TARIFF REALIGNMENT
- FINAL REPORT -

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EXECUTIVE SUMMARY

The GoB undertook an important task when it decided to implement a set of measures to revitalize the Brazilian electricity market and issued Relatórios de Progresso no. 2 and 3. NERA was requested to analyze four of the measures discussed in those document: deverticalization, tariff realignment, bilateral contracting, and promotion of free customers. We found that while these measures form a consistent approach in the Relatório de Progresso nº 2, they are no longer internally consistent in the latest Relatório. In particular, the measure on tariff realignment establishes a price mechanism, implicitly via cross-subsidies in the energy component, to reflect the “special characteristics” of the large consumers in order not to affect their industrial competitiveness. This unrestricted continuation of cross-subsidies perpetuates the problems of the past. It is contrary to the other revitalization measures in the Relatório, and is poor industrial policy and has destructive effects on the development of the electricity market. Specifically, it discourages competition and entry, especially of Independent Power Producers.

We believe that the GoB should implement sustainable and economic alternatives to encourage efficient entry into the generation sector. Subjecting customers to market price signals will stimulate market development. The elimination of cross subsidies is a way to push customers towards market-oriented outcomes as intended in the reform of the Brazilian electricity sector.

The report offers three solutions to the problem of phasing out cross subsidies. First, however, it notes that any should have two characteristics: it should be a time bound commitment, preferably enshrined in government legislation based on the principles of the reform; and since subsidies and cross subsidies are tariff matters, they should be submitted to and approved by ANEEL as part of the upcoming tariff proceedings.

The first solution is the elimination of cross-subsidies by stepping them down as Initial Contracts (ICs) are phased out. This is the only sustainable economic solution and the only economic alternative in the short term that guarantees the desired long-term expansion of the Brazilian electricity sector.
Recognizing, however, that the GoB has signaled that there are industry sensitive cases that still need special attention in terms of electricity pricing, the report proposes an alternative that does least damage to efficiency. This second solution institutes blocked tariffs that expose large industrial customers to long-term marginal costs for a portion of their consumption. However, during the transition while the ICs are stepped down, it provides a transition credit equivalent to the increased cost of the consumption exposed to market prices in the first year. Thus, it keeps customers financially whole for a year while they adapt their plans to a more market-oriented environment, provides a mitigating credit during the transition, and opens an economic opportunity to current and new generators to compete for the freed-up load.

The third (though less economically efficient) proposal for eliminating the current cross-subsidies consists of extending the transition credit for a period of time to be determined by the regulator. Conceptually, the gradual application of marginal cost to increasing amounts of consumption does not have to be coincident with the step down of the ICs. The amount of consumption exposed to market prices could be phased in during some longer time frame. The report notes, however, that if the transition is longer than the step down of the ICs, funding for the difference between the cost of wholesale power and the charges paid by industrial customers would have to be obtained from a source other than the ICs’ cheap energy.
TARIFF REALIGNMENT

I. INTRODUCTION

The economic efficiency of the electricity sector has become an area of renewed concern for the Government of Brazil (GoB). The shortage of electricity in June 2001 marked a pivotal point in the debate on whether or not the existing arrangements in the Brazilian electricity market were sustainable in the long-term. The GoB indicated its willingness to improve the current market conditions by creating the Cámara de Gestão and the associated working groups to analyze alternative avenues to improve the model adopted at the end of the 90’s. After several discussions among market participants, in January of 2002 the government issued its first Relatório de Progresso, seeing solutions that would increase the efficiency of the market without modifying the basic principles of the restructuring process for the Brazilian electricity market: competition in generation and commercialization segments; regulation of natural monopoly activities, and attraction of private investment.

Initially Relatório Progresso No. 1 identified the main areas of action where work was needed to improve the operation of the electricity market. Relatório de Progresso No. 2, then, identified thirty-three flawed areas that needed to be remedied in order to enhance the competitiveness and reliability of the Brazilian electricity sector. This report anticipated that the government, with the support of a team of working groups, would develop a set of measures identified as “top priority” for the short-term in a third report. In this Relatório de Progresso No. 3, published at the beginning of June 2002, eleven of the thirty-three measures were analyzed and specific proposals were issued for each one. These eleven measures were chosen not only because the GoB believes that they affect structure in the electricity model but also because of their interrelationships.

Based on the set of measures issued by the GoB and the new developments included in the Relatório de Progresso 3, Duke Energy International (DEI) and Tractebel Energia asked

1 This paper was funded by Duke Energy International - Generacao Paranapanema and Tractebel Energia. NERA thanks both companies for allowing us to share this document with other sector participants. Partial or total reproduction of this document is forbidden without the express permission of the sponsors.
NERA to critically analyze several of those proposals from an economic perspective. Specifically, NERA was requested to review the implications that the measure called “Tariff Realignment” could have for the competitiveness of the electricity sector. The basic concern among some Independent Power Producers (IPPs) is the prospect of inappropriate transfer of costs to low-tension customers from high-tension customers that would reduce the competitiveness of the generation market and the ability of IPPs to attract high-tension customers. In other words, the concern voiced by DEI and Tractebel is that the Relatório de Progresso No. 3 does not address clearly the current problem of cross-subsidization that exists between low-tension and high-tension customers.

In fact, it appears that the approach suggested in the document might actually impede the development of an electricity market that is supposed to be based on economic and efficient market principles when it states that “the energy component should reflect the special characteristics of the large consumers, bearing in mind intrinsic or contractual aspects that can be different from industry to industry in order not to affect the industrial competitiveness.” This statement implies that in order to preserve the international markets of certain industries, tariffs should be structured in such a way that protects them from foreign competitors.

Economic theory shows why cross subsidies distort economic choices and competition, and are therefore inconsistent with competitive markets. Cross subsidies are not only a transfer of wealth from one customer to another but in the long term encourage uneconomic consumption of the good in question. In the Brazilian case, cross subsidies not only affect the consumption of electricity but also discourage competitive generation in the electricity market since potential buyers are already supplied at tariffs that do not reflect the cost of service but rather the “special characteristics of the industry.” Additionally, cross subsidization is bad industrial policy since it discriminates against newer more efficient firms, encourages non-economic and un-sustainable technological choices by the industry in question, and can cause electric supply problems whose effects can be worse than the potential shock of cost reflective

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2 Brazil is not the only country that may be providing subsidies to its key industries. There is evidence around the world that shows that other countries have implemented equivalent measures to protect their industries. We should also note that we are presuming that the focus of this measure was international competition, but the practical effects will be protection against any entrants (domestic or foreign) in the markets of favored customers.
prices. Our belief is that tariffs must be cost compensatory and that cross subsidies should be removed in order to provide the proper economic signals to the market.

This report addresses the problems of cross subsidization in the Brazilian power sector and the effects, not only on the market itself, but also directly on the participation of private investment in the electricity sector. We identify alternative ways to deal with cross-subsidies in the Brazilian context and propose different options reflecting increasing acceptance of the need for non-cost reflective tariffs for large industrial customers, albeit at the cost of increasing economic inefficiency. Our proposals begin with the traditional and only real sustainable economic solution (the elimination of cross subsidies) but then offer a more heterodox response. This consists of eliminating the cross subsidies while keeping the average price of electricity at certain levels that do not harm the claimed competitiveness of key industries. Nevertheless, the alternatives proposed here are based, in one way or another, on the market and are oriented to produce market responses either in the short-term or in the medium term.

In order to carry out this task we have assessed the measures proposed by the GoB in its Relatórios de Progresso 2 and 3 closely related to tariff realignment, and looked at their effects on the efficiency and competitiveness of the supply segment of the electricity system in Brazil (basically IPPs). Our previous reports “Barriers for Purely Private Investment in Brazilian Generation,” “Segmenting the Brazilian Electricity Market,” and “Analysis of International Experience on Effects of Restructuring Power Sector Distribution and Commercialization Segments” also were used as inputs for our analysis.

This report is organized as follows. The next section provides an overview of the reform and puts in context the latest efforts of the GoB to revitalize the electricity sector. The third section assesses the key measures related to tariff realignment in all the documents issued by the GoB with respect to their consistency with other measures and with the reform program in Brazil. The fourth section describes the effects of cross subsidies on prices and the electricity sector in general and their use as a policy instrument for the development of the industrial sector in Brazil. The fifth section discusses alternative solutions to cross subsidization in the Brazilian electricity sector. Finally, the last section provides some concluding remarks.
II. BACKGROUND

A. PURPOSE OF THE REFORM

Brazil began restructuring its electricity sector in the mid 1990’s as a result of a realization that government resources would be insufficient to satisfy the needs of a growing economy. Private participation in monopolistic activities historically owned by the government became recognized as the only feasible resource for alternative funding.

The electricity model adopted to restructure the sector envisaged the introduction of competition and reliance on private investment. The model’s premise was that private investors would assume not only the control of generation, distribution and retail services assets that belonged to the GoB/states but would also develop new infrastructure. Meanwhile, the GoB would participate in the power sector only as a policy maker and as the sole provider of transmission service.

B. REFORM STALLS

In pursuing the reform of the power sector, the GoB implemented several significant measures such as the creation of a regulatory commission, the establishment of more favorable economic conditions to attract private capital and the privatization of the majority of the distribution segment. However, more than 70% of the generation remained in state or federal owned companies and most incremental generation has taken place with governmental support in one form or another. Only a very small percentage of thermal generation has been built for merchant purposes.

Faced with an unsatisfactory level of investments in generation, the Government attempted to induce incremental investment by establishing the Priority Thermal Plan (PPT). Though the main idea of the plan was that private investors would develop the projects on their own initiative, when the expected private capital did not materialize the GoB had to intervene by inducing investment through its governmental agencies (mostly Petrobras). Even this and other measures did not prove effective in attracting private capital for incremental investments. Therefore, GoB had to turn to its federal and state owned companies to develop the needed
incremental generation. Private participation has taken place mostly with some kind of partnership with governmental agencies.

The GoB recognized that the success in adding capacity was not consistent with the power-restructuring model as initially conceived, where the government would no longer be a direct participant in the sector and private initiative would drive the development of the sector. The competition appearing in the sector does not arise solely from private investors as consortia of private and governmental entities have proposed investments. The GoB saw that the failure to create an environment that attracted purely private investment was impeding the progress of the reform and the development of the power sector itself and in June of 2001 embarked on a program to revitalize the reform with the establishment of the Comitê de Revitalização. The mandate of the Committee was to recommend proposals to correct the current dysfunctions and to propose improvements for the model for the electric sector.

C. ISSUANCE OF RELATORIOS DE PROGRESSO 1, 2 & 3

In Relatório de Progresso 1 and 2, the Committee offered thirty-three “measures” that proposed general solutions to the problems of the Brazilian electricity sector with seven principal objectives:

- Normalize the functioning of the sector
- Strengthen the market
- Ensure expansion of bidding
- Monitor the reliability of supply
- Improve the interface between the market and the regulated sectors
- Defend competition
- Rationalize tariffs and defend the consumer
- Improve the institutions

The goal of the 33 measures was to seek solutions to the lack of market development that would increase the efficiency of the market without modifying the basic principles of the restructuring process for the Brazilian electricity market: competition in generation and
commercialization segments, regulation of natural monopoly activities, and attraction of private investment.

In Relatório de Progresso 3, eleven of the measures were assigned a particularly high priority because they produce structural effects in the model of the electric sector as well as being intrinsically related. In this paper, we are particularly interested in analyzing the topic now termed “Tariff Realignment” (17), which was formerly titled “Cross Subsidies.” In doing so, however, we will also need to briefly review five other related topics: deverticalization (7), the need for bilateral contracts (12), free and captive customers (16), limits on cross ownership and self contracting (18) and separation of the distribution tariff into its component parts of wires and commercialization, i.e., retail supply (29), since they are in one way or another related not only with cross subsidies but also with the efficient functioning of the market from an economic perspective. This is the objective of the following section.
III. COMPARISON OF THE TREATMENT OF THE TOPICS BETWEEN RELATORIOS 2 AND 3

This section compares the approach to a selected group of measures taken in Relatórios de Progresso 2 and 3. We and DEI and Tractebel Energia selected this set of measures not only because, as the GoB states, they are related to the basic concern raised in this paper – cross subsidies - but also because of their effects on the ability of the electricity market to function efficiently.

We have reviewed the statement of the problem in both Relatórios, described the problems that the measures intend to address, and briefly outlined the issues that the measures fail to address. This is our basis for assessing the consistency of these measures with others in the Relatório and with the objectives of the reform.

A. SELECTED MEASURES

The measures selected were: (1) Bilateral Contracting; (2) Deverticalization and Self-Dealing; (3) Promotion of Free Customers; and (4) Tariff Realignment and Separation of the Components of the Distribution Tariffs. Each is discussed in this section.

1. BILATERAL CONTRACTING

Problem

This measure in Relatório de Progresso nº 2 is designed to rectify a perceived lack of incentive on the part of wholesale customers to contract with incremental generation projects, especially those of private suppliers. Contracting is seen as a sine qua non of private investment for required capacity expansion, as well as the means to achieve supply reliability by ensuring physical capability to back up transactions.

Relatório nº 3 agrees that PPAs must be structured in such a way that the bilateral contracting will result in entrance of generation, which implies that they be guaranteed with physical generation. The promotion of bilateral contracting is to be done in two phases. In the short term, bilateral contracting will correspond to the post-rationing transition, in which growth in demand is uncertain and the new regulatory instruments are still in process of consolidation. In the medium term, contracting needs to reflect to the maturity of the market
and of the instruments (risk management tool and monitoring and intervention by the government) that will ensure the economic and reliable expansion of the system.

Proposals

In order to achieve these objectives, the measure in Relatório de Progresso nº 2 proposed to increase ANEEL’s current requirement that load serving entities must contract for at least 85% of their load. A new requirement was set at 95% and would be applied to all agents rather than just distribution companies.

As in Relatório nº 2, the new Relatório adopts the requirement of 95% and applies it to all agents rather than just distribution companies. It develops in greater detail the measures needed to increase the current contracting requirement for load serving entities. However, it does not address the adequacy (or even the sufficiency) of the new requirement, and postpones the definition of permanent solutions to the medium-term. According to the report, in the medium term, the distribution companies will be bidding for the purchase of power for their captive market. However, it has not addressed the important question of the interaction of these two requirements. Most significantly, the report does not address the fact that such requirements may put the load serving entities at risk of incurring stranded costs.

2. DEVERTICALIZATION AND SELF-DEALING (LIMITS ON CROSS OWNERSHIP AND SELF-CONTRACTING)

Problem

In Relatório de Progresso nº 2, Measure 7 – Deverticalization describes the objective of reform as the unbundling of the generation, transmission, distribution, and retail segments and the privatization of state-owned enterprises in order to promote competition. However, deverticalization (including privatization) has not been pursued as completely as anticipated. There remains cross participation of corporate entities in the generation, distribution and retail activities; federal companies still own generation and transmission assets; and other companies, both private and public, have not completely unbundled their assets. These problems affect competition and the efficiency of the market since conflicting interests in the decision-making of sector participants can lead to sub-optimal system performance.
The related Measure 18 – Self-dealing more specifically notes that under the current regulatory framework, the distribution concessionaires can purchase power from affiliated companies for sale to their customers. Self-dealing limits the market for independent energy producers and creates a conflict of interest between maximizing profits of the generation activity and minimizing customer cost. There is also the problem of over supply: although currently distributors can supply up to 30% of their captive customer demand, there are exceptions to this limit and there are additionally mandatory purchases by distributors from Itaipú. Together these could leave very little space for independent suppliers to enter the market.

Nothing in Relatório de Progresso nº 3’s description of the problems of deverticalization, cross-participation and self-dealing rebuts the analysis in Relatório 2. After discussing the model, it notes that thus far deverticalization efforts have been focused on separating generation from transmission, and if neutrality in the operation and expansion of the system is to be guaranteed, it is necessary to separate the activities of the regulated wires business from the unregulated commercialization business. The new model does not define in much detail the legal arrangements to handle the issue of deverticalization, and implementation is further complicated by the lack of progress in restructuring the current vertically organized companies, and especially those that are state/federal-owned.

Relatório de Progresso nº 3 states that the current regulations do not prohibit cross participation by corporate groups; rather they only limit the percentage of participation of a group in the diverse segments of the industry. The Revitalization Committee does not consider this aspect an important concern but does recommend that ANEEL analyze the participation of the diverse groups in each segment of the electric sector. Its discussion of the problem of self-dealing echoes the second Relatório in its concern that extensive exceptions to the 30% ceiling on self-dealing may limit the participation in the market of any IPPs not associated with distribution companies.

Proposals

Relatório de Progresso nº 2 proposed that federal utilities with both generation and transmission assets would divest one activity, with the resulting new companies controlled by either the National Treasury or Eletrobrás; all the remaining state-owned companies would be
required to be functionally unbundled; commercialization and retail activities would be separated and the regulator would limit the participation of transmission asset owners in other sector functions. On self-dealing, Relatório de Progresso nº 2 proposes to restudy the issue of the limits and make changes if there is evidence that the current limits and exemptions create a barrier to entry and impede the development of competition.

Relatório de Progresso nº 3 proposes measures to consolidate the currently undefined elements in the process of deverticalization. Specifically, it limits the ability of a company to carry out more than one function when one of its services is regulated\(^3\) and the ability to have direct or indirect participation in other associated business if its core business is regulated. In addition, the use of assets of the concession to guarantee financial operations is prohibited and a specific time frame for companies to comply with the norm is established.

The proposals in the current Relatório are more developed than in the previous report, but they still do not address in detail one of the two main issues that affect the participation of IPPs in the Brazilian electricity market – the deverticalization of state and federal owned companies, especially at the level of transmission and generation. As noted in previous reports by NERA, the continuing coexistence of IPPs and state/federal owned companies seriously affects the competitiveness of the market. (As discussed throughout this report, the other important issue that needs to be addressed openly is cross-subsidization. If cross subsidies are kept, the other proposals made by the GoB to promote current and incremental private participation in competitive conditions may prove to be ineffective.)

On self-dealing, the proposal is for the distribution companies to purchase energy for its captive customers based on public auctions of energy like those planned for “old energy.” Once the auction process is implemented, the limits defined today for self-dealing can be analyzed and adjusted.

\(^3\) The exception being the current distribution companies that will continue operating as retailers for captive customers.
3. FREE AND CAPTIVE CUSTOMERS

Problem

Both Relatórios argue that the presence of free consumers is fundamental for the development of the market. It is the possibility of choosing supply alternatives that characterizes a competitive electricity market. They note that the current tariff structure does not provide the correct economic signals for customers to choose between remaining captive to the distribution utility or becoming free customers and purchasing from a competitive supplier. The current tariff cross-subsidizes large industrial customers to such a degree that incremental IPPs cannot compete with the incumbent utility on the basis of delivered price. In addition, under the current tariff structure, on-peak tariffs subsidize off-peak use and allow large industrial customers to benefit by buying on-peak from IPPs and off-peak at the regulated tariffs from distributors.

Relatório de Progresso nº 3 also notes that consumers do not seek alternative supply because of the complexity of the MAE rules, the uncertainty with regard to the system charges and the characteristics of the current contracts, which are both long-term and contain automatic renewal clauses.

Proposals

The Relatório de Progresso nº 2 proposal is to push customers to the market by charging those customers with demand above a specified level but who choose to remain captive the greater of (1) VN, the normative value for generation cost the regulator allows to be passed-through to customers, and (2) spot price (PMAE), for that portion of their consumption that is “freed up” by the stepping down of Initial Contracts. It also proposes plans to expand the class of customers eligible to be free and possibly create aggregations of customers who could directly contract with generators. Both the energy contracts between distributors and customers and the tariffs would be required to differentiate between off- and on-peak hours.

The basic purpose of the proposals in Relatório de Progresso nº 3 is still clearly to establish pricing mechanisms to push customers to the market. It is more detailed and includes additional conditions to make the burdens of being a free customer more transparent. In addition, it establishes pricing mechanisms for those free customers that choose to remain with
the Distco, i.e., freed up load will be charged at market value. However, the writing of this Relatório and the associated conditions has a more discretionary rather than a compulsory character, which could affect negatively the impact of the measures proposed. In addition, it does not aggressively plan to expand the class of customers eligible to be free or directly address the possibility of creating aggregations of customers who could directly contract with generators. Nor does it raise the need of having “off and on peak” tariffs. Moreover, measures such as the competition for freed-up load blocks (as the Initial Contracts are stepped down) were abandoned in the new Relatório, which limits the competition for IPPs.

4. **TARIFF REALIGNMENT AND SEPARATION OF THE DISTRIBUTION TARIFFS (WIRES / RETAIL SUPPLY)**

**Problem**

In Measure 17, Relatório de Progresso no 2 expressed the concern that the long-standing cross-subsidy between consumer classes distorts the efficiency of the market. Full distribution tariffs (tarifas de fornecimento) for high-voltage customers, typically the largest industrial customers, are lower than the costs that these customers impose on the system, while those applied to residential, commercial and small industrial customers are higher than the associated costs. The Relatório noted that the subsidy applied to the industrial tariffs reduces the incentive for large industrial customers to become free, which jeopardizes both the level of competitiveness of the generation and commercialization segments and the future expansion of the system.

In Measure 29 the Relatório noted that the concerns related to distribution tariffs were twofold: the first is the separation (unbundling) of charges for distribution (wires) and for commercialization (retail supply), and the second is related to the structure of the current Tariff for Use of Distribution System (TUSD). The bundled distribution tariffs (wire and retail) applied to concessionaires’ customers do not allow a more competitive retail market to develop. Also, it is widely recognized that the existing TUSD does not correctly reflect the costs associated with the service. This provides uneconomic signals to market participants and gives incentives to large customers to remain tariff customers of the distribution concessionaire.
Relatório de Progresso nº 3 agrees with the previous report that separating tariffs into wires, commercialization, and generation is important to ensure that potential free customers know, understand and compare the costs of being captive versus the costs of being free. Since the wires and commercialization costs are the most important factors for tariffs charged to low-tension customers while the energy component is the most important cost element for high-tension customers, the measure proposes that a transparent regulatory framework should present this reality in the tariffs charged to customers. However, the table (in the Relatório and shown below) that depicts the current composition of the average tariffs fails to reflect the realities of the cost of serving the largest industrial customers, and more critically, the A1 and A2 customers.

<table>
<thead>
<tr>
<th>Class of Tension →</th>
<th>BT</th>
<th>A4</th>
<th>A3a</th>
<th>A3</th>
<th>A2</th>
<th>A1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item of Cost ↓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present Medium Tariff</td>
<td>199,0</td>
<td>134,4</td>
<td>108,1</td>
<td>92,5</td>
<td>81,6</td>
<td>68,4</td>
</tr>
<tr>
<td>Wires + Commercialization</td>
<td>105,1</td>
<td>57,8</td>
<td>35,7</td>
<td>25,5</td>
<td>18,4</td>
<td>9,6</td>
</tr>
<tr>
<td>Difference (Energy + other charges)</td>
<td>93,9</td>
<td>76,6</td>
<td>72,4</td>
<td>66,9</td>
<td>63,1</td>
<td>58,8</td>
</tr>
</tbody>
</table>

Relatório nº 3 also states that the charges for “energy + other charges” show a difference between tension levels that reflects the special characteristics of the large consumers, for example the electro-intensive industries, and argues that since the energy charge is very important for this segment, the competitiveness of these industries will be affected if special measures are not taken to reduce any tariff shock resulting from realigning tariffs to proper levels.

**Proposals**

Relatório de Progresso nº 2’s cross subsidy proposal was to undertake studies to determine the amount of the cross subsidies and their impact in the full distribution tariffs, taking into consideration any expected changes in distribution margins. Cross subsidies would be gradually reduced in the next five years subject to a schedule set by ANEEL, possibly in
each concessionaire’s upcoming tariff revision process. On separation of the distribution tariff, Relatório de Progresso nº 2 proposed to establish specific tariffs for the wires component; criteria for their annual readjustment and periodic revisions; and to separate out cost components that are not strictly part of the distribution tariffs.

In contrast, the proposals developed for Relatório de Progresso nº 3, while more developed than previously, reformulates these issues in a way that could jeopardize the economic efficiency of the market. The Relatório raises neither the problems of cross subsidy nor their implications for the functioning and competitiveness of the market. Rather the proposal explicitly states, “The energy component should reflect the special characteristics of the big consumers, bearing in mind intrinsic or contractual aspects that can be different from industry to industry in order not to affect the industrial competitiveness. This aspect will be object of special handling.” As we note elsewhere in this document, the elimination of cross subsidies is essential for the development of a competitive electricity market and it is desirable that a clear proposal for de-cross subsidizing the tariffs paid by large industrial customers be developed. At minimum, cross subsidies should be eliminated as Initial Contracts are stepped down. In addition, it is not clear in Relatório de Progresso no. 3 how the separation of the tariff cost components between regulated and non-regulated activities will be carried out; it does not address the structural issues of allocation of tariffs charges to different customer classes; and the problem of distribution companies shifting costs to captive customers are not raised or are distorted.

B. CONSISTENCY OF THE MEASURES

1. WITH OTHER MEASURES IN THE RELATÓRIOS DE PROGRESSO

The measures discussed above form a consistent approach in the Relatório de Progresso nº 2. They enhance competition in the generation market by encouraging privatization of state-owned enterprises and the entry of purely private investment in IPPs. As international experience has shown, clear rules with regard to deverticalization and limits on cross participation and self-dealing reduce conflicts of interest and expand the space in the generation market for independent investors. Requirements for bilateral contracts are designed to rectify the perceived lack of incentives on the part of wholesale customers to contract with incremental
projects, considered a *sine qua non* of private investment for the required capacity expansion. The promotion of free customers is seen as being fundamental to the development of the market. The Relatório proposes to push eligible customers into the market by charging those who opt to remain with the distribution companies the greater of the VN and the spot price for the portion of their consumption that is “freed up” as the Initial Contracts are stepped down and by expanding the class of customers eligible to choose. It recommends:

- unbundling the distribution tariffs to provide better price signals regarding the cost of wire service and retail supply;
- the establishment of cost reflective wires tariffs; and
- the elimination of the cross subsidies that favor large industrial customers at the expense of other consumers.

It argues that the subsidized tariff structure reduces the incentive for large industrial customers to leave the distribution company, which in turn jeopardizes both the level of competitiveness of the generation and commercialization segments and the future expansion of the system.

In contrast, the measures in the third Relatório de Progresso are no longer internally consistent. While some of the measures expand on the previous version and develop with greater detail the measures needed to address the problem – bi-lateral contracting, deverticalization, cross participation, limits to self dealing – others have been modified by omission or commission. Although the basic purpose of the measure on the promotion of free customers remains the establishment of pricing mechanisms to push eligible customers into the market, it does not aggressively plan to expand the class of customers eligible to be free or propose to create aggregations for customers who could directly contract with generators. Nor does it address the issue of tariff structure as one of the problems affecting the increase in the number of free customers.

Similarly, Relatório de Progresso nº 3 does not disagree that separating tariffs into wires, commercialization, and generation is important in order for potential free customers to know, understand and compare the costs of being captive vs. the costs of being free. However, it apparently approves of the current tariff structure in which not only are the wires charges a
fraction of the cost of service, but the energy charges show a difference between the high and low tension levels that reflects the special characteristics of the large consumers. It now argues that since the energy charge is very important for this segment, the competitiveness of these industries will be affected if special measures are not taken to reduce the tariff shock. Far from raising and addressing the problems of cross subsidies and their implications for the functioning and competitiveness of the market, the proposal explicitly states that the energy component should reflect the special characteristics of the big consumers in order not to affect the industrial competitiveness and requires “special handling.” The fact that “special handling” of the tariffs of the large industrial customers will encourage them to remain with their distribution company rather than entering the market as free customers, and that the absence of the large customers undercuts the development of a competitive market in generation and the entry of private investment, which is the object of the other measures, is ignored.

As noted in a previous report⁴, different jurisdictions around the world have dealt with the undesirable effects of distorted tariffs, by requiring utilities to design and implement only tariffs that are non-discriminatory or “fair and reasonable”, and subjecting such tariffs to regulatory or governmental oversight to enforce the directive. The clear intent has been to prevent regulated tariffs from reintroducing distorting cross-subsidies since they provide the wrong price signals to market participants and discourage the participation of IPPs in the new restructured markets.

2. WITH THE OVERALL REFORM

As noted above, the model adopted by the GoB for electricity restructuring envisaged the introduction of competition and reliance on private investors who would take the necessary actions to guarantee an adequate supply of electricity. Its premise is that profit-motivated private investors would assume the activities previously managed by the GoB and state governments, improve existing service, and provide the necessary funds and services to economically expand the system. Thus, private investors would not only assume the control of those assets that belonged to the GoB and the states but would also develop new infrastructure,

and would be the only alternative for the provision of generation, distribution and retail services. When the GoB perceived the need to implement new alternatives to enhance the initial objectives of the restructuring program and the need to improve the environment in order to attract purely private investment, it established the Comitê de Revitalização to revitalize the reform. The mandate of the Committee was to recommend proposals to correct the current dysfunctional market and to propose improvements for the model itself.

The proposals contained in the Relatório de Progresso nº 2 are consistent with the mandate of the Comitê de Revitalização and in particular with its charge to create an environment that would attract the private investment that can provide the necessary funds to assume control of the state-owned assets, improve existing service and develop new infrastructure. In contrast, the measures in Relatório de Progresso nº 3, with its reluctance to employ tariff restructuring as a tool for reforming the sector and its failure to press forward on eliminating the subsidies for large industrial customers offered by the regulated utilities, undercuts the incentives for large customers to enter the market. Without such entry, a competitive market will not develop and the growth of independent generation will be stifled. Thus, the “special handling” for the “special customers” is contrary to the fundamental premise of the reform, and as such is bad economics, is destructive of the proper development of the energy sector, and is poor industrial policy.

The following section addresses the problems that cross subsidies can cause if they are not eliminated. We analyze this issue first from an economic perspective, then from the electricity market perspective, and finally discuss the effects that they can have in the industry as a whole.
IV. EFFECTS OF CROSS SUBSIDIES

A. THE IMPORTANCE OF CORRECT PRICE SIGNALS

Cross subsidies in electricity pricing are bad economics because correct pricing is vital to the operation of an efficient market. First, electricity prices determine not only how much electricity is consumed, as customers consume more electricity when prices are low, and cut back on usage when faced with higher prices; they also determine, in part, how much of other types of energy will be consumed. Consumers have an “energy budget” and will substitute between different forms of energy in response to changes in the relative prices. Thus, increasing the cost of electricity not only results in reductions in consumption of electricity, other things being equal, it will also result in increases in the consumption of competitive fuels, such as natural gas or kerosene for heating and cooking, or petroleum for operating machinery. Second, and as a consequence, electricity prices will also determine what types of energy using equipment is purchased. Consumers take into account the life cycle cost of equipment, which includes the cost of its operation. As the price of electricity falls, more equipment using electricity becomes cost effective and not only is existing equipment used more but the demand for new electricity using equipment grows. Thus, the price of electricity affects consumer choices between electric and gas stoves, cars, agricultural pumps, etc. and affects the economic viability of the industries that produce them.

Third, electricity prices determine how much and what types of investment is made by the sector in capacity. Properly designed, cost-reflective prices such as time of use pricing encourage customer responses to consume electricity when it is least expensive. Customers who can shift consumption to off-peak periods help the utility to reduce the system peak and reduce the need for incremental capacity. At the same time, higher on-peak market prices encourage independent investment in units that supply energy to serve the system peak or to serve customers whose usage patterns would not allow them to avoid the peak charges. Fourth, electricity prices will influence the choice of the substitutes for electricity purchases

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5 This point is more obvious in thermal systems, but cost reflective prices help signal the incremental capacity and energy needs in any system.
from the utility consumers acquire. The tariff determines the point at which self-generation or co-generation becomes cost effective for industry or domestic photovoltaic panels or conservation investments become cost effective for residential customers. Correctly set, the tariffs will elicit from consumers the proper balance between purchases from the utility and investment in energy producing or saving equipment.

Electricity prices also play a role that reaches beyond the energy sector itself. The production of electricity uses the resources of the economy – oil, aluminum, steel, copper, concrete, coal, iron, water, etc. By determining how much electricity is consumed and produced, electricity prices determine the extent to which the electricity sector uses those resources. In economic terms, allocative efficiency requires that the resources of the society should be put to their best uses. If these resources were not used by the electricity sector, they would be available for building roads, schools, housing and factories. Mis-pricing of electricity means that more or less electricity is produced than is optimal, and that the sector uses more or less than the optimal quantities of the resources required to produce it.

Finally, in the broadest sense, pricing affects not only the uses of resources that are internalized in cost of production, but the external costs and benefits associated with the cost of electricity. Subsidized prices that result in uneconomic consumption and production of electricity also incur such unnecessary additional external costs as the associated air and water pollution or dam construction and loss of arable land and dislocation of populations. Similarly, over-priced electricity reduces consumption and the external benefits of electricity: reduced crime and automobile accidents from better street lighting, improved health from refrigeration, better education and communication from the use of domestic appliances.

In sum, prices matter, not only to economists concerned about the theoretical benefits of economic efficiency, but to the consumption and investment decisions of the utility and its customers and to the economy and society as a whole.
B. DESTRUCTIVE EFFECTS ON THE DEVELOPMENT OF THE ELECTRICITY MARKET

1. CROSS SUBSIDIES HARM INDEPENDENT POWER PRODUCERS

Existing tariff distortions threaten current investors in independent generation because they can reduce the size of the market share that was ultimately to be available to competition. As initially conceived in the reform of the Brazilian electricity sector, it was supposed that as initial contracts were stepped down, a larger segment of the market would become available to IPPs. This would relieve the national budget of the burden of expanding the electric power system.

Non-cost reflective regulated energy tariffs artificially enhance the competitiveness – in terms of final price – of the distribution utilities relative to the independent generation segment for possible free customers. In effect, the distribution companies offer current high tension customers (i.e. large industrial customers) better deals making up the difference in the charges to other classes of customers (i.e. low-tension level customers). Since IPPs cannot economically match such prices, the distortions minimize the competitive opportunities for the IPPs. The potential free customers could (and certainly have the incentive to) remain with their original supplier. The current distortions, and those seemingly contemplated by the third Relatório, not only financially harm existing projects by reducing their market opportunities; they also discourage incremental investment in generation. It is unlikely that independent generating projects can be financed to sell into the narrow market that remains when the largest energy intensive customers do not participate. Thus, the continuation of subsidies in the retail supply tariffs do nothing to advance the energy sector towards private investment unsupported by public funding.

6 A related topic not explored in this section is the self-dealing problem. Currently some Brazilian distribution companies can purchase power from affiliate companies for sale to their customers. Self-dealing creates market inefficiencies by limiting the market for IPPs and providing affiliated generators with non-market advantages, among other negative effects.
2. CROSS SUBSIDIES DO NOT ALLOW THE SYSTEM TO ACHIEVE THE BENEFITS OF A COMPETITIVE GENERATION SECTOR

The distortions in the tariffs, the disincentives for large industrial customers to choose to participate in the market and the discouragement of private investment in generation means that the system will not achieve the benefits of a competitive generation sector envisioned by the reform. The premise of the model was that profit-motivated private investors would assume the activities previously managed by the GoB and state governments, improve existing service, and provide the necessary funds and services for system expansion. The GoB would be able to introduce competition and rely on private investors to guarantee an adequate supply of electricity. Unfortunately, the reality that private investors are profit-motivated has not changed. The only change is that reducing the opportunities to achieve a profit that is equal to the return on projects in other countries of comparable risk is discouraging the private investment that is the motivation of the reform. The GoB will not in fact be able to rely on the private sector to guarantee an adequate supply of electricity in the future unless it resolves this problem (as recognized in Relatório nº 2).

In addition to affecting private investment in new capacity, cross subsidies have another, more subtle consequence for the generation sector. One of the enduring benefits of a competitive market is the incentive that it provides for improvements in the economic efficiency of the participants. Firms, particularly if they are privately owned, respond to the price signals of the market because they care about the company’s bottom line. Therefore, new entrants provide competitive pressures in the market to improve the efficiency of existing plants, as those plants will not remain competitive if they insist on adhering to inefficient processes, overstaffed personnel and cumbersome administrative procedures. However, these benefits cannot be achieved if price signals are not correctly set and are not cost reflective. Of equal importance is the introduction of competitive pressure on those companies (Distcos) that retain the control over a segment of the market by artificial mechanisms, i.e., cross-subsidies. If there is no competition based on market principles for those customers, the desired market benefits cannot be achieved and there are no incentives either on the side of the Distcos or on the customers to seek more economic supply alternatives.
The only viable option for the power sector in Brazil is to attract purely private investment. This requires implementing the power sector model based on economic efficiency principles. Rationalization of tariffs for all customers is one of the pivotal points for the development of the industry. Current tariffs are unlikely to achieve the objectives of equity, and economic efficiency both because they do not cover total costs and because there are cross-subsidies among consumer classes, i.e. from low-tension (residential, and commercial) to high-tension (large industrial users) customers. Any approved tariff structure should recover the full cost of service that each and every class imposes for the provision of the service (under efficient operation).

C. POOR INDUSTRIAL POLICY

1. CROSS SUBSIDIES PREDICATE INDUSTRIAL POLICY ON INEFFICIENT FIRMS

   Not only are subsidized tariffs for large industrial customers bad economics and destructive of the development of the energy sector, they are also poor industrial policy. The case for subsidized tariffs is based on the assumption that the special characteristics of the industry require special handling and arrangements. Thus, they predicate industrial policy on the assumption that Brazil’s major energy intensive industries are characterized by inefficient, internationally uncompetitive firms that need the protection of subsidized energy tariffs. There may be a case that can be made that some individual firms require particular assistance during a particular period. However, an industrial policy that presumes that subsidies will be required into the indefinite future if these firms are to survive, and then acts on that assumption, is not sustainable in the competitive global market. Nor has evidence been offered that such a policy is necessary for these industries in their entirety to compete domestically and internationally with alternative providers.

   In addition, subsidies in the long run are detrimental to the improvement in the efficiency of the firms they profess to assist. As noted above, one of the important roles played by prices is that they determine the choices of the types of energy using equipment in which firms invest. Subsidized electricity tariffs skew those decisions and encourage non-economic and un-sustainable technology choices by industry. Industries may choose electric over gas-fired equipment, or less efficient electricity using equipment with lower capital costs based on a
calculation of a life cycle cost that includes discounted electricity costs. In the long run, such a choice is not only detrimental to society, but the firm itself, insulated from the pressures of competition by the subsidies, will operate at less than optimal efficiency and will not be prepared for the future if the subsidies are ever removed.

2. **“RIGHT” TO LOW ELECTRICITY PRICES DISCRIMINATES AGAINST OTHERS**

Tariffs that discriminate in favor of one group of customers inevitably discriminate against another set of customers. To the extent that a “right” to low electricity prices is established for existing firms or existing blocks of power, it discriminates against newer more efficient firms that have made more recent or more technologically efficient choices. Competitive markets are dynamic in nature, and policies that fossilize technological choices do not allow the economy to reap the full benefits of competition.

Cross subsidies are particularly insidious because they imply that not only certain customers benefit from lower than cost based tariffs but those benefits are paid by other customers through higher than cost based tariffs. In Brazil, the majority of customers subsidize the large industrial tariffs. It is not only the low-tension customers (i.e. residential, commercial and even some industrial customers) themselves and non-large industrial users that suffer the inefficiencies of such price signals, however. Such tariffs also discriminate against any producer of electrically driven consumer goods. Rational consumers will take into consideration the electricity costs when deciding to purchase household appliances, and may well decide to postpone or forgo purchases of goods they deem to expensive to operate, since their prices for electricity are subsidizing other economic segments.

3. **INDUSTRY IS MORE HARMED BY POWER INTERRUPTIONS THAN BY COST REFLECTIVE ELECTRICITY PRICES**

Finally, industrial policy should take into account the effects on industry of shortages in the generation sector and consequent power interruptions and forced reductions in consumption. The lack of success in instituting a climate in which private investors add incremental generation, coupled with the lack of Governmental resources to provide the necessary public funding for generation, a fact that was the original motivation for the reform, will lead to shortfalls in electricity production in Brazil in any year the hydroelectric plants
operate at below normal levels. The energy intensive industries in particular need to consider whether they would be more affected by cost based electricity prices or by a repetition of the rationing that occurred in June to November 2001.

Under this spectrum of the negative effects that cross subsidies have not only on private investments but also on industry policy and on the customers that do not benefit from cross subsidization, the question remains: what are the alternatives for the Brazilian electricity sector that promotes market oriented results? In the next section we explore possible answers from a market perspective.
V. SOLUTIONS

When restructuring an industry or a sector, policy makers must ask and answer a myriad of different questions, ranging from the philosophical to the practical. A first defining question is whether or not it is desirable from an economic, societal, and political perspective to have market outcomes: that is, whether to adopt a framework in which supply and demand are the key instruments to determine the quantities traded and the prices of the goods exchanged.

Once it is decided that the sector under consideration will be subjected to market rules, policy makers then need to identify the existing inefficiencies of the sector being restructured. In the electricity industry, cross subsidies are one of the inefficiencies that need to be addressed because they distort economic choices and erect barriers to effective competition, and are therefore inconsistent with a competitive market. Within the restructured power sector, cross-subsidized tariffs have a negative impact on the efficiency of electricity consumption and investment in electric facilities. Moreover, the overall cost to the society from cross-subsidized tariffs can be substantial, and the negative effects of cross-subsidization can multiply, spreading the costs of distorted power tariffs to other sectors and industries and to the society as a whole.

Whatever the genesis of such cross-subsidies, they tend to become embedded in tariff structures and need to be eliminated if the restructured sector is to realize the benefits of reform. In the following section, we outline alternative solutions to deal with the problem of cross subsidies in the Brazilian context. This is a problem that has been present for years in the electricity sector without a clear solution and requires a swift response in order to avoid the problems noted in the previous sections.

The alternatives to eliminating cross subsidies and making tariffs for large customers cost-based, range from the only real sustainable economic market solution to one that could extend part of the current arrangements for an additional period of time. Nevertheless, the common and most important characteristic is that all the solutions presented here ultimately eliminate cross subsidies and require eligible customers to face market prices for some portion of their consumption immediately. This provides efficient price signals for choosing among competing suppliers. In return, these customers can obtain the benefit of competition whenever they decide to opt for a supplier different than their current distribution company.
As noted in the following paragraphs, we have divided the solutions into three main groups. The first is called “the market solution,” the second is called “the second best solution,” and the third is called “the alternative solution.” These solutions have been organized by their level of efficiency, the first solution being the only one to produce real and sustainable market outcomes.

The market solution calls for the elimination of cross subsidies in a period concomitant with the phase out of the ICs. Under this alternative, the tail block associated with the phase out of the ICs will be subject to market prices and priced at its marginal cost. The size of this tail block would be gradually increased by a factor equivalent to the corresponding stepped down portion of the ICs. This alternative would eliminate cross subsidies by 2006. The second best solution basically recognizes the political difficulties of eliminating cross subsidies immediately and proposes an alternative mechanism that keeps large customers whole for some time but eliminates cross subsidies by the end of the period. The proposal makes large industrial customers pay the long run marginal cost of electricity on a portion of that consumption comparable to the consumer’s non-IC related demand and receive a transition credit on the portion of the load still under the ICs. We also discuss under this proposal the location of the subsidy and alternative funding arrangements. Finally, the last and least sustainable solution consists of extending the transition credit during a timeframe deemed appropriated by the regulatory authority. In terms of economic efficiency, this approach does expose large industrial customers to marginal costs; however it extends the transition period, which only exacerbates the uneconomic effects caused by cross-subsidies. We present with greater level of detail these alternatives in the following section.
A. THE MARKET SOLUTION

1. ELIMINATION OF CROSS-SUBSIDIES AND ESTABLISHMENT OF COST-REFLECTIVE PRICES

The residential, commercial, and small industrial customers and the large industrial customers in Brazil are concentrated in separate tension levels, with the former group at lower tension and the latter (the larger customers) at higher tensions. The problem is that the full distribution tariffs for high-tension customers, especially the largest industrial customers, are lower than the costs that these customers impose on the system, while those applied to the other customers are higher than the associated costs. The existence of this cross-subsidy not only distorts the efficiency of the market but promotes a transfer of wealth from low-tension and non-large customers to large industrial customers to the detriment of the other customers.

Further, in the long run the cross subsidies must result in losses for the direct suppliers of service, the Distcos, and for the other participants of the energy chain, i.e., the generators, either private or public. Such loss is unavoidable since customers whose tariffs do not cover the system cost of providing them services are encouraged to over-consume, while those whose tariffs over-collect the cost of serving them are encouraged to use less than their efficient level of consumption.

Our proposal for the elimination of these inherent inefficiencies is to remove such undesirable effects of distorted tariffs by requiring utilities to design and implement only tariffs that are non-discriminatory and allocate costs on the basis of who imposes the costs. The minimum criterion for tariff design is that the tariff must recover the cost of service and the relevant standard for this purpose is that each class of customer covers at least its short-term marginal cost so that any incremental demand from this class does not impose additional costs on other customers. To achieve the objective of the reform in Brazil - to have market-oriented results - prices for electricity must comply with these cost of service criteria. Otherwise, the initial group of free customers, which are also the most efficient target for new entrants into the generation market, will have (inefficient) incentives to remain under regulated service. To ultimately achieve an efficient tariff, tariffs need to reflect the marginal costs of providing customers service. This is the price signal that gives proper incentives for evaluating choices among competing suppliers.
The above discussion is simply a restatement of economic fundamentals. In efficient electricity markets, the market price paid for a unit of electricity consumed is represented by the long run marginal cost of supplying that unit. This in turn must rise to the cost of entry when supply cannot satisfy incremental demand. If investing financial resources in the electricity sector is to be attractive, this cost of entry must recover the principal and interest on all debt over a period of time consistent with available financing (e.g. 10-12 years) and provide a competitive return on equity. Therefore, in efficient markets, the objective is for customers to pay the marginal cost of consuming an additional kWh whether the energy comes from an independent supplier or from its current distribution supplier. Subjecting customers to market price signals will stimulate market development. Prices will reflect the opportunity cost of incremental resources: higher prices will attract incremental investment and conversely, lower prices will postpone new capacity additions.

But, how is it possible to achieve this objective in the Brazilian context without causing a tariff shock? In other words, what is the mechanism to make tariffs reflect cost in such a way that does not suddenly increase the production costs for the currently subsidized energy intensive industries? This topic is raised in the following section.

2. TRANSITION OVER THE PHASE OUT OF THE INITIAL CONTRACTS

A review of international experience demonstrates that the elimination of cross subsidies has been neither sudden nor absolute. The phase-out of cross subsidies has been gradual, sometimes by simply holding the tariffs of those who over-pay constant while allowing subsidized tariffs to increase over time. Further, many countries retain some level of intra-class cross-subsidy, between large customers and small or between urban and rural customers. Nevertheless, the elimination of cross-subsidies, especially between classes, has universally been part of the objectives of reform aimed at guaranteeing higher levels of competition and market efficiency.

The existence of the Initial Contracts (ICs) in Brazil provides an approach for the elimination of cross subsidies in a measured but relatively short period of time. The ICs, under which the distribution companies purchase part of their electricity supply, incorporate (below-cost) tariffs that were established at the beginning of the restructuring of the sector. They are
scheduled to be stepped down over a period of four years, and the capacity represented by that phase down will be auctioned into the market. Simultaneously over those four years, the distribution companies will replace their IC capacity with purchases from the market. Thus the distribution tariff supplying the load of the high-tension customers is currently a blend of the rates from the ICs and the market price, and that blend includes lesser amounts of IC priced electricity and greater amounts of market priced electricity over the period of the phase-in.

An appropriate policy for the elimination of cross subsidies would be to reset the industrial tariffs to reflect more accurately the supply costs of the distribution company. The industrial tariff can be separated into two blocks, the first reflecting the distribution company’s purchases under the ICs, and the tail block reflecting its purchases from the market. Assuming that the prices of capacity and energy purchased on the market will be valued at their marginal costs (i.e., long run marginal cost), the proportion of industrial consumption in the tail block will gradually increase by a factor equivalent to the corresponding stepped down portion of the ICs, i.e., 25, 50, 75, 100%.

In addition, the current industrial tariff may well be below the average distribution supply costs, i.e., is both subsidized by the below-cost ICs and cross-subsidized by the low-tension customers. Rather than immediately resetting the high tension tariff to reflect the supply cost, the amount of the subsidy attributable to the cross subsidy from low tension customers could be calculated, and phased out over the same four years. In either case, by the end of the four-year phase in period, regulated industrial tariffs should reflect market prices.

By implementing this approach, cross subsidies would be eliminated by the year 2006 and the negative effects that they could cause in the sector would be eliminated in a relative short period of time. Since problems of over collection of revenues by distribution companies could occur (revenues obtained from the sale of power could be higher than the embedded revenue requirements of the companies), the excess could be credited to wires charges or be transferred to low-income customers. Since almost all the distribution companies will have their first tariff revision in the next two years, we recommend that they take this opportunity to adjust tariffs to compensatory levels in the way proposed here. This is the most appropriate time to pursue the objective of “de-cross-subsidizing” the electricity sector since distribution
concessionaires must also provide a tariff-restructuring proposal to the regulatory authority at the time of their tariff revision.

B. SECOND BEST

As we have mentioned throughout this document, policy-induced cross subsidies like those promulgated for some of the industrial users of the electricity sector in Brazil result in lack of efficient entry into the generation sector. Even aside from this undesirable effect on entry, it is always important to consider whether such pricing policies really do benefit consumers in aggregate. Unless there are particular overriding factors, prices should reflect costs and the fundamental principle is that cross subsidies are undesirable. However, although the efficient solution is to eliminate such subsidies and have cost reflective tariffs, as we pointed out in the previous section, this is not always politically feasible. In such situations, an explicit scheme to phase subsidies out might need to be an integral part of restructuring the sector. We describe this alternative in the following section

1. PROVISION OF A TRANSITION CREDIT FOR THE PERIOD OF THE INITIAL CONTRACTS

The market solution phases out the retail cross-subsidies over the same period that the Initial Contracts are stepped down and the subsidies from the generation portion of the sector disappear. Given the long standing nature of those subsidies, and, compounded by the retail cross subsidies, the beginning of the transition period may be considered too abrupt for the high-tension customers (large industrial users) to adjust their production processes and stay competitive in their domestic and international markets. It may therefore be necessary to phase in the transition period itself to give large industrial customers an opportunity to plan for the adjustment to efficient prices.

One way of phasing in the transition period in order to accommodate “the special characteristics of the large consumers,” could be to provide a cushion of a credit that initially makes the large industrial customers financially whole in relation to existing charges and then offsets for a time part of the effects of the market prices. This solution is premised on the assumption that the term “special arrangements” actually means to continue at least in part the current level of protection. In order, however, to have a viable transition, we propose that this “make whole” accommodation be phased-out over a time-bound period and we adopt the
period of the step-down of the ICs. Our suggestion consists of making high-tension customers (i.e. large industrial users) pay the long run marginal costs of electricity on a tail block of consumption comparable to the consumers’ non-IC related demand, and receive a transition credit on the fraction of load still under the ICs. The tail block would be specific to each customer and would be all consumption above the customer’s remaining IC quota in each of the years of the step-down. Thus each year, more of the large customer’s marginal consumption is exposed to the efficient price.

Under the proposed arrangement, the credit would allow the new total cost for energy purchased in the first year to be no more than the total costs prior to the IC step-down. The new total costs would have three cost components: a first block priced at the cost of the ICs discounted by a transitional credit, a middle block equivalent to energy priced at the IC contract price (i.e., the existing tariff) and a tail block priced at long run marginal costs. The transitional credit would be equivalent to the amount of reduction in energy costs for supply provided under the ICs necessary to keep the large customers whole for one year, with respect to the cost of consumption prior to the IC step-down. Customers would have the option of purchasing energy to supply its tail block either from the distribution company or the market, without forfeiting their eligibility for the credit in the first block. The credit would continue to apply in subsequent years, but each year offsetting a smaller proportion of the cost resulting from consumption exposed to market prices.

Figure 1 below illustrates this alternative. In this figure, \( Q_{IC} \) is the IC amount before any step down price for that energy, \( P_{IC} \) = the contract price for that energy, \( P_{MC} \) = the long run marginal costs of electricity and \( P_d = P_{IC} \) less the transitional credit. The area \( OP_{IC}AQ_1 \), which is the price of IC energy (i.e., the current tariff) times the quantity of energy currently consumed, i.e., the current cost of energy, must be equal to the area \( OP_dDEFBCQ_1 \) in order to keep large customers whole for the first year. \( BCQ_10.75Q_{IC} \) would correspond to the cost of the portion of energy priced at long run marginal costs and \( OP_dDEF0.75Q_{IC} \) would correspond to the cost of the energy under ICs including a discount for the transitional credit.\(^7\)

\(^7\) We have assumed that currently the standard large industrial customer consumes more than \( Q_{IC} \) and pays the current tariff (the IC price) for all consumption. In the event that this would not be the case, i.e. the large industrial user only consumes a share of the ICs, the area \( C_1CQ_1Q_{IC} \) should be subtracted in order to make (continued...)
The first advantage of the approach is that for the first year of the IC step-down, customers are kept whole relative to the pricing under the ICs. So their cost for the level of energy they currently consume, \( Q_1 \), will be equal to \( Q_1 \times P_{IC} \) as it is now. A further advantage is that while it cushions customers against the increase in tariffs as the ICs are stepped down, it exposes their marginal demand to long run marginal costs, which should increasingly provide the large industrial customers with the incentive to become more efficient. It will also provide potential entrant generators an economic opportunity to compete for this growing load, i.e., it will encourage new investment in capacity.

Figure 2 demonstrates the first step in the phase out of the ICs. In the first year (2003) the cost for the quantity exposed to marginal cost is offset by the discount in first block \((P_{IC}P_{D}P_{ED})\). In the remaining two years of the phase out of the ICs, the quantities exposed to marginal cost \((Q_1-.50Q_{IC} \text{ and } Q_1-.25Q_{IC})\) respectively, increase while the discount remains fixed, thus offsetting less and less of the exposure to marginal cost and increasing economic efficiency at each step. However, the fixed discount is fully available for the entire IC phase-out period.\(^8\)

\[ (...continued) \]

consumers whole. Therefore, \( OP_{IC}A_1Q_{IC} \) should be equal to \( OP_{D}DEA_1Q_{IC} \). In addition, \( BC_1Q_{IC}0.75Q_{IC} \) would correspond to the cost of the portion of energy priced at long run marginal costs and \( OP_{D}DEF0.75Q_{IC} \) would correspond to the cost of the energy under ICs including a discount for the “old energy transitional credit. For the purposes of this paper, we assume that large industrial users consume more than the share assigned to them in the ICs.

\(^8\) One concern voiced by some agents is whether the alternative proposed here creates a barrier to entry for new energy intensive industries. We believe that it may but the ICs themselves are, indeed, a clear and stronger barrier for new entrants. The proposed treatment of the subsidy should only be applied to current large industrial users since the rationale behind this proposal is to protect current industries from external competition.
2. LOCATION AND FUNDING FOR THE SUBSIDY DURING THE TRANSITION

a. SUBSIDY IN WIRES TARIFFS

We believe that the most appropriate location of any subsidy, whether a cross subsidy from low-tension customers or a transitional credit, is in the wires component of the distribution tariff. Wires are a monopolistic regulated industry and, therefore, are not subject to competition and so, market signals, though distorted, would not explicitly affect current or new generation. Thus, in the option of phasing out the energy subsidy currently in the ICs as described above in Section A1, by the end of the ICs, all customers face the marginal cost of generation and any remaining subsidy is in the wires tariff. Similarly, the credit described in Section B1 could be applied to the wires component of the distribution tariffs. Current and new generation entities would be able to compete for any segment of the market that is subject to competitive prices as long as the energy portion of the tariffs reflects costs. The distribution companies would not in effect be able to exclude independent generators from the market by offering energy tariffs discounted to levels at which the IPPs cannot compete. The cross-subsidy from the low-tension customers or the credit would then be reflected in or applied to the wires tariff and could be gradually phased out over some longer period of time.

b. SOURCE OF FUNDING: PAID DIRECTLY BY THE GOVERNMENT TO LARGE INDUSTRIAL USERS

It is possible, however, that the size of the large customers subsidy is too great to be captured in the wires tariff alone. In that case, the solution would be for the subsidy to be paid directly by government to the affected industries. Budgetary provisions and direct subsidies are always more efficient than cross subsidies and better preserve proper economic price signals. They avoid the negative effects of higher prices to other customer groups and the industries that serve them (e.g., residential, commercial, and small industrial consumers and appliance manufacturers), and do not affect the consumption and technology decisions of the entities receiving subsidies or the investment decisions of suppliers (the IPPs). Nor do they put at risk intermediate entities that may be forced to supply at discounted prices goods they must purchase at market prices (the distribution companies). The subsidies can also be targeted to only those firms that need the assistance through a transition to more efficient operation and can be structured to be phased out as that assistance is no longer necessary, regardless of whom
their supplier is. They can also be limited to firms that satisfy other goals of industrial policy such as job creation or exports (to the extent permitted under law).

Fundamentally, subsidies though budgetary provisions also represent the choice by society through its government to set its priorities and fund them. Budgetary allocations require a conscious decision to subsidize the energy costs of industrial consumers at the expense of other uses for public monies, and this is a public policy decision that should be weighed carefully and transparently, rather than hidden in the arcane calculations of the tariff setting process.

Budgetary provisions are most easily provided through the tax structure. In the case of Brazil, the most obvious vehicle for a reduction in corporate taxes is a reduction in the ICMS, a corporate tax with some flexibility in its rate that is collected at the state level. To the degree that the state cannot afford to provide tax relief, it can be compensated, in whole or in part, by the federal government for the lost revenue.

Unfortunately, this recommendation has two potential problems: first, the availability of resources at state or federal level to support this measure may be limited and second, the impact of this measure before the international community. We did not investigate the implication of this kind of measure with regard to the rules of the World Trade Organization but certainly we believe that it could be troublesome since the subsidy will directly benefit a group of Brazilian industries in order to make them more competitive.

c. SOURCE: ALTERNATIVE FUNDING

It is probable, therefore, that both the cross-subsidy through the distribution wires and available budgetary allocations for a credit will be insufficient to provide the desired funding for the industrial subsidy. Under these assumptions, there are two less efficient options. The cross-subsidy from low-tension customers through the energy component of the tariffs could be continued, with all the attendant disadvantages of spreading inefficient price signals to other classes and sectors of the economy. Alternatively, a surcharge could be added to the System Service Charge (SSC). This second option is more economically efficient, but less transparent and continues an unhealthy tendency to bury miscellaneous charges unrelated to the provision.
of transmission services in the SSC\textsuperscript{9}. Alternatively, the surcharge could be added to the charge proposed in the Relatório de Progresso n. 3 for the CCC and other costs that are related with the consumers’ category.

C. ALTERNATIVE SOLUTION: EXTENDED TRANSITION CREDIT

The final proposal for eliminating the current cross-subsidies consist of extending the transition credit for a period of time to be determined by the regulator. As we proposed in section B1, the transition credit could be instituted over the period of the current step down of the ICs. The difference between that proposal and this “alternative solution” is that the amount exposed to market prices (the difference between Q\textsubscript{1} and .75Q\textsubscript{IC}, .5Q\textsubscript{IC}, .25Q\textsubscript{IC} in 2003, 2004, 2005 respectively) could be applicable during a longer time frame deemed appropriate by the regulator. Conceptually, the gradual application of marginal cost to increasing amounts of consumption does not have to be coincident with the step down of the ICs, although if it is not, funding for the difference between the cost of the ICs and the charges paid by large industrial customers would have to be obtained from another source. Again, we would re-emphasize, that any extension of the transition period only exacerbates the more undesirable effects cross subsidies produce in the efficiency of the electricity sector and delays the point in time when Brazilian industries would become globally competitive.

As in the case of phasing down cross subsidies based on the initial contracts, the amount of the subsidy attributable to the cross subsidy from the low-tension customers should be calculated, and phased out over the same period of time the alternative proposed here would take. In any event, the period should be predefined as soon as possible so that all consumers can begin to adjust to the anticipated pricing, and by the end of the period selected for the provision of the extended transition credit, regulated industrial tariffs should be cost reflective.

\textsuperscript{9} A new version of the Brazilian market rules is under public audience. Companies may use this opportunity to include this charge in the SSC.
VI. CONCLUSIONS AND RECOMMENDATIONS

The GoB undertook an important task when it decided to implement a set of measures to revitalize the Brazilian electricity market. Relatório de Progresso no. 2 and 3 are a significant step towards such revitalization. Among the measures analyzed in those documents, this paper analyzed the topics of deverticalization, tariff realignment, bilateral contracting, and promotion of free customers. We described the problems that the measures intend to address and outlined the issues that the measures fail to address. This was the basis for assessing the consistency of these measures with others in the Relatório and with the objective of the reform.

While the above measures form a consistent approach in the Relatório de Progresso no. 2, they are no longer internally consistent in the latest Relatório. While some of the proposals expand on the topics of Relatório no. 2 and develop with greater detail the measures needed to address those problems – bi-lateral contracting, deverticalization, cross participation, limits to self dealing – others have been modified by omission or commission. The tariff realignment measure constitutes an example of such concerns. Contrary to raising and addressing the problems of cross subsidization and its implications for the functioning and competitiveness of the market, the proposal is oriented more towards establishing a price mechanism, implicitly via cross-subsidies, that should reflect the special characteristics of the large consumers in order not to affect the industrial competitiveness. We have focused our analysis on the effects and impacts of cross subsidization on the development of a market-based Brazilian electricity sector.

We have shown that cross subsidies discourage competition and entry. Unless there are overriding factors, prices should always reflect costs. The objectives of any reform based on market-oriented principles are to correct inefficiencies to produce efficient outcomes. Cross subsidies must be eliminated to avoid uneconomic incentives that are not consistent with competitive markets.

Any solution to the problem of cross subsidies and their elimination should have two characteristics. First, it should be a time bound commitment, preferably enshrined in government legislation based on the principles of the reform. No one should assume that retail electricity tariffs will be mis-priced for any foreseeable future. All participants, the customers
that are subsidized, those that provide the subsidy and those that are affected by the collateral damage, need a map that shows the nature of the tariffs at the destination and the road that will take the sector from here to there. All participants need to be able to plan and to avoid making long-term decisions during the transition that will prove inefficient in the longer-term reality.

Second, subsidies and cross subsidies are tariff matters, and as such they should be submitted to and approved by ANEEL as part of the upcoming tariff proceedings. During the coming two years, all but one distribution company will be filing their tariff proposals with their regulator and they should take this opportunity to put forward a plan to adjust their tariffs to compensatory levels and, over some reasonable period, to remove the distorted price signals from their tariffs.

We believe that the GoB should implement sustainable and economic alternatives to encourage efficient entry into the generation sector. Subjecting customers to market price signals will stimulate market development. The elimination of cross subsidies is a way to push customers towards market-oriented outcomes as intended in the reform of the Brazilian electricity sector. The only sustainable economic solution, the only economic alternative in the short term that guarantees the desired long-term expansion of the Brazilian electricity sector, is eliminating cross-subsidies by stepping them down as ICs are phased out.

However, the GoB has signaled that there are industry sensitive cases that still need special attention in terms of electricity pricing. An alternative solution to eliminate the problems caused by cross subsidies that does least damage to efficiency is to make large industrial customers face long-term marginal costs for a portion of their consumption while receiving an offsetting credit for their “old” energy consumed, equivalent to the increased cost of the portion exposed to market prices in the first year. Effectively, this measure would keep large industrial customers financially whole altogether for a year while they adapt their plans to a more market oriented environment; for the remainder of the period, the credit would continue to apply, offsetting a gradually decreasing proportion of the effect of market prices. Even though we believe that this alternative is not the correct economic answer to the problem of cross subsidization in Brazil, at least it forces customers to face market prices and become more efficient and provides an economic opportunity to current and new generators to compete for the freed-up load. Issues such as the location and sources of the subsidy are still a crucial issue.
In any circumstance, we believe that they should not be put into the “energy” part of the charge since this would create barriers to current and future generation. We believe that if subsidies are going to be kept in the electricity industry, they should be located in the wires tariffs due to the monopolistic nature of that business. With regard to funding, if the size of the subsidy cannot be captured in the wires tariffs alone, governmental budgetary provisions are the appropriate alternative solution. Other alternatives are less efficient and should be adopted as a last resort.

As we pointed out in the previous section, an extension beyond 2006 of the transition credit is our “bottom of the barrel” proposal but we believe that its implementation may exacerbate the undesirable effects of cross subsidies. As shown in previous reports done by NERA, longer transition periods only increase uncertainty among players and delay the expected outcomes of a market oriented model.