MINISTRY OF MINES AND ENERGY - MME
Secretariat of Energy

RESTRUCTURING AND DEVELOPING THE ELECTRICITY SECTOR IN BRAZIL

APPROACH AND RESULTS

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Contents

Attachments:

I - THE GOVERNMENT POLICY FOR THE ELECTRICITY SECTOR

The guarantee of a high quality and reliable supply of Electric Energy is, undoubtedly, a fundamental issue for the economic well being of mankind and the development and competitiveness of countries. Future supply must be planned several years in advance because project and construction of the generating units take a considerable period of time and involves especially intensive capital investment. Any delays in the expansion program lay the country open to the hazards of interruptions or rationing, since electric energy can not be imported provided there are no interconnection with neighboring systems, and shortages may endure for years to be overcome. An appropriate strategy is crucial to insure access to primary sources of energy in the world market (oil, natural gas, coal, etc.) when the energy requirements are not met by the country's own natural resources of hydropower, or other fossil energy sources.

In the last four decades, Brazil has developed a widespread and efficient state owned electric system, based on its hydroelectric resources. The ownership and control of the system was shared between the federal government and the states in accordance with the following ratios (as of 1994):

SECTOR	FEDERAL%	STATES%	PRIVATE %
GENERATION	65	35	-
TRANSMISSION	70	30	-
DISTRIBUTION	19	79	2

From 1980 on, and despite the technical competence of the electricity sector, the industry became economically unfeasible because of the government's economic policies (tariff reduction, anticipation of huge projects) and political interference in the management of some utilities.

In the international field, the electricity sectors were rapidly evolving from its traditional structure of integrated monopolies, which encompassed local concessions of generation, transmission and distribution. Unbundling these segments and introducing competition in generation opened the way to consumers to choose their suppliers through free access to the transmission and distribution networks.

Meanwhile the crisis in the Brazilian electricity sector was building up so that in 1993 the Federal Government had to interfere to rescue it from bankruptcy, taking over a US$26 billion liabilities in debts and increasing the price of energy by 70%. In this period, it was widely acknowledged that the sector called for immediate structural and institutional reform. However, political factors, such as the elaboration of the 1988 Constitution and the interruption of the previous President's office, impeded and postponed the long needed reform.

Due to insufficient investments during the previous period the current Government was confronted, in 1995 with a critical risk of deficit in energy and capacity of generation besides of rising transmission constraints. Total incapability of the state to provide the required funds to promote expansion was underlined by a new cycle of default among the utilities. All these contingencies were accompanied by the lack of a well defined reform proposal and by a continuous and large increase of demand around 6% per annum, spurred by the "Plano Real" effects rising the purchasing power of the lower income classes.

For this reason, there was not an adequate span of time to develop a lengthy program to reform the electricity sector which would convey the country to an exposure to insufficient supply of electric energy resulting in a situation of emergency, which usually leads to improvisation.

In this context, the guidelines adopted by the Brazilian Government, supported by an active and proficient Congress, were based on a series of simultaneous actions that, in other conditions would have been undertaken in a different order and approach.

1 - BASIC GUIDELINE TO SUPPORT THE PROCESS

restructuring of the electric sector was started by the enactment of the "Lei das Concessões" (Law of Concessions) 8987/95 and 9074/95, drawn up through close relationship between the Executive and the Congress, which established the guidelines of the new model for the market and opened the way to the start up of the process of privatization of the electric sector.

2 - DEVELOPMENT OF SIMULTANEOUS AND COORDINATED ACTIONS IN FOUR WORKING FRONTS

First, the creation of a regulator, independent and self-governing (ANEEL) and enactment of the initial regulations, a fundamental step to start privatization of the distribution utilities, as well make the projects and contracts aimed at the expansion of generation feasible.

Second, concrete actions to ensure expansion of the system and supply encompassing, among others, restart of unfinished plants, revocation of concessions for non initiated projects, bidding of hydropower plants and authorization of thermal units and interconnections with neighboring countries. These priority activities were aimed at the prevention of rationing assuring balance between supply and demand and were also intended to avoid price increases from a shortage of supply during the transition period.

Third, the privatization of distribution which had already been started even though a framework of regulations had not yet been devised in view of the following reasons:

- it was feasible, although at the time the Market Model was yet not available since contracts for concession contained the necessary provisions to define scope of the granted services;
- the sale of just two important distribution utilities controlled by the Federal Government represented a forthcoming measure in view of its dominant position in generation through the ELETROBRÁS subsidiaries. At the present about 80% of the States have followed by deciding to privatize their own utilities;
- it fulfilled the macroeconomic imperative to reform the finances of the State, deducting from the national debt the proceeds from the sale of these assets;
- it promptly created momentum for the long needed reform;
- finally, privatization of distribution was intended to eliminate the requirement of federal guaranties covering energy supply purchases defaults of state controlled utilities asked for by potential investors on new projects and buyers of the existing generation assets.

Fourth, the detailing of the commercial, regulatory and institutional model, developed jointly between a consortium of consultants, led by Coopers & Lybrand, and a selected group of professionals from the Brazilian electricity sector. As a result of this effort, a blueprint for reform was produced, which has been well accepted by the electricity sector and by investors in general therefore adopted by the government as a general guideline for the ongoing reform.

The enclosed chart provides a high level overview of the challenges faced by the current Government, as well as the concrete actions which have been enforced in the last three years. The chart also illustrates the concrete results achieved during this period, despite some adverse initial conditions, uncertainties and an impending energy crisis.

It has to be noted that, instead of partial and shortviewed actions, the Government was able to assure the system expansion until 2005, define a process to restructure the electricity sector as well as to attain new, innovative long term strategic objectives.

Currently, 35% of the distribution sector has already been privatized - 47% if the sale of ELETROPAULO METROPOLITANA is considered. This will pave the road for the privatization of the generation segment, to be started immediately with the sale of GERASUL (formerly ELETROSUL), in conjunction with the implementation of the Market Agreement, the Independent System Operator, and regulation of competition in the electricity market.

The actions which have been taken by the Government represent a significant revolution, based on responsibility and compromise to long term, enduring solutions, though an open and participative process, with no other commitment then to antecipate the countrie's auspicious future.

II - THE MME ACTIONS IN THE ELETRIC SECTOR AND THE RESULTS OBTAINED

I – CURRENT SITUATION IN 1/195

In 1995, the model was exhausted, the construction of 23 units was interrupted (11.500 MW) and 33 granted concessions had not been started. The sector was off course, without adequate projects to assure the expansion and to take care of market growth. The crucial situation was an impediment to lengthy studies and required immediate and coordinated intervention. Main facts:

- Law 8631/91 tariffs were increased by 70%. The Treasure took over a debt of US$ 26 Billion on the account of previous tariff deficits; but in 1995, new defaults of utilities stretched to more than US$ 3 Billion;
- the expansion of consumption, resulting from "Plano Real", increased from 3 to 6/7% p.a.; breakdown of transmission in many regions and continuous deterioration in the systems of many distributors; from 1991 to 1994, the expansion of generation was restricted to an average of 1,080 MW/year instead of the needed of 2,500 MW/year. Investments were reduced in 50% to US$ 3,5 Billion/year;
- in some future periods, 15% of the hydrological series revealed risks of deficit, above the 5% accepted risk. In some of the drier series, the extent of deficit could surpass 25% of the total consumption (MWh) denoting alarming rationing possibility.

II – MEASURES ADOPTED: SIMULTANEOUS AND COORDINATED

1 – Concessions Laws 8.987/95 and 9.074/95 defining the Bases of the Reform of the new Model: Competitive generation, Free Access to the Grid, choice of Supplier for large customers with more then 10 MW or more than 3 MW in 2.000 and lower threshold to be defined after 2003/ Extension of Concessions/ Independent Power Producer/ Independent Regulator, etc..

2. REGULATION

- ANEEL Law creating a regulator to control the industry and **protect the consumer**
- **Revision of service standards**
- IPP and Self-Producers
- Extension of concessions with unbundling
- Tariffs and access to T&D grids for new projects

3. EXPANSION OF THE SYSTEM

- Resuming construction of 19 out of 23 unfinished plants (10.000 MW)
- Annulment of 33 unsettled concessions
- Re(bidding) of Hydropower plants
- Bidding of Generation to IPP's and Thermal plants
- Interconnections with neighboring countries
- Resuming construction of Angra II
- Capacity Increase of existing plants
- PROCEL – Conservation
- North-South interconection,
- PRODEEM, etc

4. PRIVATIZATION

- Renegotiation of defaults
- Adjustment of the concession contracts to the new model
- ELETROBRÁS takes over the management of 9 state concessionaires in preparation for privatization with funding from BNDES and ELETROBRÁS
- Privatization of distribution utilities and generation (Cachoeira Dourada - CELG)

5. RE-SEB: RESTRUCTURING

- MME submits to the CND, in 4/95, the privatization of ELETROBRÁS generation. Contract of consulting services accepted and signed(7/96)
- SEN plus 60 technicians work with consultants
- COOPERS/RE-SEB finished in june/97.
- **It is adopted as a Reference for implementation**
- 130 technicians concluded the basic documents for the Marke and ISO (12/97)

III – RESULTS OF GOVERNMENTAL ACTION IN 3 YEARS, UNTIL 12/31/97

ASSURANCE TO MEET MARKET NEEDS:

- Integrated actions, favorable hydrological conditions (1996) and the investments program reduced the deficit probabilities to 5% (1998) and 7% (1999 – manageable) and below 5% in the following years;
- Effective operation have resulted in more than 80% availability of the system even under extreme conditions (losses of transmission lines, accidents).

ASSURED EXPANSION OF THE SISTEM - MW:

	1995-97	98-2005	US$ mil (98/2005)
Projects resumed	863	9,335	6,196
Contracts IPP/Thermal		5,045	2,628
Resumed Angra II		1,309	874
Itaipu		1,400	190
Tucuruí		4,125	1,623
Other Projects	5,053	2,471	1,410
Nominal Sub-total	**5,916**	**23,685**	**12,871**
Conservation	918	2,705	125
Interconnections		1,270	635
North/South Transmission Line		1,000	663
Virtual Total	**6,834**	**28,660**	**14,294**

Total Virtual Capacity (MW): 54,105 (1994) + 6,834 (95/97) + 28,660 (98/05) ➡ 89,599(2005). A 66% expansion upon 1994. Average annualincrease of 3,583 MW, from 1998 until 2005.

PRIVATIZATION: in three years, 10 distributors were privatized, federal and 8 state owned, 7 in 1997, i.e., 31% of the market in MW. Recent premium, above 50% and higher unit values than obtained in other countries confirm the confidence of investors. More than 20 states have agreed to privatize their utilities. Start up of privatization of federal owned generation to take place in 1998.

SECTORIAL MODEL: the RE-SEB COOPERS Report has had general acceptance and has been adopted as Reference for the restructuring; it will undergo adaptations during the process. **The market is confident that the model will be implemented consistently**.

STRATEGIC GOALS: together with the complex changes, the following strategic goals have been advanced: participation of private capital, interchange with neighboring countries, increase of participation of Natural Gas in the energy matrix (increase in the production, gas pipeline from Bolivia and generation with gas from Argentina). Attention to the remote areas (PRODEEM): 120 projects concluded, 700 underway and 1.500 to be started.

PROTECTION TO CONSUMERS: ANEEL was implemented as an autonomous and independent regulator.

III.- FLOWCHART OF THE STEPS OF THE RESTRUCTURING AND PRIVATIZATION OF THE BRAZILIAN ELECTRICITY SECTOR

1 .Background:

- Funding model in crisis from 1981 on
- Attempts to revitalize the sector in 1985 (PRS)
- Attempts to reformulate the sector in 1986-88 (REVISE)

↓

Period of stalemate immobility

(Loss of the Investment Capability in the Sector)

Law 8.631/93

- Adjustment of the capital structure of utilities (26 billions) → Financial relief of the utilities
- Tariff increase of 70% (1993) → 100% until 1997

NEW FACTS

- Elections and new financial unbalance: the crisis reemerges
- Gradual maturity of the sector for the reforms
- Start up of studies for privatization (BNDES)

2.Policies and Actions of Fernando Henrique Cardoso Government

Due to lack of investment, under the threat of energy supply in case of unfavorable hydrological conditions (until 1996):

2.1 **Bases for reformulation:** ***Concessions Law 8.987 and 9.074/96***

- Bidding of generation
- Competition in generation
- Free access to transmission grid
- Free choice of energy supplier

2.2 **Double Challenge:** *to promote a consistent and permanent restructuring and at the same time to expand the market* ("THE MARKET CAN NOT WAIT FOR THE CHANGES")

EXPANSION DURING THE TRANSITIONAL PERIOD

Restructuring of the sector
Consulting services: Coopers & Lybrand (Project RE-SEB)
Basic proposal:jun./97

Initial Regulation
- Independent Power Producer
- ANEEL - regulator
- Extension of the concessions
- Annulment of 33 concessions of non started projects
- Reduction of utilities defaults

Expansion during transition
- North-South Interconnection
- Natural Gas Thermal Units
- Enhancement of the S/SE system
- Resume of infinished works
- Bidding of projects
- Interconections with neighboring countries.

Privatization
Starting with distribution by a joint effort of BNDES, ELETROBRAS and DNAEE/ANEEL in order to:
- establish competitive market
- enforce reforms,
(concession contracts anticipate the ongoing regulations).

Political decisions: 2nd semester/97

Legal Modifications: only the essentially necessary: 2nd sem/97 and 1st sem/98

Privatization of Cachoeira Dourada and CEEE
Start up of the bulk generation privatization of Eletrosul, Furnas, São Paulo´s company and CEEE generation.
Privatization of the systems of Manaus, Roraima and state owned utilities

Implementation *(2 to 3 years)*

Regulation (*infra- legal)*

Code of Electricity

Adjustments in regulation (infra-legal)

INSTITUTIONAL CONSOLIDATION OF A NEW COMPETITIVE MARKET

IV – SCOPE OF THE REFORM OF THE IN BRAZILIAN ELETRIC SECTOR:

1 - The Nationalization in the Fifties and Sixties

The cultural and juridical traditions of the country induce the general perception that generation and distribution of electric energy is a "public service" under government responsibility. Such a concept was reinforced by the success obtained with the national model adopted since the fifties and sixties where the lack of investments by the private sector had steered the country to a prolonged period of rationing. It is necessary to review such understanding according to the context of that time.

Firstly, the reduction of investments by the private sector was triggered by the legislation adopted from the "Código de Águas e Energia Elétrica" (Water and Electric Energy Code) which prevented adequate return of investments, since investments were considered based on their historical value, corroded by inflation, a distortion that would be corrected only in 1964, when the nationalization of the sector had been almost fully accomplished.

Secondly, at that time, favorable conditions to nationalization prevailed: the country's low debt exposure, the absence of expressive domestic economic groups, the lines of credit offered to the government by newly created international agencies (IBRD, IBD) at low interest rates and long repayment periods, etc. Considering the deficient interconnection between the systems, it was understood, at that time, that the industry was a utility service provided under the regime of natural monopoly through which only one exclusive company accounted for all the segments of generation, transmission and distribution, in its own area of concession, subjected to government control.

2 - Subjacent Factors to the Reformulation of the Electric Energy Industry Worldwide

The industry was organized in the structure of regional monopolies, subject to government's regulation intended to prevent the concessionaires from exploring the monopolistic position to gain advantages at the expenses of consumers; but, on the other hand, this scheme also protected the concessionaire from competition...!

Such an organization was logical and adequate in the first decades of the sector when the systems were relatively isolated, with few interconnections and the transmission was restricted. Tariffs were approved by the regulator following the principle:

Tariff revenues = operational expenses + depreciation + return of the non-depreciated assets.

During the 70s criticism that this model could lead to an over investment started to arise, and at the end of this decade, after the oil crisis, a series of coincident factors put the electric industry under scrutiny due the following reasons:

- the technological limits of economical gains from the enlarged scale of the thermal and hydro mega-projects (bigger plants and generation units at lower unit cost) had been attained which, for decades, had permitted the industry to obtain a relatively stable tariff;

- the pressure on the tariffs provoked by increased prices of fuel originated from the oil crisis;
- the utilities lack of capability or impossibility to transfer to the tariffs the excess cost of nuclear projects and of stranded investments in face of market reduction (rationalization and energy conservation);
- competitors from outside the sector emerged with lower generation costs based on more economic alternatives of production than the usual projects adopted by the utilities, notably the combined cycle of natural gas, co-generation, etc.
- finally, in many countries with nationalized electric sectors criticism arose about the efficiency of the model, mainly in developing countries where the reduced capacity of investment led to an imminent electric energy crisis (Brazil) or a real and serious one (Argentina, Peru etc).

The combination of these factors lead to the revision of the sectorial model grounded on a new "technological factor" which stems from the interconnection produced over time of the transmission systems which permits, through regulated free access, the commercialization and competition in energy supply and generation.

3 - Basic Tends in Reforming the Electricity Sectors

From 1978 on, when USA "Public Utilities Regulatory Policy Act." was issued, the tendency to revisit the regime of public utilities became extensively based on the following fundamental principles:

- acknowledgment of electric energy as a "commodity" where the regulated monopolies were replaced by competition in the segments not characterized as natural monopolies, i.e. generation;
- progressive regulation of the access to transmission and distribution networks;
- unbundling of the industry in the competitive segments-non regulated (generation and commercialization) and regulated-natural monopolies (transmission and distribution);
- free access by generators, distributors and consumers to the transmission and distribution networks;
- creation of a market for competitive commercialization of energy among generators and distributors and consumers, either by freely negotiating long term power purchasing agreements (PPA's) or selling/buying on a short term spot market;
- increased consumers' rights, starting with the highest demand, to freely choose and contract their supply with the generators;
- privatization of the industry.

The introduction of these principles implies a profound and complex reformulation of the sector followed by a deregulation of their competitive segments as well as privatization, which is, normally, the case of state owned systems.

In reference to the USA, where the sector had already been in private hands so that the existing companies could not be easily forced to unbundle, competition was introduced, and imposed, marginally in the beginning, by regulating the opening up of the systems and the compulsory acquisition of energy supplied at avoided cost, with the institution of the Independent Power Producer (Qualified Facilities) concept.

Progressively, however, the American sector is progressing towards a clear-cut separation of the basic functions of generation, transmission, distribution and commercialization bearing in mind a growing competition.

4 - Difficulties and Particularities of the Brazilian Case

It is usually recognized that the restructuring of the Brazilian electricity sector is one of the most complex cases due a set of limitations and factors which should be taken into account in the elaboration of alternatives adjusted to its reality and in the formulation of strategies to conduct the process. Special aspects should be emphasized:

First, the necessity to revise the model was not yet been recognized by many; neither the lack of efficiency nor a threat of an energy crisis had been sufficient to justify major changes - "Why reform if the service has never failed?" It is a distinct situation when compared to Argentina's, where a major shortage crisis actually took place.

Second, the Brazilian electricity sector is a hybrid state model where ownership/ control of assets is shared between the federal government and the states. Accordingly, the restructuring could not be decided by the federal government without being supported by the states. That represented an intermediate situation between England on one side - where the government, as the sole owner, had the power to reform the sector in order to make it ready for privatization, and the United States where the predominance of private monopolies was an impediment to the reformulation of the sector.

Third, industrialized countries, in general, exhibit high levels of energy unit consumption, and low rates of expansion with occasional surplus of capacity. Conversely, Brazil has a low per capita energy consumption coupled with a considerable expansion of services to new consumers. Therefore, Brazil does not present sufficient conservation potential when compared to those countries, which implies that reform has to be addressed under a high need of investment pressure scenario since there is a lower demand side saving potential.

Confronted with high rates of demand growth, the country does not have a significant reserve capacity with limited possibilities of efficiency gains in so far the hydraulic system that accounts for 92% of generated energy is running within the limits of theoretical capacity. In others countries, on the contrary, there was margin for productivity gains and rationalization, so that competition could lead to a reduction of prices. For example in Argentina private management increased the rate of availability of the thermal plants, portraying 45% of the installed capacity, from 42 to 82%, moving from rationing to a surplus of supply.

It follows that, either during the period of reformulation or after it, the process must give high priority to significant and continued investments in expansion.

Fourth, the prevailing hydraulic system imposes restrictions for the adoption of the usual concepts of a competitive market, in which each generator provides energy and price to be dispatched on a bidding process, in so far individual decisions would jeopardize the possibility of optimization of the hydrocascade generation. It was, therefore, necessary to envisage a competitive process without compromising the optimization of the hydroelectric generation.

Fifth, retaining a not yet developed hydroelectric potential capable of tripling the installed capacity, calls for a strategic guideline aimed at the harnessing of these potentials by enabling expansion with private capital, supported by governmental mechanisms to allow: (i)reduction of significant risks involved in such enterprises; (ii)recognition of future benefits that surpass the horizon of sensitiveness of cash flows which are the basis for private investors value assessment. If further development of an hydroelectric program is decided, it must be supported by a planning which can not be fostered exclusively by the private sector, comprising: inventory, projects, pre-feasibility, etc; (iii)other fundamental areas for decisive governmental actions (feasibility of projects via allocation of public funds) would be rural electrification and construction of strategic transmission lines.

Sixth, it is necessary to bear in mind that carrying on a Research and Development Program is essential to the country since energetic solutions are linked to technologies adherent to the characteristics of each region and country. It is probable that private capital, partially foreign, will only rely on technologies already available in the international market, which may not necessarily be suitable for domestic demands.

Seventh, it is mandatory to keep in sight that, under the present conditions of the world market of energy, natural gas/ combined cycle is the preferred and cheapest generation process. Fortunately, it is also an alternative for the country, at least for a few years, permitting to bridge significant part of the expansion necessities during the period of changes. The future perspectives deserve, however, a more accurate analysis in relation to the nations and Latin America's natural gas reserves and to the trends of the international oil and gas market.

Eighth, it is necessary to take into account that the principles referring to the "market solution" in the electricity sector have been developed and recommended notably in relation to predominately thermal systems where expansion also relies on thermal units. The price behavior, the possibility of the market prices (marginal cost of expansion) to provide excess of revenues and others aspects, such as reconciliation of the periods of concessions with the period of economical sensitivity of the investors decisions are issues which can not be neglected.

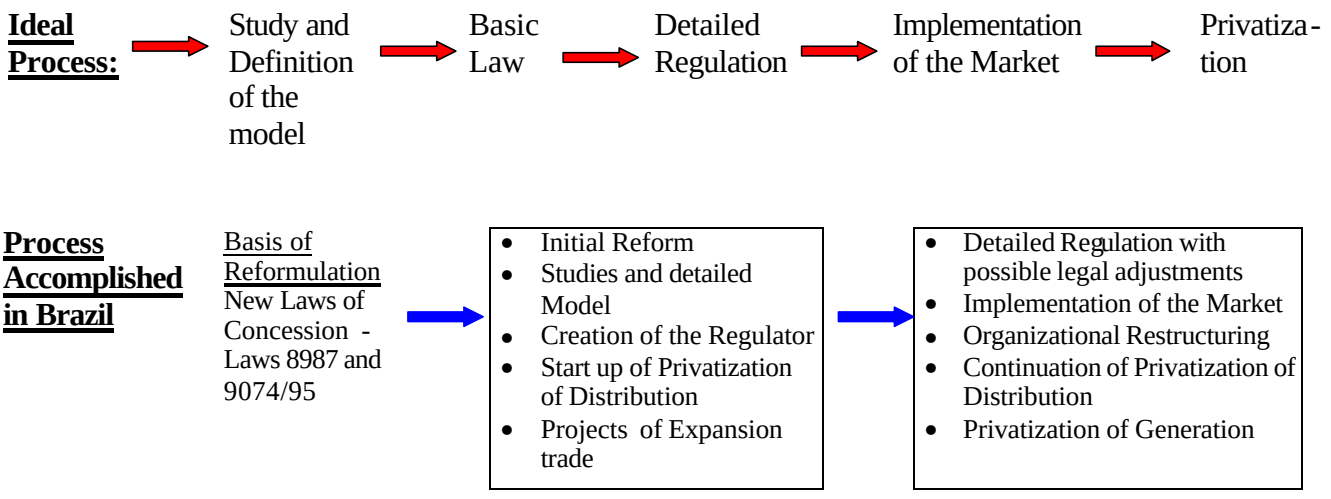
Ninth, emerging from a period of hyper inflation which seriously collapsed the structure of costs and encouraged the introduction of crucial distortions under the influence of subsidies and entangled to modifications not always conceptually consistent, the realignment of the sector will require a comprehensive consolidation effort of concepts and criterea in different areas: (i) structure of tariffs; (ii) definition of economical and financial balance of concession contracts; (iii) equalization of the IPP to the competitive generator; (iv) trade-off of the periods of concession with the horizon of the cash flows on which investors ground their decisions etc.

The last, and possibly the most noteworthy aspect resides in the process of restructuring itself. Enduring crisis since the 80s and in the absence of corrective measures, with the exception of the Law 8.631/93, forced the Government to launch the process of reform without a detailed model. The "*Novas Leis de Concessão*" (New Laws of Concession) made up for this omission anticipating a set of basic guidelines consistent with the progressive tendencies of the sector (it will be enough to compare what was established by these laws as shown by the attachments II and III).

In this scenario the restructuring process became more complex. However, despite this limitation it was possible to conceive a model more adjusted to Brazilian reality mainly due the organization of a close collaboration of the Brazilians technicians with the consultants.

The acceptance of high level objectives set by the Government and the pressure imposed by an aggressive privatization schedule enabled the sector to define a clear agenda and an effective process for change. However, the sense of urgency did not compromise the Government commitment to find an optimal, long term solution. The following chart gives a picture of an ideal and theoretical sequence and the adjustments made to reconcile conflicting objectives and to introduce rationality within the process once the challenge of restructuring was accepted.

THE IDEAL PROCESS VIS-À-VIS THE ACTUAL REAL PROCESS



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