electricity markets. The market provisions apply to so-called eligible consumers, the precise definition of which is left to Member States with two constraints:

- Obligatory inclusion of all consumers using more than 100 GWH
- Distribution companies must be allowed to contract for the power necessary to supply any eligible customers within their distribution area

The directive identifies two approaches to system access:

- Negotiated access
- Single buyer procedure

Both means of access are required to be objective, transparent and non-discriminatory. Under negotiated access measures must be taken to allow access to the system either on the basis of published tariffs or as a matter of negotiation. In the latter case, an indicative range of prices must be published reflecting as far as possible the average price agreed in negotiations in the previous 12 months.

Under the single buyer procedure, a single buyer would be designated with the responsibility for the unified management of the transmission system and/or for centralized electricity purchasing and selling. The single buyer must allow supply contracts to be implemented via access to the system based on published tariffs or negotiated access. Alternatively, the single buyer may be obliged to purchase electricity contracted by eligible consumers

at a price equal to the sale price offered to the eligible consumers by the single buyer, minus the price of the published use-of-system tariff. Thus for all practical purposes the EU Directive mandates open access to the transmission system for large customers at fair, non-discriminatory rates.

It is clear from the above that the existing power sector in Romania would not meet the EU Directive in a number of areas, the most significant of which are:

- Lack of objective, transparent and non-discriminatory procedures
- No competition in generation
- No competition in supply
- No independence, managerial or otherwise, of the transmission system operator

In order to comply specifically with the EU Directive, Option 2 would have to be modified to make provision for open access and thus would eventually take on some of the characteristics of Option 3.

In order to comply, Option 3 would have to be modified to provide additional independence for the transmission / national dispatch function. Option 4 complies without modification.

6. *It can be argued that electricity is a public service and therefore the full force of competition should be limited. Does the EU Directive address this issue?*

The EU Directive explicitly deals with this issue by establishing the general right of Members to impose public service obligations in the general economic interest, which "may relate to security, including security of supply, regularity, quality, and price of supplies and to environmental protection". Public service obligations are to be clearly defined, transparent, non-discriminatory and verifiable. How the performance of public service is to be organized is left to the Member States.

The Directive allows that public service obligations are possible grounds for deciding not to apply specific provisions of the Directive including those related to competition in generation and system access, providing that the obligations do not affect the development of trade "to such an extent as would be contrary to the interests of the Community". It should be noted that the authority to rely on public service obligations to suspend the provisions of the Directive is limited to individual cases and does not permit blanket suspension, for example on the grounds of general economic difficulties. Thus the public service rules cannot be used to justify keeping out competition if the minimum market share opening required by the Directive is not achieved.

7. *What is the most recent experience of other countries with respect to restructuring their power sectors?*

It is instructive first to consider the situation among EU Member States and then to look at the recent situation in Central Europe.

The provisions of the EU Directive legally come into force in January 1999. A number of EU Member States have already taken individual initiatives for power sector liberalization. Electricity markets have already been liberalized, with freedom of entry and extensive retail competition in Finland, Norway, Sweden, and the UK. Recent developments in other countries are as follows:

- Germany - In late 1996 measures were passed by the Federal cabinet to abolish monopoly supply areas, to end demarcation contracts and exclusive concession agreements, to open up competition in supply to all consumers, and to permit full Third Party Access.
- France - EdF, while still retaining its vertically integrated structure, is improving the terms under which it will purchase power from independent cogeneration plants. In particular, it is to increase the upper purchase limit for power from IPPs from 8 MW to 1,000 MW.
- Portugal - The liberalization process commenced in 1994 when the state-owned monopoly was split into 12 companies to create a competitive system along side a state owned system. Recent developments include development of transmission network charges for access to the network.
- Spain - By virtue of the Electricity Act of 1994, Spain has adopted the legal basis for many regulatory devices used to promote competition; namely, abolition of exclusive rights, qualified third party access, unbundling, creation of a regulatory authority and a independent dispatcher.

In Central Europe, Poland and Hungary are continuing the transition to liberalization and privatization:

- Poland - A new Energy Law has passed the lower house and is being discussed in the Senate which would create the legal basis for separation of the energy sector into policy making under the Federal government, regulation under the Energy Regulatory Authority, and ownership by private enterprises and the state. The new law also allows for competition in generation and negotiated third party access. The state currently owns the power sector although it is disaggregated into generation, transmission, and distribution, and these have been set up as separate commercial entities as of the end of 1996. Plans for privatization are being considered on a pilot basis focusing on the distributors first. These initial privatizations could take place during 1997.

- Hungary - Significant progress has been made in liberalizing the power sector through aggressive privatization. This has resulted in a disaggregation of the system into generation, transmission and distribution which is still ongoing. Despite this, at present there is no provision for third party access. An independent regulator been established which has responsibility for licensing, pricing, consumer protection, resource and capacity planning and enforcement. The combination of disaggregation and the development of a clear regulatory framework have brought private investment in the Hungarian power sector totaling over \$2 billion.

8. *What would be required to implement a restructured power sector?*

Once a decision has been made to proceed with a specific option, a number of steps will be necessary to implement the new structure. The details of course will depend on the structure selected.

- Determine the policy changes necessary to support the option.
- Establish the legal and regulatory framework for the new sector.
- Establish the objectives for valuation and, in conjunction with other interested parties, commence to value RENEL generation and other assets.
- Reorganize, corporatize, and commercialize the new sector organizations.
- Develop the basic agreements, codes, and other documents needed for the proper functioning of the new structure.

A transition plan would be prepared for the orderly implementation each of these steps, taking into account realistic time requirements for all changes within the power sector. It would also provide for a complete transition from the current state of the power sector to a fully functioning new structure.

9. *What will happen to the price of electricity in a restructured power sector?*

Romania's electricity prices have been established by the GOR and are heavily subsidized. In 1996 the average price of electricity was about \$32/MWH exclusive of VAT.

The continuation of subsidized energy prices would have as its natural consequence a downward spiral toward power shortages and other negative operating conditions. This would impose significant costs on consumers and the Romanian economy as a whole, and would make it impossible to become part of the western European electrical interconnection or the European Union.

Under agreements with the World Bank the price of electricity was to be maintained at a minimum of about \$43/MWH, but the GOR has recently increased electricity prices to an average of \$50/MWH before VAT, with provision for monthly revision. This is a major step in laying the foundation for reform which demonstrates the commitment of the GOR to a revitalized power sector.

Accurate pricing is critical to the financial viability of any sector and of the overall economy of Romania. This is particularly true for the power sector, which requires significant investment that will be forthcoming only if prices are set appropriately. Accordingly, it must be recognized that under any power sector structure electricity prices must be fairly regulated or reflect market conditions.

The dynamics by which prices are set, however, will be influenced by the sector structure. More specifically, where the potential for competition exists prices will be more responsive. Option 2 provides a much broader scope for competition than currently exists. Option 3 and Option 4 provide for more competition and would create a more dynamic pricing environment where prices could change even more dramatically.

The price implications associated with restructuring can be seen by comparing the current vertically integrated structure (the "Base Case") with a "Reform Case" (based on Option 2 as illustrative of the changes to be seen with any of Options 2, 3, or 4). In all cases we assume that tariffs will be based on the cost of providing the service, including a return on investment. With even more competition, Option 3 and the eventual transition to Option 4 would provide prices even lower than Option 2.

As a result of competition and consequently improved performance under restructuring, costs decline in the long run with the result that cost-of-service tariffs are lower than in the Base Case. By the year 2010 the Reform Case tariff is lower by approximately 5%.

The restructuring scenarios have lower tariffs quite simply because they have lower costs. The most important single reason for the lower costs is that IPPs have lower costs than if RENEL built and operated the same generation. This reflects experience around the world: competition in generation drives down costs, and IPPs displace utility-owned plants because they are more cost-efficient. The IPP has slightly lower capital and operating costs, is slightly more efficient, and operates at a slightly higher capacity factor. These advantages result in a cost advantage of about 12% for the IPP.

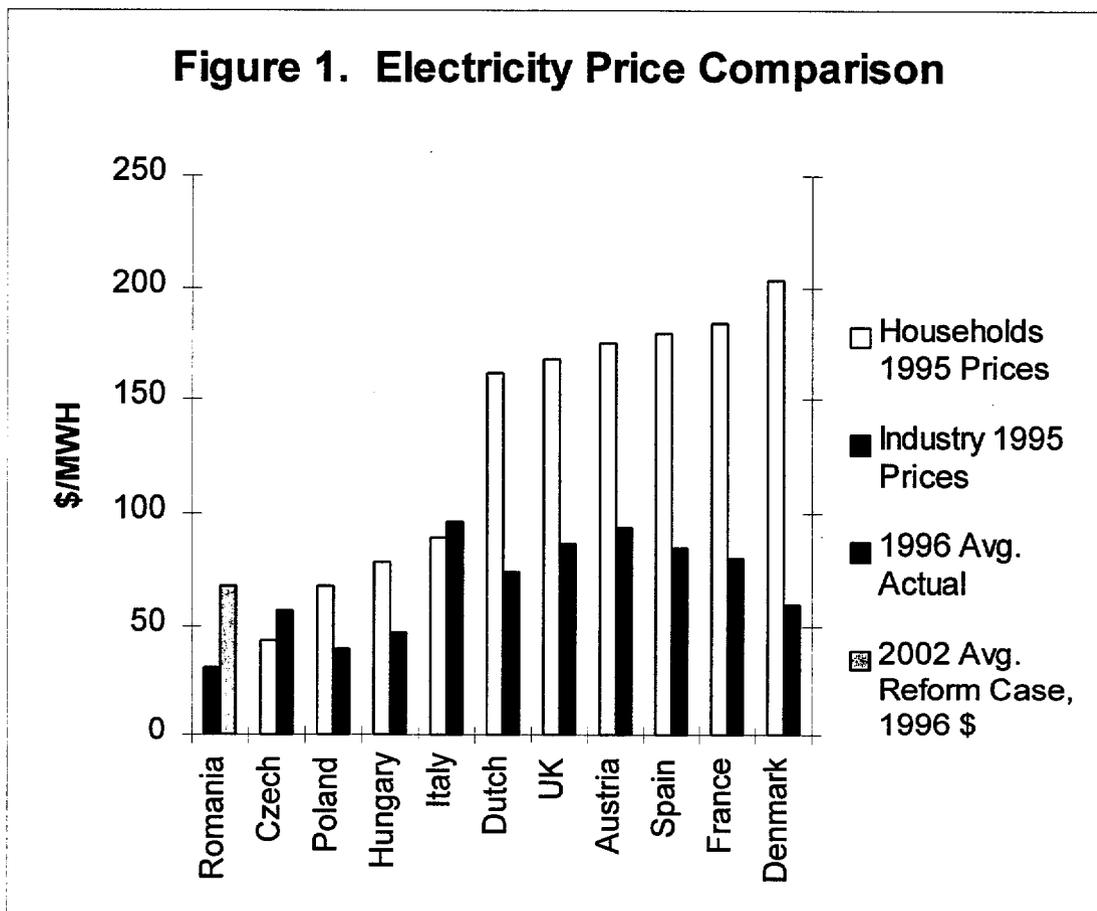
In addition, competitive dynamics will provide incentives for other improvements. Generation will operate under contracts and market conditions that provide incentives for improving performance or lowering

costs and penalties if performance does not improve. New generation will be obtained on a competitive basis. If RENEL cannot compete with new IPPs, it will not be chosen to provide incremental new generation capacity. Thus, the structures provide incentives both for RENEL to improve performance and cut costs for its existing generation, and for RENEL and IPPs to provide new generation at the lowest cost.

11. *How do these prices compare to the price of electricity in other countries?*

The retail cost of electricity differs among countries because of differences in native natural resources, especially the availability of hydro generation, and for other factors. Nevertheless it is instructive, because often much of the final cost of electricity depends on the cost of items that are traded internationally and whose cost in any country is closely linked to world prices.

Figure 1 compares the 1995 household and industrial prices in other European countries to the actual average cost in Romania in 1996, and the forecast price in 2002 for the Reform Case, the year of highest forecast price. There are three observations one can make regarding this price comparison. First, current average prices in Romania are lower than in any other country, reflecting the lack of cost of service pricing principles. Second, a restructured power sector



would result, over time, in prices more comparable to market levels. Third, all of these countries have higher levels of private investment than Romania, which may be in part due to more realistic electricity prices.

12. *What are the financial implications for a restructured power sector?*

RENEL's current weak financial condition is a major factor indicating the need for reform. Romania's generating plants are inefficient and suffer from poor availability. Part of this is a result of the poor quality fuels used in some plants, but even premium fuels are used at far below attainable efficiencies. The power sector in general sustains significant losses from obsolete and difficult-to-maintain equipment. It would benefit from substantial investments to improve performance and bring conditions closer to western standards. Under current conditions private investment will not materialize. From a business point of view, the power sector will not be viable without substantial reform.

Let us now compare the changes in financial performance of maintaining the current vertically integrated structure (the Base Case) with restructuring under the assumption of price liberalization (the Reform Case). In all Figures, calculations are based on the results of the Option providing the least reform, Option 2. If Option 3 or Option 4 were to be adopted, the beneficial effects would be even greater due to the introduction of increased competition and private investment.

Figure 2 compares total electric expenses in the Base and Reform cases. Total electric expenses are all expenses incorporated in the calculation of tariffs, including operating expenses, depreciation, and return. With cost-of-service tariffs, operating revenues equal total electric expenses, apart from losses due to uncollectable bills (bad debts). In the first few years restructuring has not yet begun to generate benefits, primarily because we assume that new generation is not needed until 2001. From 2001 through 2010 the Reform Case outperforms the Base Case, as more IPPs displace higher cost Base Case RENEL generation and other improvements take effect.

Another factor contributing to lower costs is improved productivity both of labor and capital - a key element in creating value for investors and employees, and ultimately consumers. Figure 3 compares the two cases, showing that productivity would increase more with restructuring.

As a consequence of the above changes the following financial improvements would occur:

- Investment. The former functions of RENEL together require less new capital than RENEL alone in the Base Case, because the private sector provides the capital for new generation. Private sector investment in IPPs

Figure 2. Total Electric Expense

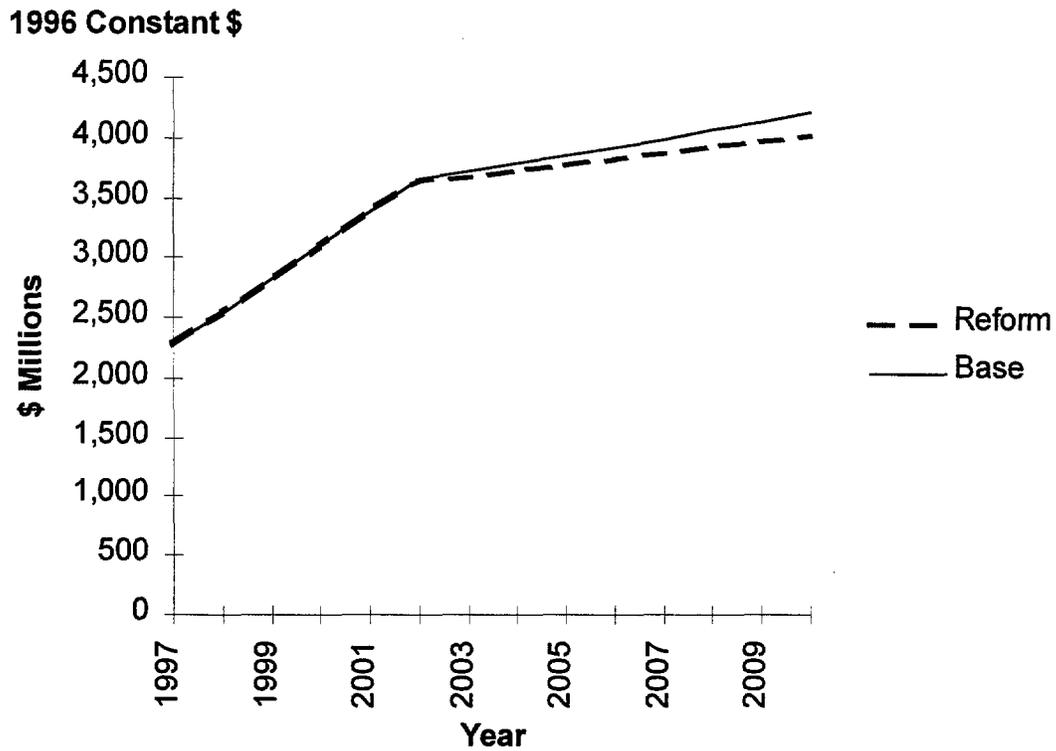


Figure 3. Labor And Capital Productivity

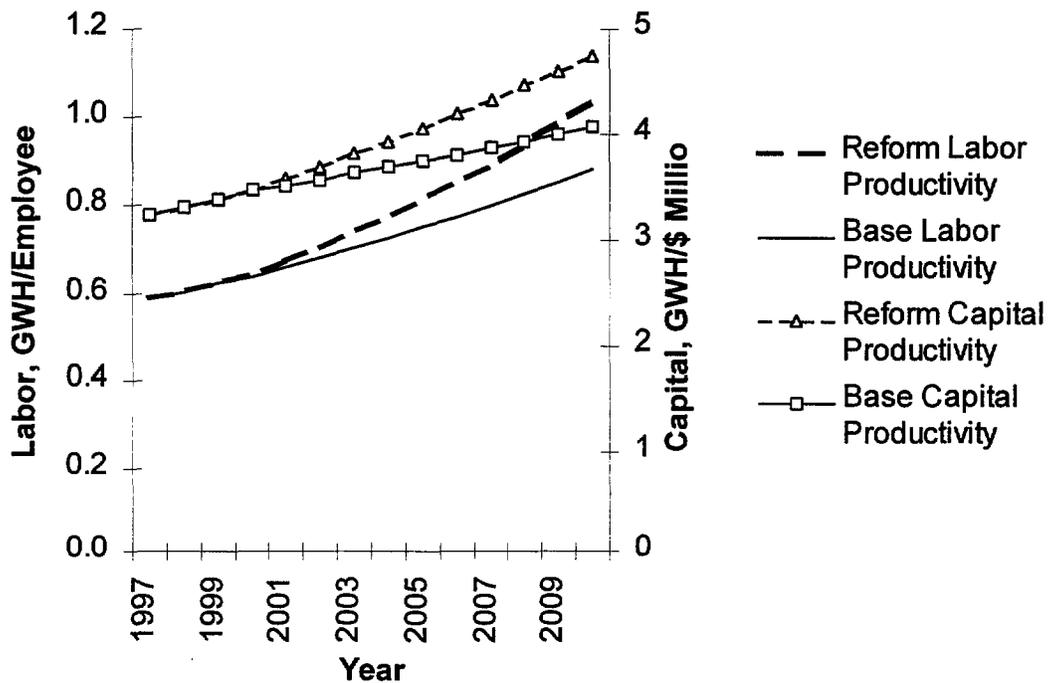


Figure 4. Investments

1996 Constant \$

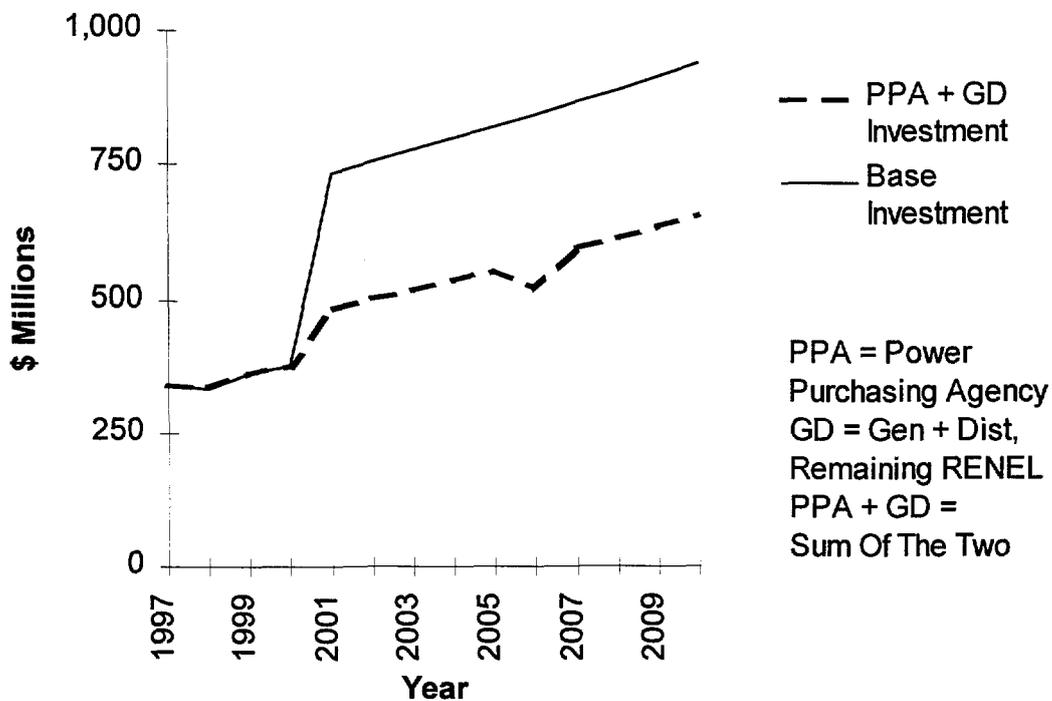


Figure 5. Internal Cash Generation Ratios

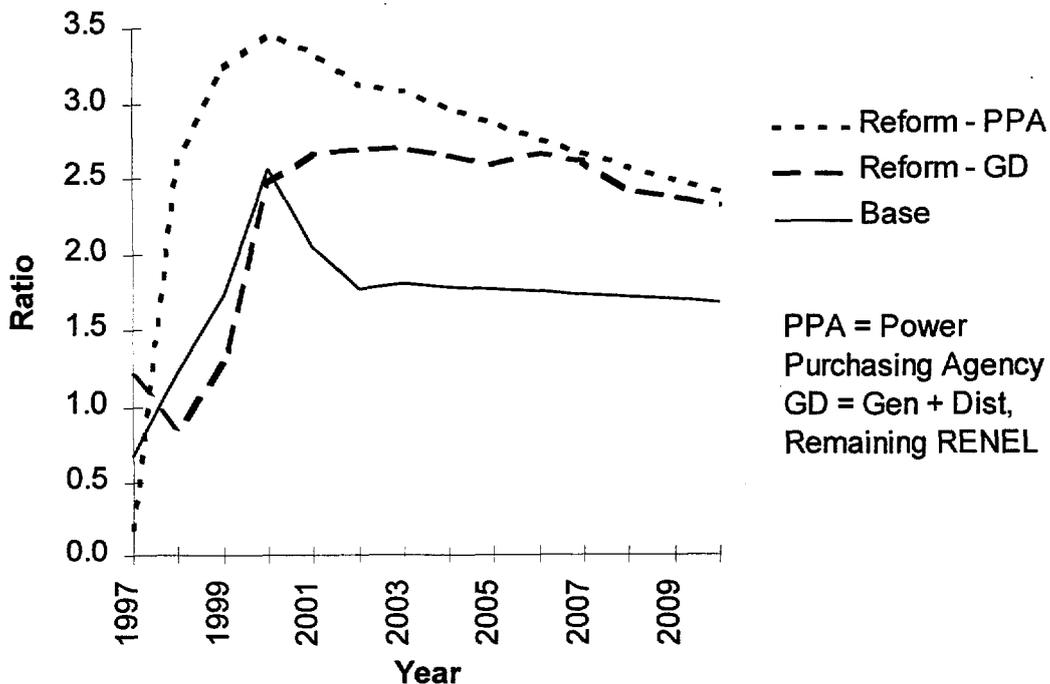


Figure 6. Debt Service Coverage Ratios

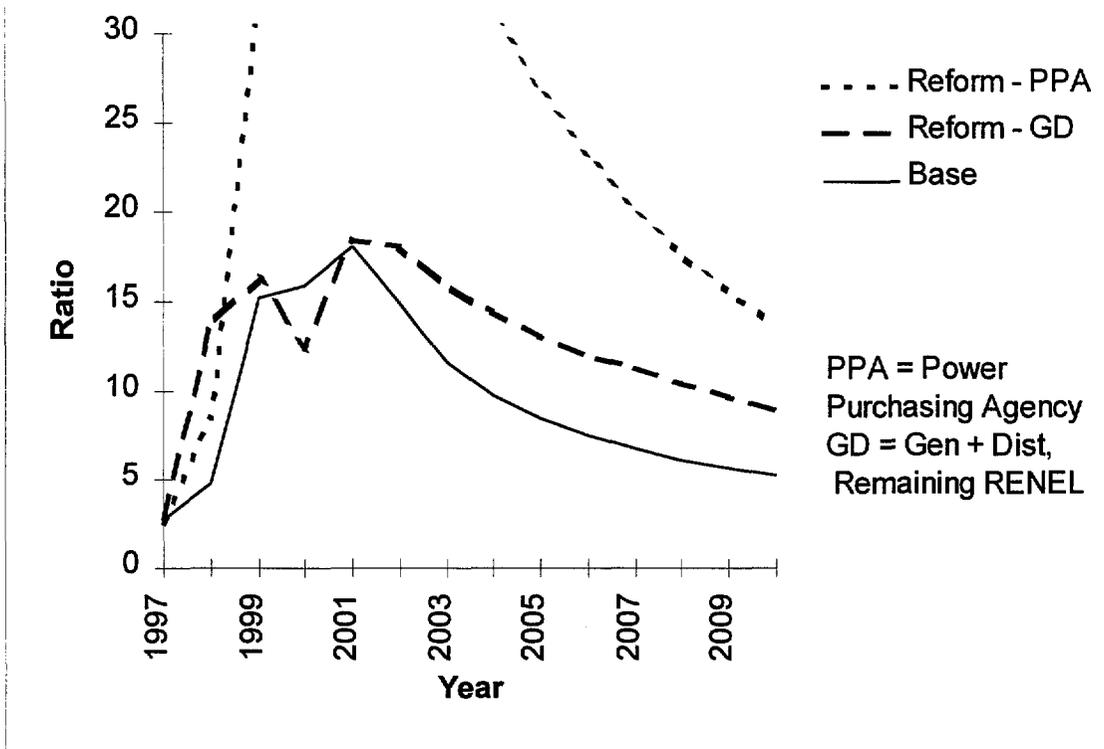
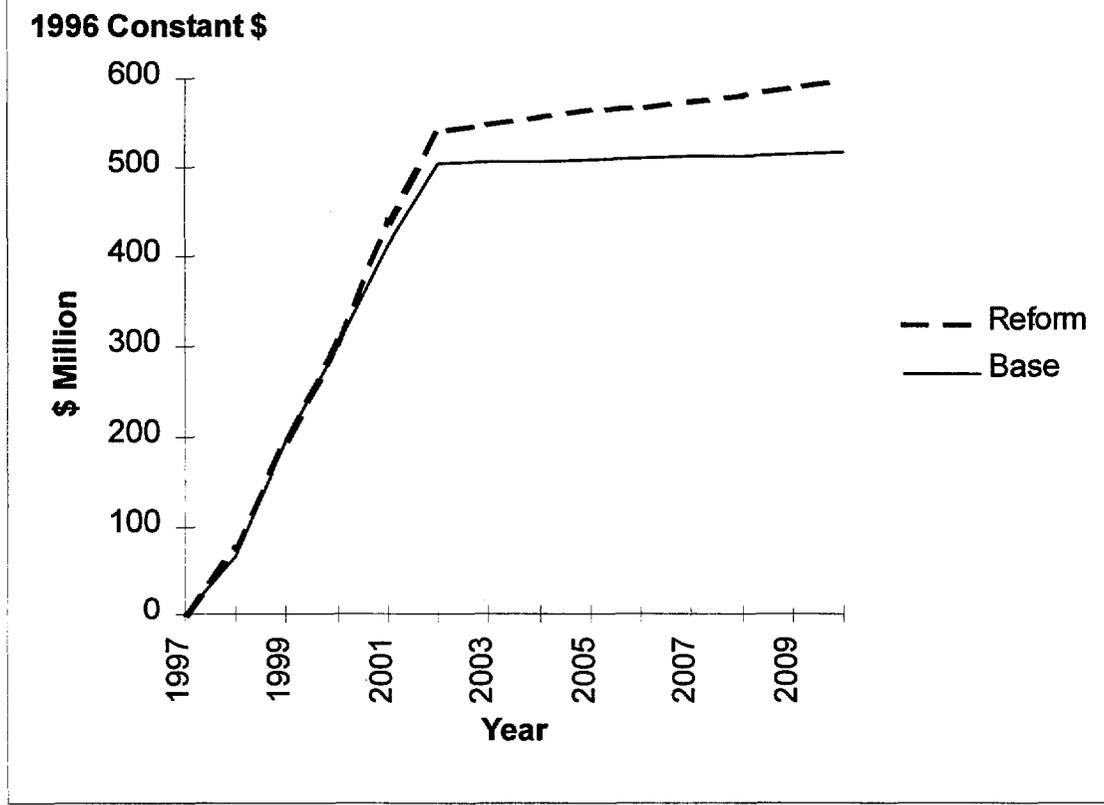


Figure 7. Income Taxes Paid



(not shown) fills the gap between the lines showing yearly investment for the two cases in Figure 4.

- **Loan Covenant Ratios.** The two financial ratios specified in the World Bank loan covenants are higher in the Reform Case than in the Base Case. Figure 5 shows the internal cash generation ratio (ICGR); Figure 6 shows the debt service coverage ratio (DSCR).
- **Tax Revenues.** The GOR directly benefits from restructuring since Reform Case tax revenues are higher than Base Case, as Figure 7 shows. Over the 14 year period shown in the Figure, approximately \$6,100 million in tax revenues are generated under the Reform Case.

13. *What impact would restructuring the power sector have on labor?*

There is an understandable concern that restructuring the power sector is principally focused on reducing the labor force in the sector, with the result that thousands of workers will be discharged on short notice once the restructuring is implemented. RENEL currently employs approximately 97,000 people and accounts for approximately 2 percent of the non-farm work force in Romania. It is therefore a major employer.

Even if there were no change from the current structure, there would be reductions in the work force. RENEL currently plans to reduce employment by 10 percent or 9,700 over the next year, with likely further reductions thereafter. It should also be noted that RENEL will separate its nuclear unit into a separate entity in approximately one year which will account for approximately 7,000 employees.

The decision to restructure is motivated principally by the need to create a competitive environment in an objective, transparent, and non-discriminatory manner which will promote private investment in the sector. The will result in electricity being produced and delivered in the most economically efficient manner.

Competition motivates managers to achieve low cost production, typically by focusing on those factors which have a major impact on cost. In some industries labor costs are a significant factor. However, in the case of the power sector labor costs account for approximately 15 percent of total costs, whereas fuel costs account for over 40 percent of total costs. Accordingly, it is important to point out that reduction in labor costs and hence employment is not the principal factor in deciding to restructure the power sector.

This does not mean that labor will not be affected as the power sector is restructured. It will be, because the sector, when compared to other commercial utilities around the world, is overstaffed. However, what it does mean is that the impact on labor can be managed over time in a way which will avoid major dislocations.

For Option 2, we have estimated the resulting impact on the power sector labor force, which could be distributed gradually over a ten year period. By 2010 the resulting employment in RENEL and the Power Purchasing Agency, after restructuring, could be 67,000, a 31 percent decline from current levels, or approximately 3 percent per year. Counter-balancing this reduction in work force would be the development of IPPs which will create new employment opportunities, although these would be less than the number of positions eliminated elsewhere through attrition and restructuring.

Option 3 and the subsequent Option 4, with more competition, would result in faster reductions, although Option 4 would take longer to implement and thus it would be longer before structure-related reductions would commence.

14. *What will be the impact of restructuring on domestic and imported fuels and hence security of supply?*

Energy imports currently account for approximately 34 percent of total energy supplies in Romania. Of these total imports, crude oil accounts for 44 percent, natural gas accounts for 25 percent and petroleum products and coal each account for 15 percent.

The power sector consumed approximately 7 billion cubic meters of gas in 1995, of which almost half was imported. It also consumed approximately 3 million tons of fuel oil of which 90 percent was imported. Thus the power sector presently accounts for 30 percent of all energy imported into Romania.

In a restructured power sector the principal fuel supply impacts would be as follows:

- Lignite use declines by five percent by 2010 as older inefficient plants are shut down due to competition and lignite is burned more efficiently in the remaining plants.
- Imported gas use could double by 2010 principally due to the increase in IPPs during this period. This amounts to an average annual increase in gas use of 5 percent per year. However, the increased use of natural gas would not commence until after 2000.

The net effect of these changes is that the power sector will remain a major importer of fuels but with a significant difference. Fuel supply procurement will be diversified among the IPPs as well as the former RENEL and this should minimize the risk of a major gas supply interruption. In addition, given the time frame for the increase in gas use, this will allow sufficient time to develop gas storage and additional pipeline capacity, including a possible pipeline between Romania and Western Europe. More importantly since private investors need to minimize the risk of supply interruptions in order to secure financing for their projects, these measures would probably be implemented by the private sector.

Alternatively, if no restructuring were to occur gas use would most likely be higher and subject to greater risk, since there would be less incentive to make efficiency improvements on the part of the utility. Moreover, as the largest user of natural gas RENEL's precarious financial condition would probably preclude making the requisite investments in storage or pipeline capacity to minimize the risk of supply interruptions.

15. *Would the technical integrity of the power system be affected by restructuring?*

"System technical integrity" refers to maintaining the continuing safe, reliable, economic operation of the interconnected electric generation, transmission, and distribution system throughout the range of normal and normal upset conditions, with provision for system protection during all extreme upset conditions. Viewed broadly, maintaining system integrity includes long-range system planning as well as shorter term planning and operations.

As the organizational and administrative structure of the electric sector changes, it is not surprising that concerns about the technical integrity of the system should be voiced. The points discussed below bear on the question of whether system integrity can be adequately maintained when the power sector structure is something other than a vertically integrated monopoly.

The short answer is that system integrity can be maintained equal to or better than today's levels in Romania, or anywhere else for that matter, at comparable cost. A more complete answer is provided by understanding what happens in each of the following areas:

- Initial separation
- System planning
- System operations
- Grid code requirements

The Romanian electric system today was built over the years, based on certain planning criteria and to certain technical specifications. It already operates with a hierarchy of surveillance and control, the highest level of which is National Dispatch.

From a physical perspective, initially nothing changes upon separation of the system. As it applies to establishing non-vertically integrated monopoly structures, the word separation refers to the organizational and administrative separation of some or all of the main functions of the power sector. Initially the same physical assets will exist. Eventually, independent

power plants will join the system, just as self-generators are interconnected with the system today. Existing and new equipment will be planned according to certain criteria and will operate with requirements for communication and control. Most of the requirements will be similar or identical to those that exist today, and all will be based on the principle that system integrity must be maintained.

System operation would be governed by a Grid Code, discussed below, that among other things would leave National Dispatch as the highest level of authority. It along with the other participants would operate within the requirements of the Grid Code. Nevertheless within their scopes of responsibility the directions of National Dispatch and lower levels of the hierarchy must be followed, as they are today.

Part of the reason that the system will continue to operate properly is that there will be economic incentives for operation that support the needs of the system. With regard to system operations, tariffs would include charges for grid services such as load following and reserves. As in other countries, contractual requirements or payments would provide generators incentives to deliver when the power is most needed, provide frequency control, to provide reactive power as needed, to deliver reliably, to keep regional dispatch centers informed of their status, and so on.

A Grid Code would be developed and revised as needed in consultation with all interested parties. It will be designed to permit the development, maintenance, and operation of an efficient, coordinated, economical integrated electrical system. It will establish the requirements that assure the continued technical integrity of the system. It will cover the following areas:

- A planning code that specifies the supply of certain information by participants in the system, in order that system planning can be done properly in a coordinated manner.
- Interconnection conditions that specify the minimum technical, design, and operational criteria which must be met at interconnections between participants and the electric system.
- An operating code that addresses a number of issues including demand forecasting, coordination of the outage planning process, reserve requirements, operational planning, load shedding, reporting and communication, system protection, contingency planning, tests, and nomenclature.
- A scheduling and dispatch code that outlines the general requirements and obligations for matching loads and resources and maintaining frequency.

- Information requirements specifying what data must be provided among the participants.

The technical and commercial viability of accomplishing the above has been well demonstrated in other countries including England and Wales, the United States, as well as Hungary and Poland.