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# Environmental Licensing for Hydroelectric Projects in Brazil



A Contribution to the Debate

Summary Report

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**Environmental Licensing for  
Hydroelectric Projects in Brazil:  
*A Contribution to the Debate***  
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## ACRONYMS AND ABBREVIATIONS

ANA	National Water Agency (Agência Nacional de Águas)
ANEEL	National Electricity Agency (Agência Nacional de Energia Elétrica)
CONAMA	National Environment Council (Conselho Nacional do Meio Ambiente)
CNMP	National Council of the Public Prosecutor's Office (Conselho Nacional do Ministério Público)
DILIC	Directorate for Licensing - IBAMA
EIA/RIMA	Environmental Impact Assessment/Environmental Impact Report
Eletrobrás	Centrais Elétricas Brasileiras S.A. – Brazil's Electricity Company
EPE	Energy Research Company (Empresa de Pesquisa Energética)
FUNAI	National Foundation of Indigenous Peoples (Fundação Nacional do Índio)
IBAMA	Brazilian Institute for the Environment and Natural Renewable Resources
IEA	Integrated Environmental Assessment
IL	Installation License
MMA	Ministry of Environment
MME	Ministry of Mines and Energy
MP	Public Prosecutor's Office (Ministério Público)
OP	Operation License
PL	Preliminary License
PPA	Power Purchase Agreement
PPP	Plans, Programs and Policies
SEA	Strategic Environmental Assessment
SISNAMA	National Environment System
SRH	Secretariat for Water Resources of the Ministry of Environment
TAC	Conduct Adjustment Term
TOR	Terms of Reference
UCs	Conservation Units (Unidades de Conservação)
UHE	Hydropower plants (Usinas Hidrelétricas)

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<sup>1</sup> The case studies and the legal study were commissioned directly by the MME.

<sup>2</sup> The Technical Annexes contain a list of all contacts made during the preparation of the report.



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**INDEX**

I.	MAIN MESSAGES.....	9
II.	THE PURPOSE AND MOTIVATION FOR THIS STUDY.....	13
III.	THE CHALLENGE OF EXPANDING BRAZIL'S ELECTRICITY SUPPLY.....	15
IV.	MAIN CONCLUSIONS	
	A. Legal and regulatory aspects.....	19
	B. Technical and institutional aspects of licensing.....	22
	C. The costs of environmental licensing of hydropower developments .....	25
V.	MAIN RECOMMENDATIONS.....	31

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## I. MAIN MESSAGES

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1. It is expected that by 2015 hydropower will provide around 75% of Brazil's electricity. Hydropower plants (UHEs) will therefore continue to play a predominant role in Brazil's energy sector. Much of the country's unexplored hydropower potential is in the environmentally-sensitive Amazon region. The environmental licensing of hydropower projects in Brazil is perceived as a major obstacle for the expansion of the country's electricity generation capacity. Brazil's economic growth could be compromised if the country is unable to expand capacity in a predictable manner, and within a reasonable time frame.
2. This study examines the legal and institutional frameworks involved in the environmental licensing of hydropower developments. As such, it is intended as a contribution to the ongoing debate on the issue. A number of selected case studies are presented together with an assessment of the transaction costs of the licensing processes. In addition, the study also draws comparisons with relevant international practices.
3. Most of the problems associated with environmental licensing in Brazil occur at the first stage of a three-step process - the preliminary licensing stage. Major problems include the lack of adequate planning at government level, a lack of clarity about which level of government (federal or state) possesses the legal authority to issue environmental licenses, and delays in issuing the terms of reference (TORs) for the environmental impact assessments (EIA) required by law. Other problems include the poor quality of the EIAs submitted by project proponents, the subsequent uneven evaluation of the EIAs (by the Government), the lack of a suitable dispute resolution system, the absence of comprehensive rules for social compensation for populations affected by hydropower projects, and the shortage of qualified social development specialists within the Government's federal environmental agency.
4. Social, environmental and regulatory issues are not the only factors that have impeded the expansion of energy production by the private sector. There is disagreement over the correct method for sharing the hydrologic, geologic and other risks involved in major hydropower development projects involving the private and public sectors. Moreover, there has been limited hydrographic basin planning ('river basins'), inventory and pre-feasibility studies over the past decade. A further consideration is the potential need to mitigate foreign exchange fluctuations at project inception. Currently, these financial risks are negligible but could well become a major factor in the future. Investors are also concerned about the increase in electricity transmission costs and how these could be affected by the use of remote plants located in the Amazon region. The Government's current system of bidding out future generation capacity --widely regarded as a positive development in Brazil--needs greater transparency. Finally, investors are anxious to have a strong regulatory agency in place, backed by a legal framework that ultimately guarantees contract compliance.
5. A modern, predictable and transparent regulatory framework is needed to bring about a greater level of predictability to the environmental licensing process, and the broader regulatory framework. In order to achieve this goal, the following is needed: (i) to improve and expand the database on hydropower potential at the river basin level and to incorporate environmental factors into energy sector planning; (ii) to reduce the many uncertainties involved in the socio-environmental licensing process; and (iii) to continuously improve energy sector regulation.

6. An assessment of the time spent complying with the various steps of the environmental licensing process indicates that the key question is how to substantially reduce the time that it takes to issue the Terms of Reference for the EIAs. Ideally it should be possible to reduce this from one year (at present) to about three months.

7. Public prosecutors enjoy virtually unlimited autonomy in Brazil. This power has no parallel in any of the other countries examined in this study and plays an important role in the lack of predictability and timeliness of the environmental licensing process. This allows prosecutors to be involved in technical or administrative acts related to the environment, which would otherwise fall under the mandate of the environmental agency.

8. Two of the main conclusions<sup>3</sup> that emerge from this study are particularly noteworthy. First, the costs of dealing with environmental and social issues in the effort to develop hydropower in Brazil represent 12% of the total project costs. Second, the costs arising from regulatory and contractual problems account for approximately 7.5% of total costs (not including environmental licensing). While it is clear that the social and environmental costs can easily be absorbed, what is really needed is a far greater degree of predictability in the regulatory regime, particularly the parts of it which impact directly on environmental licensing.

9. This study does not seek to suggest radical changes to Brazil's environmental licensing system. Reform of this complex and multifaceted system (with its long legal and institutional history) does not depend on a single, straightforward solution. Rather a comprehensive national debate on the energy issue and its implications for the country's environmental heritage is essential and is in fact underway. The Brazilian Government has begun to address several of the points mentioned above.

The study's main recommendations are as follows:<sup>4</sup>

- (a) The need for formulating and adopting a Complementary Law to clarify the responsibilities of the Federal Administration (the 'Union') and of the States with regards to environmental licensing.
- (b) The adoption of dispute resolution mechanisms to be employed in the environmental licensing process, especially in the case of large hydropower projects, in order to minimize the need for the Judicial Branch to become involved in issues that could be resolved as part of the environmental licensing administrative process.
- (c) The adoption of a process which would make it possible for the current licensing process, involving the issuance of Preliminary Licenses for individual projects, to be applied to a larger set of projects in the same river basin. The Preliminary License should be based on the analysis conducted at the planning stage as a result of an adjusted Basin Management Plan, and should contain the key strategic environmental assessment principles currently being tested in Brazil. A more focused EIA/RIMA could then be an essential requirement for obtaining the Installation License. The EIA/RIMA could then address issues related to the actual engineering design and focus primarily on the prevention and mitigation of the potential impacts of the

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<sup>3</sup> See Chapter V of this report and Chapter VII of the main report.

<sup>4</sup> Id.

specific project. In this manner, there would be no need to revisit the broader issues related to the social and environmental viability.

- (d) The EIA process should be strengthened by: (a) the preparation of Terms of Reference by a multidisciplinary team. These TORs should draw on a preliminary analysis of the proposed project and its location, using secondary information and involving at least one field visit; (b) the preparation of an operations manual by a multisectoral team comprised of experienced licensing professionals and experts in different fields of environmental expertise; and (c) the provision of technical capacity building and the broadening of the professional experience of SISNAMA and private sector staff involved in the licensing process.
- (e) A broad consensus now exists which confirms the need to make Brazil's energy sector planning capacity more efficient. This process, already underway in the Energy Research Company (Empresa de Pesquisa Energética –EPE), will include a broad set of issues and options-economic, financial, technical, environmental and social. This would mean carefully reviewing all options, rather than ruling "yes" or "no" on a specific proposal.



## II. THE PURPOSE AND MOTIVATION FOR THIS STUDY

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10. *The environmental licensing of hydropower projects in Brazil is perceived as a major obstacle to the expansion of Brazil's power generation capabilities.* Licensing needs to be completed in a predictable manner, and within a reasonable timeframe. Not expanding the country's energy capacity would further pose a serious threat to Brazil's future economic growth. This situation derives from a partial disconnect between the regulatory frameworks for the environmental and energy sectors. While the rules governing environmental<sup>5</sup> have remained basically unchanged since they were introduced in the late 1980s, the electricity sector has experienced 10 years of major change. Furthermore, the environmental agencies have to date failed to significantly bolster their institutional capacity. The centralized, monopolized and government-controlled system has gradually given way to an internationally-accepted system based on promoting regulation, competition and a greater level of private sector participation.

11. *This study<sup>6</sup> is a contribution towards the current debate on environmental licensing in Brazil.* The World Bank has contributed to this debate through dialogue and a range of projects and activities as a means to contribute to the Brazilian government's own efforts to improve the country's business environment: environmental licensing plays an important role in this process. The introduction of a more efficient and effective environmental licensing system is anxiously awaited by the relevant sectors and practitioners as the current system is seen as an obstacle to economic development, but at the same time, the Government's main environmental management tool for ensuring environmental quality throughout Brazil. The World Bank's efforts in this respect are fully in step with those of the Ministry of Mines and Energy (MME), the National Electricity Agency (ANEEL), the Ministry of the Environment (MMA), the Brazilian Institute for the Environment and Natural Renewable Resources (IBAMA) and the National Environment Council (CONAMA).

12. *The study analyzes the environmental licensing of the electricity sector and, more specifically, of the construction of hydropower plants of interest to the Federal Government.* The suggestions outlined in this report will focus on how to increase the efficiency of the licensing process and to integrate it more effectively with other planning tools.

13. *The study examines the legal and institutional framework for the environmental licensing of hydroelectric projects. It includes selected case studies, an assessment of the transaction costs involved in the licensing process, and draws comparisons with international practices where appropriate.<sup>7</sup>* The study seeks to encourage debate among the players involved in the licensing process and to contribute to enhancing the efficiency of the system through the analysis and evaluation of the following:

- ⇒ The legal and institutional frameworks governing environmental licensing;
- ⇒ The costs of the environmental licensing process, including the additional costs related to the

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<sup>5</sup> For environmental licensing purposes in Brazil the expression "environmental" also includes the social impacts generated by the process.

<sup>6</sup> The study was organized in three volumes: the present Summary Report, the Main Report and the Technical Annexes. These may be accessed at [www.bancomundial.org.br](http://www.bancomundial.org.br) or may be requested by email to [aninio@worldbank.org](mailto:aninio@worldbank.org).

<sup>7</sup> A direct comparison with licensing processes in other countries is not entirely possible as specific licensing rules differ depending on historical, institutional and legal traditions.

- delay or interruption of works, environmental and social compensation etc;
- ⇒ Environmental and social risks vis-à-vis other problems faced by the Brazilian hydropower sector in its efforts to meet market demand for electricity;
  - ⇒ The provision of incentives for interested parties as part of the effort to explain the effective implementation of the licensing process; and
  - ⇒ Mechanisms targeted at integrating environmental licensing with other public policies.

### III. THE CHALLENGE OF EXPANDING BRAZIL'S ELECTRICITY SUPPLY

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14. *The Brazilian electricity sector today serves around 60 million residential and commercial customers and represents US\$20 billion in revenues.* The sector possesses a modern institutional structure, encompassing several hundred public and private companies. The sector receives both national and international investment. Official projections for the next decade point to electricity demand increasing annually by 4.4%, which is slightly higher than the growth rate of the economy as a whole (4.2% p.a.). Energy consumption is expected to reach an average of 600 TWh by 2015. Meeting this demand is estimated to require an additional 3000 MW per year in base generation capacity, and investments on the order of around US\$40 billion.

15. *Hydropower plants represent 85% of the installed capacity of Brazil's interconnected energy grid.* The remaining 15% comes from thermal plants running mainly on natural gas, coal, nuclear energy and diesel oil. Brazil's electricity generation capacity is 105 GW, of which 92 GW are connected to the national transmission grid, generating around 400 TWh per year.

16. *It is forecast that hydropower plants will continue to play a predominant, but decreasing, role in the Brazilian energy matrix. By 2015, it is expected that hydropower will account for 73% of Brazil's energy capacity.* Brazil's economically-viable hydropower potential is estimated at 260 GW, of which only 30% is either operational or under construction. Brazil's North Region is home to an estimated 43% of the country's viable hydropower potential, a fact which implies the need for even greater concern for environmental aspects and the careful treatment of indigenous communities. Renewable energy sources and energy conservation are expected to play a small-but growing-role in efforts to supply the market in this region.

17. Up to the 1990s, the Government controlled Brazil's electricity sector. Despite the Government's success in expanding the sector throughout the 1970s, the state-led model virtually collapsed the following decade. *Heavily subsidized tariffs led to an accumulated deficit in the sector of approximately US\$ 35 billion. Thus, financial rather than social and environmental problems were the main impediment to the sector's expansion at that time. Environmental concerns were already emerging on the electricity sector's agenda related to expansion and operation.* Eletrobrás lead the adoption of the environmental assessment process, and assembled a core group of competent environmental experts.

18. **The reforms in the 1990s attracted new investments and lead to efficiency improvements in the electricity sector.** Sector reforms were embodied in Federal Laws 8987/95 and 9074/95 (particularly the latter, focused exclusively on the electricity sector). These two laws established competition in the granting of sector concessions, together with a framework to encourage an influx of Brazilian and international private capital into the sector. The prospect of a clear and consistent regulatory framework (or at least the perception of one) gave investors the necessary confidence to put money into the electricity sector, which in due course attracted US\$60 billion in private capital for expanding capacity and improving service delivery.

19. *The merits of the reform were seriously questioned for the first time in 2001, when Brazil faced a major energy crisis caused among other things by a drought affecting practically the entire country.* The Brazilian Government, in response to this crisis, made unprecedented efforts to review



the main regulatory and institutional aspects of the reforms that had been undertaken to date in the electricity sector. The ex-post analysis of this crisis singled out environmental licensing as one of the factors contributing to investment lag and the energy shortage.

20. The reform process continued under the newly elected government of President Lula, beginning in 2003. Some corrections were necessary in the wake of the 2001 crisis. One of the highlights of the new (2004) model was the introduction of 'auctions' as a basic means for distributors to purchase generating capacity. *This initiative has over recent years contributed to enhance the sector's competitiveness. While initial expectations were that hydropower plants would predominate at the auctions, the government was unable to obtain the environmental licenses for half the planned hydropower plants.<sup>8</sup> Subsequently, these projects were excluded from the auctions.* This gap was filled by thermal plants, including diesel generation power plants; licenses for these more expensive, and more polluting technologies were easier to obtain. Sixty-nine percent of the total power (3,330 MW) under concessions in the December 2005 auction was energy from thermal plants. These plants charge up to 30% more than the price for electricity from standard hydropower plants. It is clear that hydropower was a clear loser in this particular auction, due largely to the complex environmental licensing process.

21. *The environmental licensing process has caused additional difficulties for Brazil to exploit more fully the hydropower potential of the Amazon Region.* Plans for constructing hydropower plants in the Amazon region have received strong support from many but continue to face powerful opposition from some sectors of civil society. Perceptions of the electricity sector in the Amazon have been negatively affected by the mixed experiences with the previous generation of hydropower plants. Although some of these plants were viewed as successful, others (particularly the Balbina and Samuel) suffered from serious social and environmental problems. Outside the Amazon region, and especially in the Southeast, the environmental licensing process of hydropower plants has also been slow and bureaucratic. Licensing problems have increased over the past decade by a shortage of planning with respect to the river basins and a lack of appropriate inventory and pre-feasibility studies. Two factors are primarily responsible: (i) prior to the advent of the market model, Eletrobrás was responsible for planning and studies and no longer performs this function; and (ii) in fiscally-tight years the Federal Government systematically cut back planning and project development budgets which negatively impacted the country's infrastructure.

Acknowledging this problem, the government established EPE in 2004. EPE's mandate is to plan and design projects in the energy sector. There is a strong consensus that it will take several more years until EPE is able to regroup and reactivate the planning and project design capacity vital for developing sound energy projects.<sup>9</sup>

22. *Social and environmental problems, together with regulation, are not the only factors that have restricted expansion of energy generation by the private sector.* A lack of consensus exists regarding the most appropriate formula to be used for sharing the hydrologic, geologic and other risks involved in major hydropower developments between the private and public sector. Furthermore, potential investors point to the excessive regulatory uncertainties which lead them to demand higher rates of return than they would expect to earn in well-regulated countries. The funding of projects also involves establishing mechanisms for mitigating potential foreign exchange fluctuations. At

<sup>8</sup> Such as Dardanelos, Mauá, Cambuci and Barra do Pomba.

<sup>9</sup> It is estimated that the first inventories will be concluded at the end of 2008, with new projects to be submitted to the energy auctions scheduled for 2009 (operational in 2014).

present these risks are negligible but could well become more significant in the future. Investors are also concerned about the financial impacts of high transmission costs involved in bringing electricity from remote places in the Amazon. The auction process, while widely regarded as a positive development, needs additional improvements to render it more transparent. Finally, investors expect a strong regulatory agency, as well a legal framework to ensure contract compliance.

**23.** *The dearth of medium-term energy alternatives, energy security issues and the effects of global warming make it imperative to mobilize Brazil's substantial hydropower potential, much of which is in the Amazon.* Brazil needs to be able to exploit this potential in an efficient and socially-responsible manner. Administrative and decision-making shortcomings associated with environmental licensing policies reduce the opportunities for attracting investments to the sector and have a negative financial impact on all Brazilian consumers - both industrial and individual household users. Social and environmental risks, whether related to problems incurred in obtaining the three obligatory licenses or to unforeseen mitigatory costs, also obviously generate risks for investors, thereby occasioning higher tariffs for consumers. The fact is that irrespective of origin, higher risks mean higher yield expectations. All in all, the uncertainties enshrined in the regulatory regime boost the costs of energy for Brazilian society in general.

**24.** *There is a widespread consensus that over the next ten years hydropower will continue to play a major role in the expansion of Brazil's energy sector. Environmental licensing practices and procedures need to be improved so to ensure that carbon-emitting thermal energy sources do not displace cleaner hydropower.* Investors normally prefer to invest where regulatory frameworks are predictable. There is an urgent need to develop a more modern, transparent and broader regulatory framework. Such a framework should be capable of bringing a greater predictability in environmental licensing which, if properly managed, could ultimately benefit Brazil's entire population with lower energy costs. To achieve these objectives, three initiatives are called for: (i) to upgrade and expand the database on hydropower potential at the river basin level by incorporating environmental factors into sector planning; (ii) to minimize the many uncertainties involved in the socio-environmental aspects of the licensing process; and (iii) to make efforts to constantly improve regulation of the sector.



## IV. MAIN CONCLUSIONS

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### A. *The Legal and Regulatory Aspects*

25. *The combination of regulatory uncertainties arising from the environmental legal framework and (to a lesser extent) from the legal framework governing the energy sector, represents substantial risks for potential investors.* Investors are obliged to put a price on this risk and pass on the costs to consumers. The Brazilian Electricity Regulator (ANEEL) estimates that investors are prepared to invest in electricity generation only when rates of return are approximately 15%. This is almost double the rate of return of well-regulated countries such as Chile. The weaknesses inherent in the energy sector's legal framework, notwithstanding the progress achieved over the last ten years, have been addressed above. This section of the report examines the legal and regulatory aspects of environmental licensing.<sup>10</sup> *It is worth noting that the legal framework governing environmental licensing has not undergone substantial change since the 1980s: the three-stage licensing procedure, still intact, does not necessarily serve the public good, nor does it protect the environment or benefit the affected population.*

26. *Brazil is one of the very few countries (if not the only one) to employ a three-stage process (Preliminary License, Installation License and Operating License), with separate procedures for granting licenses at all three stages. This procedure allows or contributes to transferring, restarting or revisiting old disputes during the three phases. Furthermore, it generates much uncertainty, lengthy delays and high transaction costs.*

27. The National Environmental Policy stipulates the need for environmental licensing of potentially polluting activities. This provision has attracted a great deal of attention from the public authorities over the past 26 years, particularly with regards to large scale investments. The Federal Constitution<sup>11</sup> established that licensing must always be preceded by an Environmental Impact Assessment (EIA) and a corresponding Environmental Impact Report (RIMA) whenever works or activities can potentially cause significant environmental impact. Federal Decree No. 99274/90, complemented by CONAMA Resolution n° 237/97, set forth the three-stage process for the issuing of licenses as follows:

- a) **A Preliminary License (LP)** is granted during the preliminary planning stage of a project for a maximum five-year term. The license signifies approval of the location and design of the project, certifies its environmental feasibility and establishes the basic requirements and conditions to be complied with during subsequent stages of implementation.
- b) The **Installation License (IL)** authorizes the installation of the development in accordance with the specifications contained in the approved plans, programs and projects, including environmental mitigation provisions and other conditions.
- c) The **Operating License (OL)** authorizes operation of the development in accordance with environmental mitigation measures and operating requirements upon confirmation that the

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<sup>10</sup> This study takes into account the legislative updates until Aug 31, 2007.

<sup>11</sup> CONAMA Resolution N° 001/86 mandates that the activities that require an EIA/RIMA on account of their environmentally polluting potential, shall include *hydraulic works needed for exploiting water resources - e.g. dams for hydropower purposes of over 10 MW* - works involving the rectification of water courses, two-lane (or more) highways, railways, ports and ore, oil or chemical terminals etc.

previous licensing conditions were met. The Operating License can vary from 4-10 years and is renewable within the legal timeframe established by the competent environment agency.

**28.** *The licensing process offers few opportunities for dispute resolution. As a result, disputes related to environmental licensing tend to proliferate and are rarely resolved. This has led to a widespread perception that excessive environmental regulation exists in Brazil.* The absence of regular revisions to the environmental licensing rules has led to an increase in political and social disputes; these disputes have created serious complications and delays for infrastructure projects. Moreover, these projects face overlapping environmental jurisdictions at the Federal and State level, which is compounded by the fragmented nature of current Brazilian environmental licensing legislation. The legal framework itself is often at odds with sectoral legislation and lacks a strategic focus. This means that energy projects are forced to confront a number of uncertainties that should be dealt with long before the beginning of the specific project-related environmental licensing process. The lack of comprehensive sectoral or thematic rules—for instance, on social compensation—often obliges the developers to resolve problems that have little to do with the potential social or environmental impact of the proposed development in an attempt to reduce the potential for conflicts. The environmental licensing process addresses ‘social activities’ which have no bearing on environmental impacts per se. Examples of this include investments by municipal governments in the construction or surfacing of roads in areas far from the main development, and social actions targeted at populations totally unaffected by the proposed scheme (distribution of food baskets for the poor, provision of healthcare facilities, construction of schools, etc).

**29.** *Interviews with those involved in the environmental licensing process for hydropower developments reveal that licensing agency employees fear that penalties may be imposed under the Environmental Crimes Act (Lei de Crimes Ambientais) (Federal Law Nº 9605/98) and the Administrative Improbability Act (Lei de Improbidade Administrativa) (Federal Law nº 8429/92).* These laws, which have precedents in few (if any) other countries, renders officials (i.e. the licensing agent), personally and criminally liable, even when he or she acts in good faith in complex circumstances. This obviously generates risk averse behavior among those responsible for issuing licenses, with a focus on possible errors for their actions (and none on errors of omission). This has made it difficult for officials to give correct responses to legitimate requests for information, inducing them to be overcautious when dealing with analytical and licensing-granting procedures. The box below contains an account of the recently published Provisionary Measure No. 366/07, which eventually became Federal Law No. 11.516/07. This law seeks to modify the technical, administrative and judicial responsibilities entailing the issuing of environmental licenses.

Provisionary Measure (PM) No. 366, published on April 26, 2007, provides for the establishment of the Chico Mendes Institute as a government agency (autarquia) linked to the Ministry of the Environment. The objective of this measure was to improve the licensing process. A proposal was submitted for inclusion of a new article to address the technical, administrative and legal responsibilities regarding the content of any conclusive technical opinion connected with the issuance of an environmental license by IBAMA. The exclusive transfer of this responsibility to the collegiate body, within the context of IBAMA, represents an important measure taken for de-personalizing technical legal opinions essential to the issuing of licenses. This measure, would penalize the Institute rather than individual technical staff members. It was intended for application to environmental licensing procedures and given regulatory status. Another important proposal in the context of this Provisional Measure was to make public agencies in charge of environmental licensing at the different levels of government (federal, state and municipal) responsible for establishing deadlines for receiving public comments, preparing legal and technical opinions, and issuing of environmental licenses.

On June 12, 2007, the final text of PM No. 366/07 was approved by the Federal Chamber of Deputies under Conversion Bill No. 19/07. On June 14, the measure was submitted for consideration by the Federal Senate. On June 18, the Chairman

of the National Congress extended the validity of the PM for an additional 60 days commencing 26 June 2007 with Act No. 40/06. On August 28, 2007, the PM was made Federal Law No.11516. This law stipulated that technical, administrative and legal responsibility for the content of a conclusive technical opinion concerning the issuance of a preliminary environmental license by IBAMA resides exclusively and legally with IBAMA's collegiate body.

30. *The Public Prosecutor's Office (Ministério Público) plays a major role in Brazil's environmental system. Of all the players involved in the environmental licensing process the MP possesses the best educated staff, significant resources and a broad mandate. The MP has not employed its resources to solve problems but has instead come to represent an additional and controversial impediment to the environmental licensing of major developments, especially hydropower plants.* The 1988 Federal Constitution granted the Public Prosecutor's Office functional, material and technical powers that by far exceeded those of other of line agencies, and including the Judiciary. Data provided by our interviewees, including members of the Federal Public Prosecutor's Office and the São Paulo State Public Prosecutor's Office, reveal that prosecutors have a broad mandate to influence issues that do not fall directly or explicitly into the Public Prosecutor's legal or technical mandate, such as: (i) defining the national energy matrix; (ii) the territorial organization of the energy generation system; (iii) establishment of regional economic development targets and the structuring of the same in response to energy demand; (iv) establishment of economic and environmental priorities; and (v) impact assessments of these priorities. The Public Prosecutors' actions, and their natural inclination to use judicial measures generate frequent disputes within the licensing process.

31. The virtual total autonomy of members of the Public Prosecutor's Office is a key factor when examining the implementation of the environmental licensing process in Brazil. In other countries public prosecutors do not operate in such a manner. Even in the United States, where the accountability system is considered to be robust, the situation is significantly different. The Attorney-General is appointed by the President and approved by the Senate, and is subject to dismissal by the President himself. The Attorney-General heads 94 'district' US Attorneys who are appointed in the same manner and are also subject to dismissal at will. All these have authority to appoint and dismiss their assistants (Assistant US Attorneys-General and Assistant US Attorneys, respectively) who are the equivalent of Brazil's Federal Public Prosecutors. In France, the Public Prosecutor's Office is based on a hierarchical structure and incorporated in the Judicial Branch. The French Minister of Justice has the power to impose disciplinary sanctions on the PPO's members, which can include dismissal from office pursuant to the issuance of an advisory opinion by the Higher Magistracy Council. This Council has five members: one judge, one Councilor of State (elected by the General Assembly of the State Council) and three respected experts who do not represent either Parliament or the Judiciary and are appointed by the President of the Republic, the President of the National Assembly and the President of the Senate. Finally, in Italy the Public Prosecutor's Office is part of the Magistracy, reporting directly to the Higher Magistracy Council. The Italian Constitution rules that this Council must be chaired by the President of the Republic. Its membership comprises 20 members of the Magistracy and 10 members elected by Parliament from among professors and lawyers. Its attributions include the power to apply sanctions ranging from warnings to dismissal. A disciplinary procedure can be initiated either by the Italian Attorney-General or by the Minister of Justice himself.

32. *The above examples show that while a public body may have autonomous status this does not signal that it is free from hierarchical or external control in accordance with the powers conferred by the Constitution.* External control on its activities would ensure that the MP would take appropriate and rapid action focused on prioritizing the legal aspects related to the environmental

licensing process, and would not be involved in the technical and administrative matters that fall exclusively under the mandate of the environmental agency. The unfettered autonomy enjoyed by individual public prosecutors in Brazil is without parallel anywhere in the world. This autonomy is a major impediment which serves to constrict and delay the environmental licensing process.

### *B. The technical and institutional aspects of licensing*

33. ***Technical Aspects.*** *Four case studies of hydropower plants were undertaken for purposes of this study.<sup>12</sup> In all four cases the licensing processes played an essential role in maintaining and, in some cases, improving the project's environmental quality through the adoption of impact mitigation measures.* Four basic questions however merit attention. These revolve around the need to boost the efficiency and reduce the time spent on the environmental licensing process:

- (a) ***The low quality of the Terms of Reference and RIMAs.*** In the cases studied, the TORs that were intended to guide the studies prior to preparation of the EIA/RIMA were too generic, being applicable to different biomes, resource uses, and types of settlements, as well as to different hydropower plant designs (e.g. run-of-the-river versus storage reservoirs). There were also major omissions such as the failure to gauge the potential impacts on priority conservation areas (Ipueiras case study), on ecological corridors in conservation units (Itumirim case study) or on the survival of threatened species (Aimorés case study). Because these important issues were not addressed in the EIA, they surfaced *only after the RIMA had been submitted to IBAMA*, which led to a number of requests for supplementary information causes delays. *Moreover, in all the cases the initial EIA/RIMA submitted were incomplete and/or inaccurate, or differed from the Terms of Reference.*
- (b) ***The lack of information:*** The locations proposed for Itumirim and Ipueiras are areas with relatively small populations. There was lack of technical-scientific information on the biological and physical environment. This creates additional work for a developer in assembling and processing a large amount of field data over a short period of time. Analyses such as this are bound to be incomplete. As a result the licensing body often resorts to the precautionary principle established by the 1992 Convention on Biological Diversity (and thereby prohibits the proposed activity).<sup>13</sup> The application of this precautionary principle poses major problems since it focuses only on the costs rather than the benefits of the proposed action. Furthermore, it also fails to take into account the costs and benefits of not proceeding with the proposed action.
- (c) ***Inadequate communication between the relevant agencies:*** A key issue in the Itumirim case study is the lack of information about the size of the buffer zone for the Emu National Park. This makes it difficult to gain an objective assessment of the scheme's impact upon the Park and its biodiversity. The buffer zone, as well as other factors relevant to the management of flora and fauna, should be defined and provided by the Park's Management Plan. This plan was not completed at the time of the licensing request. Preparation of the plan at that time

<sup>12</sup> The Aimorés, Ipueiras, São Salvador and Itumirim UHEs. For detailed description and analysis see Chapter V, Volume I, Main report and Annex 2, Volume III, (Technical Annexes).

<sup>13</sup> In its introduction, the Convention of Biological Diversity states that "where there is a threat of a significant reduction or loss of biological diversity, the absence of absolute scientific certainty should not be used as an excuse for postponing measures to avoid or minimize such threat."

fell under the responsibility of another IBAMA directorate. The priority conservation areas defined by Decree 5092/04 needed to be properly studied in order to identify the genuinely important areas and subsequently design and establish Conservation Units. Actions that could positively contribute to the licensing process have not been prioritized in either of these two cases. As a result, a disconnect exists between the need to provide relevant information to a potential bidder with respect to the license and the implementation of a key government priority undergoing the same process (in this case, the management plan for the park).

34. Problems have also been observed in the flow of information between the various agencies involved in the licensing process. In the case of Aimorés, IBAMA accepted a proposal concerning the Parque Estadual de Sete Salões, which involved a developer constructing the park as part of an 'environmental compensation measure'. However, during the process FUNAI made a counterclaim—the first time that provided an opinion on the area under dispute- that the area belonged to the Krenak indigenous tribe. If it were designated an Indian reserve in accordance with applicable Federal legislation, it would not be eligible for environmental compensation funds.

35. Information flow problems are also common between the energy and environment sectors. In the case of Ipueiras, IBAMA concluded that a strong negative impact would be incurred in an area that had previously been used for releasing animals rescued during the flooding of the Lajeados UHE. In the São Salvador case, the State of Goiás environment agency claimed that the development would indirectly involve land belonging to quilombola populations which had already been compensated during the Cana-Brava UHE licensing process. In both cases, it is reasonable to assume that if IBAMA had been aware of all the developments in the pipeline for that particular river basin, it would not have approved relocation activities for an area that was already included in energy sector plans.

(d) *Subjectivity of the adopted principles and criteria.* The principles and criteria adopted in impact analysis, the extent of the impacts and the corresponding mitigating/compensatory measures vary from case to case and even between different analysts involved in the same case. In Aimorés, the developer suggested at the start of the process that four areas could be established as Conservation Units (UCs) with environmental compensation funds. Three of the areas were however rated as "too small and with very poor environmental quality" (this observation appeared correct since the areas, totaling around 2,000 hectares, were separated from each other in the middle of a larger rural area). Recommendations were made to provide support to three other already existing UCs in addition to the establishment of the single UC that was considered a viable proposition (i.e., eligible for compensation funds). However, two of the rejected areas were subsequently considered to be viable and were therefore included in the licensing process. One area was included for rescued animals while the other was said to be the habitat of the papagaio-chauá - demonstrating a clear modification of the criteria during the licensing process.

36. In the case of Aimorés, the licensing process employed a strict 'species conservation' approach, focusing recommendations on the in situ survival of seven papagaio-chauá couples in the middle of a developed area which included several fruit orchards. Substantially broader conservation biology and landscape ecology concepts have in fact been deployed in the São Salvador, Ipueiras and Itumirim cases, involving analyses and recommendations for maintaining natural habitats, ecological corridors and species communities. Given that the teams involved in the licensing processes tended to vary



and that no minimum set of technical principles and guidelines needed to followed, the experts responsible for each development ended up by setting their own guidelines on a case-by-case basis.

37. *IBAMA has recently established, through Normative Regulation No. 065/2005, a timeline for each step of the licensing process. Past performance indicates that the actual times taken are much longer than those established by this rule.* The following Table and Chart (a) indicate IBAMA's understanding of 'acceptable' periods for each step in the licensing process, in accordance with 065/2005; and (b) compare the stipulated times with the actual times taken in the processes already underway. This comparison of past performance with recently-established goals demonstrates that the times taken were extremely long. No new licensing requests have been submitted for hydropower developments since IBAMA established the norms shown in the table below. Therefore, it is not possible to assess whether IBAMA is currently capable of reducing the times and complying with the norms that it has itself established.

	Days taken for IBAMA to submit the TOR to the Project Proponent (n=20)	Days taken for Delivery of the EIA-RIMA to IBAMA (n=13)	Days taken up to first Public Hearing (n=13)	Days taken up to last Public Hearing (n=12)	Days taken for PL Issuance (n=11)	Days taken for the Proponent to Require to IL (n=13)	Days taken until Issuance of IL (n=12)	Days taken until issuance of OL (n=11)
Total <sup>14</sup> Average	394	613	852	876	958	1103	1235	2335
Average for the period	394	220	239	24	82	144	132	1100
Normative Instruction IBAMA 65/2005 <sup>15</sup>	30	Exclusive Responsibility of the Proponent	270			Exclusive Responsibility of the Proponent	150	Dependent on construction deadline

38. In order to estimate the costs related to the time spent at each stage of the licensing process, our study examined the processes submitted to IBAMA between 1997 and 2005. Since many of these processes started out at the state level and were subsequently transferred to IBAMA (federal level), the table denotes only the processes which were originally the responsibility of IBAMA.

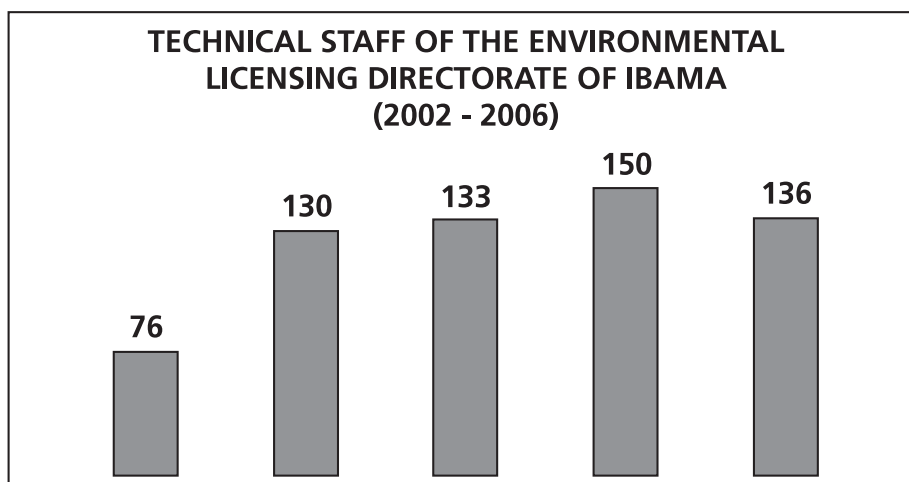
39. IBAMA's Normative Regulation No. 065/2005 sets out in detail a series of requirements for different aspects of the licensing process, including deadlines for IBAMA action at each licensing stage, as depicted above. The time periods shown in the table cover an entire licensing step (including litigation, time for the proponent to supply additional information or the time taken for issuing the RIMA). Regardless of the fact that the processes under study pre-date the Normative Regulation, *it is clear that while the most significant challenge is to substantially reduce the time spent on issuing the Terms of Reference for the RIMA, the remaining licensing steps are in fact consistent with the deadlines as set forth by the Normative Regulation, particularly since these deadlines are not of IBAMA's exclusive responsibility.*

40. *Institutional Aspects of the licensing body. Licensing bodies have insufficient financial and human resources for satisfying Brazil's growing need for energy. This means that preparation of the TOR and the subsequent analysis of the EIA/RIMA are not always carried out in a competent, inter-*

<sup>14</sup> Data from projects initiated prior to the adoption of IBAMA Normative Regulation N° 065/05 and corresponds to total number of days for each stage, including provision of supplementary information of the developer and resolution of eventual conflicts.

<sup>15</sup> Processing days within IBAMA only.

*disciplinary fashion or within a reasonable timeframe.* IBAMA has made efforts, particularly over the past few years, to increase staff levels in order to comply with the requirements of the licensing process. IBAMA has undertaken a major effort to regularize staff employment conditions for those responsible for environmental licensing (see Table below). While a major training operation is no doubt essential for IBAMA staff, *it has not been possible to assess whether increased staffing levels in the licensing directorate of IBAMA are sufficient to meet the new licensing deadlines.*



Source: IBAMA, 2007.

41. *IBAMA's hydropower licensing coordination unit is short of professional staff with expertise in the social sciences.* Of the 83 staff members with a university degree allotted to the IBAMA Licensing Directorate in Brasília,<sup>16</sup> only five are Social Science graduates. The Hydropower Coordination Unit (DILIC) employs only one staff member with expertise in the social sciences (history). Given that the social aspects associated with hydropower projects play a major role in determining the costs and timeframes involved in the environmental licensing process, this would suggest that DILIC needs to hire additional social scientists.

STAFF	YEAR				
	2002	2003	2004	2005	2006
Environmental Analysts (oficial)	6	62	79	115	120
UNDP Technical Consultants (basic team)	70	68	54	13	4
UNDP Technical Consultants (product)	0	0	0	22	12
<b>TOTAL</b>	<b>76</b>	<b>130</b>	<b>133</b>	<b>150</b>	<b>136</b>

### C. *The costs of environmental licensing for hydropower developments*

42. This section presents the results of the estimates for the total costs of socio-environmental licensing for hydropower plants. These results suggest that the costs associated with social aspects, which include: land improvements, population resettlement, compensation for displaced families, support for communities and cultural heritage; represent the majority of total costs.

<sup>16</sup> IBAMA data, March 2007.

43. *Environmental licensing costs involve two major components - direct costs and opportunity costs. Both affect the overall costs of power generation, and subsequently its price.*

Direct costs affecting investment decisions include: (i) compliance with social norms; (ii) environmental mitigation measures; and (iii) the costs of regulatory uncertainty, the value that a developer adds to their bid in anticipation of potential contingencies such as license requirements and queries by the Public Prosecutor's Office. A fourth category of direct costs was considered for inclusion in the study - financial costs generated by the postponement of implementation schedules caused by licensing delays. Since the findings of the present study showed clearly that the main delay in licensing takes place during the issuing of the PL, prior to the beginning of the construction works, we decided not to estimate or include these direct financial costs. Rather, the study refers to the costs incurred with delays in the licensing process as opportunity costs under indirect costs in the following Table.

Opportunity costs or indirect costs arise from licensing delays and lead to more expensive (licensed) plants to be built earlier in order to meet energy demand. The mix of supply sources in effect changes, resulting in higher overall power generation costs. This increase apparently does not affect the construction costs but nevertheless results in increased energy prices.

### SUMMARY OF ENVIRONMENTAL LICENSING COSTS

COST	US\$ per KW installed <sup>(a)</sup>	Share of Total(%)
<b>Direct Costs</b>	<b>133</b>	<b>14,1 a 14,7</b>
i) Social	94	10,0 a 10,4
ii) Physical Environmental	19	2,0 a 2,1
iii) Regulatory Uncertainty	20	2,1 - 2,2
<b>Indirect (opportunity) cost</b>	<b>10 to 50</b>	<b>1,1 a 5,4</b>
<b>Total costs of environmental licensing</b>	<b>143 to 183</b>	<b>15,2 a 20,1</b>
<b>TOTAL COST</b>	<b>906 to 946<sup>(b)</sup></b>	<b>100</b>

a. Since the number of observations of the direct cost components differed from each other, we have normalized the costs by multiplying them by a factor consisting of the ratio between the maximum number of observations (36) and the number of observations of the corresponding component. In this manner, it was possible to divide the (total) costs for each component by the total power and by the total costs, thus obtaining the figures shown in the table.

b. The total cost per installed kW provided by Eletrobrás (Account 10) is US\$ 876/kW. This excludes the costs estimated here as regulatory uncertainty (US\$ 20/kW), as well as the opportunity costs, which do not directly affect the plant construction costs. Both need to be added to this value for calculating the licensing cost percentage. Thus 906 (946) = 876 + 20 + 10 (50).

44. Based on inventory data, the figure observed for social and physical environmental costs in relation to the total plant costs (both measured in terms of installed kW) has been estimated at an average of 12%. Outlays for social aspects, such as population resettlement, support to communities and municipalities and supplying infrastructure, represents the major part of these costs (about 80%), whereas the costs associated with the physical environment represent only 2% of the total.

### Direct Licensing Costs: Social Issues

45. Although social and environmental issues are both part of a given project's environmental dimension, these need to be addressed separately for two reasons: first, the data from EPE and Eletrobrás (Conta 10<sup>17</sup>)--which provided the basis for our analyses--make a distinction between physical environmental (mitigation and bureaucracy) and social aspects (land acquisition, compensation, displacement<sup>18</sup>);

46. In discussions with government agencies we noted that the social problems associated with hydropower projects, which tended to outweigh the purely environmental issues, were duly recognized. Considerable interest was shown in seeking solutions. It should be mentioned that the many social demands arising during the licensing stages of hydropower developments are essentially social ones. Many of these are often unrelated to the project and generally precede the project itself. The burden of costs to satisfy these demands cannot be borne entirely by the project proponent. The Government could play a more effective role in the licensing process as a partner and meet demands of this type. Based on Conta 10, the present study has estimated that the costs involved in addressing the social issues linked to environmental licensing are of the order of US\$ 94 per installed kW on average.

### Physical Environmental Problems

47. Although the costs of environmental licensing are predominantly associated with mitigating social issues, the physical environmental aspects are often referred to as the villains of the licensing process and involve both administrative and mitigation costs. Data provided by EPE and Eletrobrás point to an average cost of US\$19/installed kW that can be attributed to these aspects.

48. Similar to most cost parameters, the figures vary significantly between large and small plants, representing an average of US\$ 4.5/kW in plants generating over 130 MW, and US\$ 39/kW in smaller plants (< 130 MW). This suggests an extremely high range of costs: average mitigation costs for large plants can in reality be as low as US\$ 0.02/installed kW.

### Regulatory Uncertainty

49. The third direct costs component arises from regulatory uncertainty following award of the contracts. Our study assessed investors' risk perceptions by calculating the difference between the expenditures forecast by developers and those effectively incurred. Since we were not able to access ex-post data on expenditures on mitigation, we based our estimates on a study by EPE (2005), which compared the data of Conta 10 with the budgets that were revisited for seven developments, based on the EIA/RIMAs already available for these projects. Three of the projects incurred budgetary

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<sup>17</sup> For a complete treatment of *Conta 10* please refer to Table 5 of the Main Report and Annexes 2 and 4 of the Technical Annexes.

<sup>18</sup> Social questions associated with the construction of dams and hydropower plants are a major issue, involving very high costs. In 2004, the Office of the Chief of Staff of the Presidency published a report on 'People Displaced by Dams' (Atingidos por Barragens), which analyses the main social problems arising from dam construction and makes a series of recommendations. The list of problems includes: the need for emergency actions (basic food hampers and farm credit) for displaced populations; lack of criteria for identifying displaced populations and possible indemnities; lack of social content in the EIS/EIR; lack of information conveyed to the affected population; weak negotiation process between concession-holders and displaced people; incompatibility between technical, physical-financial schedules and social programs; insufficient participation by the states and municipalities regarding actions taken on behalf of the affected people. This long list clearly suggests that the transactional costs and the costs of resolving these social issues are very high.

increases of 4%, 7% and 22%, compared with the Conta 10 estimates. This suggests that investors' perceptions of risk were not sufficiently negative, and that actual costs ended up about US\$ 20/kW higher than those expected.

50. The total cost of US\$39/installed kW for strictly environmental aspects (US\$19 for mitigation and US\$20 for regulatory uncertainty) cannot be directly compared to costs observed in other countries, since their cost structures cover different items and components. For purposes of illustration, however, the equivalent cost in the USA (US\$200/installed kW) suggests that, regardless of differences of calculation, the costs involved in dealing with strictly environmental problems are significantly lower in Brazil.

### Opportunity Costs

51. Opportunity costs are those costs caused by delays in the licensing process. They should be distinguished from the premium involved with regulatory uncertainty. In the event of delay, more expensive energy (from other hydropower plants or thermal power plants) is substituted for the 'delayed' energy, thus increasing its price. The alternative plants can be built in time to avoid decreases in energy supply or they may be completed after the expected date.

52. The construction of alternative plants could obviously cause temporary shortages in energy supply. Assessing the costs incurred in the event of these types of shortages requires estimating the duration of such a shortage. We chose not to undertake such a speculative exercise. Rather, we considered that in the event of licensing delays in building a hydropower plant a substitute plant could be built quickly enough so as not jeopardizes the regulatory authority's forecasted energy supply. While this approach clearly underestimates the true opportunity costs of delays, it nevertheless avoids producing estimates with no economic justification.

53. The estimated opportunity costs for licensing delays since 1996 amount to an increase of between US\$10-50/ installed kW, depending on two key factors: a) the length of such delays and b) the marginal costs involved in obtaining alternative energy sources during the period of delay. The following box contains a summary of the main data observed and the hypotheses required for compensating for the lack of data.

## **Statistics, scenarios and hypotheses**

### **Basic relevant statistics**

- 1) The average total time for a UHE to go on line in Brazil<sup>19</sup>, considering the sample employed, is 6.5 years, albeit with high variances. This average is approximately 30% longer than those incurred in the USA.
- 2) Issuing a PL takes 2.5 years on average, with 1.1 years (44%) spent on preparation of the TOR by IBAMA. Developers take an average of only 6 months to submit an EIA/RIMA.
- 3) Issuing an IL (including the time required to issue the PL) takes 3.4 years.
- 4) According to ANEEL, of the 66 hydro plants of the portfolio examined, only 27 have exceeded the dates planned for their contracted start-up.

### Scenarios and hypotheses for delays

- 1) We have assumed that **all** delays beyond the contract end-date were due to delays in environmental licensing, which clearly overestimates the opportunity costs of such delays.

<sup>19</sup> Since the initial request for the Preliminary License up to the Operation License, this includes the conclusion of the interprise.

2) Only 8 units remained delayed at the time data collection was finalized for this study. Two possibilities are considered for the start-up dates: (i) using the past average of 78 months; or (ii) devising scenarios for these data beginning in September 2007 and splitting them into consecutive 6-month periods (March 2008, September 2008, etc.).

3) Since some power units have started operations earlier than foreseen, we again adopted two alternatives: ignoring the schemes completed ahead of schedule (adiantamentos) - (which provide for an 11.8-month average delay per plant), or compensating the latter with the delays incurred by the others (thereby reducing total delays by 25%).

4) Another hypothesis in the analysis (of a static type) was to ignore (or not) grossly delayed plants such as Cubatão and Monjolinho. These alone were responsible for 22.5% of total delays. By excluding these two units, the average delay was reduced from 11.8 to 9.2 months.

Scenarios and hypotheses for the marginal costs of alternative energy

1) Two different approaches for assessing the substituted energy cost were adopted: the first hypothesis is that the 'substitute' plants would also be hydropower plants. In the second hypothesis, we assumed that substitute energy would be provided by 'thermal' plants. In the first case, the change in total costs per MW of installed capacity was estimated by using a multiple linear regression based on the size of the plant and on temporal values. For thermal alternative energy the difference in unitary prices between thermal and hydropower energy was assumed to be that used in the 2005 auction (19.8%) and we applied it to all the units in our data base.

Total opportunity costs of licensing delays

These costs depend on three elements: the monthly opportunity cost of a delayed hydropower plant, the type of substitute source, and a composite factor reflecting both the cost increase over time (temporal value) and the number of months by each unit was delayed. The first was a three-factor product: the cost of installed capital per kW for the delayed plant, its size, and a monthly capital remuneration factor (assumed to be 1% per month).

Assuming that the other plants substituted for the plants delayed by licensing problems, and assuming that the 'before-schedule' units were ignored, we obtained an estimated total opportunity cost for delays of 6.6% of the installed capacity costs. Other hypotheses could, if taken into account, reduce this percentage to a mere 1.0%.

54. The study also examined the licensing framework used in **Canada** for hydropower developments. The licensing timeline, excluding construction for a large complex hydropower project in Canada, is currently between four years and five years (i.e. slightly longer than in Brazil). For a medium-sized hydropower project, the timeframe can be estimated at three years or less in Canada, which is less than in Brazil. The tables below illustrate these principal stages of licensing and their respective timeframes: from project notification through to issuing of the final TOR, reception of the TOR through to completion of the Environmental Assessment and from its submission to the responsible authorities up to approval of the report or project.

**Estimated timeframe for completing environmental licensing arrangements for hydropower projects in Canada.**

**LARGE COMPLEX HYDROPOWER PROJECTS ABOVE 200 MW**

YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
TOR				
	EIA REPORT			
		APPROVAL		

**MEDIUM SIZED HYDROPOWER PROJECT**

YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
TOR				
	EIA REPORT			
		APPROVAL		

55. *Substitution of (new) hydropower plants for thermal plants.* During the 2005 and 2006 auctions for energy purchases to be delivered five years later (the so-called 'A-5' auctions), an average of 2855 MW were purchased. It was expected that hydropower plants would dominate the A-5 auctions since they are capable of producing energy at a lower cost than thermal plants, but in the 2005/6 auctions thermal plants accounted for almost 50% of the energy purchased (an average of 1397 MW). The sluggishness of the environmental licensing process for hydropower plants reduced the number of competitive hydroelectric projects that could be offered at auction and their place was taken by the thermal plants.

56. The substitution of new hydropower plants for thermal plants witnessed at the 2005 and 2006 auctions will trigger an increase in generation costs as from 2010 when these plants go into operation. The average prices at the auctions for hydropower energy were in the region of R\$123/MWh, while prices for thermal energy were 10% higher at around R\$ 135/MWh. If all the 1397 MW thermal averages purchased at the 2005 and 2006 A-5 auctions were to be supplied by hydro energy at R\$ 123/MWh, electricity consumers would save R\$ 857 million (at current values discounted at 10% per year) over a 15-year period. We suggest in these circumstances that a study should be undertaken of the impact of a sub-optimal expansion of the country's generating capacity, using stochastic dynamic programming models able to capture hydrological uncertainty, dynamic iteration and optimization of the hydro-thermal capacity, together with the cost of the 'deficit' of the electricity sector.

57. The problem of slow environmental licensing is not the only obstacle. In recent years, Brazil has failed to invest in river basin inventories and pre-feasibility studies of new hydropower<sup>20</sup> developments. This lack of planning gave rise to significant distortions, as can be seen in the Rio Madeira case. Rather than have the Government preparing feasibility and environmental impact studies of the Madeira River, the studies were done by the companies which hoped to build the project. This led to the emergence of perceived and real problems related to the objectivity and reliability of information. Furthermore, it discouraged competition from others interested in the development. The lack of government capacity to plan and prepare projects gave rise to uncertainties, and a long and contentious pre-bidding process. The problems were eventually overcome at enormous institutional cost and after much delay. Nevertheless, the procedures would suggest that this is no way to conduct business. The Ministry of Mines and Energy has acknowledged this and is now giving priority to strengthening the EPE's capacity to undertake river basin inventories and planning. In the short to medium term, there are a limited number of hydropower developments that possess design studies and Preliminary Licenses that will be eligible to bid in the next auctions. The delays incurred in the issuing of the Preliminary Licenses are likely to be one of the factors that is bound to set back the rejuvenation of Brazil's hydropower portfolio and will lead to a further increase of thermal plants within Brazil's energy sector.

58. In order to meet the needs of the *EPE Ten-Year Plan* scenario, an additional 3000MW per year in firm generation capacity will be required. The increase in the power generation costs caused by an eventual substitution of hydropower energy for more expensive thermal energy will be, in absolute terms, considerable.

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<sup>20</sup> See paragraph 12.

## V. MAIN RECOMMENDATIONS

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59. *This study does not propose radical changes to the environmental licensing system.* Reform of this complex and multifaceted system (with its long legal and institutional history) does not depend on a single, simplistic solution. In this respect, a comprehensive national debate on the energy issue and its implications for the country's environmental heritage is essential and is in fact currently underway. Several of the main points have already been addressed by the Brazilian Government such as the regulation of environmental competence (Article 23 of the Federal Constitution), the drafting of strategic evaluation tools, and strengthening the personnel structures of EPE and IBAMA. The main recommendations of this study are as follows.<sup>21</sup>

60. **RECOMMENDATION #1:** *Consideration needs to be given to the preparation and adoption of a Complementary Law in order to clarify the responsibilities of the Federal Administration (Union) and the States with regard to environmental licensing.* Article 23, Clause IV of the 1988 Federal Constitution grants common competence to the Union, the States and the Municipalities to "protect the environment and fight pollution in any form". The Constitution also rules on the subsequent publication of a Complementary Law to establish rules for engendering cooperation between the responsible federative bodies. This Complementary Law has not been issued to date. There is significant confusion among the respective federative bodies regarding their designated responsibilities. This continues to generate problems with environmental licensing<sup>22</sup>.

61. Aware of the lack of a clear division of competences in the environmental licensing area, the Executive Branch has recently submitted Complementary Bill (Projeto de Lei Complementar - PLC) N° 388/07 to the National Congress aimed at addressing this impasse. However, in its definition of 'competence' the PLC treats the concept of "direct environmental impact" from a purely territorial standpoint. This could continue to cause confusion as regards the meaning and reach of 'impact' and, by extension, of the 'competent' federal authority responsible for project licensing. *In order to overcome this problem a declaration of federal interest prior to the start of the licensing process and/or the recognition of jurisdiction over the river basin that hosts the project site should be considered*, in accordance with the terms of Article 20, Clause III and Article 26, Clause I of the Federal Constitution.

62. **RECOMMENDATION #2:** *The establishment and promotion of mechanisms for resolving disputes among players in the licensing process.* Environmental licensing for large developments has often been the victim of litigation. Issues that should have been resolved within the environmental licensing administrative framework have been submitted to the Judiciary for resolution. It is obvious that structural changes to reduce the propensity to resolve these conflicts in court (see next paragraphs). Specialization might be one of the alternatives that could assist the Judiciary to resolve disputes over environmental licensing in a safer, swifter and more efficient manner. A positive move by the Judiciary in this direction has been, for example, the establishment of special environment courts staffed by judges with technical-judicial expertise focused on environmental issues. A further example has been the establishment of a Special Environment Chamber in the São Paulo State Court of Justice. This

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<sup>21</sup> The Main Report contains additional recommendations.

<sup>22</sup> Examples exist which point to the present trend to "federalize" environmental licensing, based on a problem arising from interpretation of the rules, despite the existence of other conflicts between municipalities and states. This trend has been confirmed in the present study where we have ascertained that **one third** of all hydropower projects (from a universe of 35 projects) obtained their respective environmental licensing processes from agencies in the states and that these processes were subsequently transferred, usually under judicial order, to the federal agency IBAMA.



special unit is staffed by specialist adjudicators who have made a significant contribution to decisions on environmental licensing matters in the São Paulo appeals courts.

63. **RECOMMENDATION #3: *Establishment of independent highly qualified consultative panels to advise on projects entailing major social/environmental risks.*** Due to the technical nature of litigation arising from the licensing process, many other countries have recourse to technical panels to help resolve environmental licensing disputes. In the **United States**, with its long tradition of dispute resolution mechanisms, a special panel for clarifying technical issues has been set up under environmental licensing legislation<sup>23</sup>. The World Bank guidelines<sup>24</sup> on environmental impact studies recommend that in *high-risk or highly controversial projects, involving multi-dimensional or serious environmental concerns, consideration should be given to the establishment of an independent advisory panel of internationally-recognized environmental experts to address all the aspects of a given project that are relevant to the environmental assessment.* Expert panels are also used in Canada.<sup>25</sup> It is vital that the Terms of Reference for such panels, and the timelines established for their work, are clearly defined to avoid them becoming one more unpredictable step in the licensing process.

64. **RECOMMENDATION #4: *Cooperation Agreements between Federal and State Public Prosecutor's Offices (Public Ministry) and environmental agencies, to include guidelines to be issued by the CNMP.*** This study has revealed that a number of the problems identified in the course of environmental licensing result from a lack of a proper structure to encourage liaison and dialogue between the environmental agency and the Public Prosecutor's Office. This arrangement would help to produce clearer drafting of the terms of reference for a particular project and, importantly, minimize tension and disputes over contentious issues between the technical staffs of the environmental bodies (hitherto burdened with the prospect of lawsuits) and the technical teams in the Public Prosecutor's Offices. *The solution lies in a greater commitment by the senior members of the ministerial Councils (including the CNMP) in the interests of promoting productive dialogue between those responsible for legal control and supervision and those with a more technical, scientific and political 'discretionary' approach.* It is essential to promote good liaison within the CNMP to ensure that well-defined guidelines and targets are incorporated in the SNMP's Strategic Plan and focused on improving (and removing bureaucratic impediments to) project and policy analysis for the hydropower sector. The Council needs to be engaged, with no loss of its autonomy, in a joint effort to implement a key government policy. Recent improvements made by Colombia and Indonesia to their environmental licensing systems have focused on the need for good quality, transparent environmental information at every stage of the process. Likewise, after years of disputes over who should be responsible for licensing, the Canadian government has introduced agreements aimed at harmonizing licensing arrangements. This initiative has substantially reduced contention between the provinces and the Federal Government.<sup>26</sup>

65. **RECOMMENDATION #5: *The plans, programs and policies for the electricity sector must take into account social and environmental aspects together with economic, financial and technical aspects. All these aspects must be considered at the design stage, with participation by the various stakeholders.*** The EIA-based environmental licensing process that has been adopted worldwide, including by Brazil, is perhaps not the most appropriate tool for taking decisions with a significant social and environmental impact. Although this instrument can generally avoid major and irrever-

<sup>23</sup> See Technical Annexes.

<sup>24</sup> See Operational Policy 4.01 - Environmental Assessment.

<sup>25</sup> See Technical Annexes.

<sup>26</sup> See Technical Annexes.

sible environmental impacts, it does not provide solutions for generating energy for the country in a socially/environmentally sustainable and economically feasible way.

66. It is now widely acknowledged that a pressing need exists for Brazil to bolster its capacity to plan effectively for the energy sector. This process has already begun in EPE. All aspects of planning have to be taken into account: economic, financial, technical, environmental and social. It is also vital to examine all the options and not to be tempted to cast an unconsidered positive or negative vote for specific proposals. The SEA can play a key role in this overarching, broader approach to planning (although its title might suggest that its purpose is restricted to the environment). The instruments based on the SEA concept do not call for the level of information that would normally be needed to evaluate a specific project.

67. The focus of the SEA (and its information base) differs substantially from the EIA/RIMA. The type, quantity and the specificity of information required for a SEA is distinct from that required in the preparation of an EIA/RIMA. It follows that the SEA is not just an EIA/RIMA with larger territorial scope. Instruments based on the SEA concept allow decision-makers to identify and adopt management strategies that take into account the interests of different stakeholders. These instruments are also targeted at maintaining and improving environmental quality by developing consistent and informed multisectoral policies and management systems. The process involves substantial public participation aimed at defining a set of strategic goals that reflect a high level of transparency and participation. This should significantly improve capacities for implementing policies in a cooperative and pro-active way since the rationale, the requirements and impacts of such policies are likely to be better understood by the affected communities and society as a whole before specific projects are examined.

68. **RECOMMENDATION #6: Brazil should consider employing its existing planning instruments. At the same time the multisectoral and social participation content etc of such instruments needs improvement.** The use of modern planning tools (including the SEA) should not complicate the Brazilian licensing process nor burden the process with yet another stage. On the contrary, use of these instruments should help to accelerate the licensing process by better focusing its scope and by reducing costs, ensuring that the proposals for hydropower projects are submitted on the basis of a well-informed policy that has been previously subjected to environmental scrutiny and public participation. Countries such as **Germany** and **Norway** have for many years possessed an elaborate hydropower planning process linked to environmental licensing which has substantially improved the process, particularly with regard arrangements for anticipating potential disputes).<sup>27</sup>

### Opportunities for Strategic Planning in the Brazilian Hydropower Sector

Level	Definition	Opportunities Available
<b>Policy</b>	A general course of action or a proposal for a general course of action that a government is seeking or may seek and which can guide the decision-making process.	Definition of Energy Matrix National Water Resources Plan National Environment Policy
<b>Plan</b>	A design or strategy with a specific vision, often with coordinated priorities, options and measures for designing and implementing policies.	Strategic Plans for Water Resources and River Basins; National Energy Plan
<b>Program</b>	A coherent and well-organized schedule or timeframe of commitments, proposals, instruments and/or activities for designing and implementing policies.	10-Year Energy Expansion Plan Integrated Environmental Assessment at the river basin level; River Basin Plans.

<sup>27</sup> See Technical Annexes.

69. **RECOMMENDATION #7:** *The PL must be considered (and issued) on the basis of an analysis carried out during the planning stage. The present practice requiring a detailed EIA/RIMA for obtaining a PL should be changed for a process involving a range of agencies, all of which should incorporate social and environmental factors. The EIA/RIMA would then be a requirement for obtaining the IL, based on the engineering design.* The electricity sector recently took an initiative to launch a new Manual for the Hydroelectric Inventory of Hydrographic Basins which includes preparation of the EIAs. The EIA arose originally as a result of the Conduct Adjustment Term (TAC) signed with the Public Prosecutor's Office for the Uruguay River Basin as part of the licensing process for the Barra Grande UHE, with the aim of assessing the cumulative impacts of existing and planned hydropower plants in this river basin. The MME then decided to prepare IEAs for 11 river basins. Although these studies employ the same SEA methodologies they effectively possess a more strategic level of evaluation than a project-level EIA/RIMA. These are still at the design stage but it is expected that they will contribute to consolidating planning for the sector as well as to environmental conservation in the river basins.

70. Furthermore, the National Water Agency (ANA) is in the process of experimenting with methodologies for the design of river basin master plans and is at present focusing on the Araguaia-Tocantins Basin Master Plan. Basin plans are tools (defined by Law No. 9433/97) that define the uses of river basin water resources for the different sectors as well as the requirements for granting water usage permits. Basin plans are important for determining the possibility of water-charging and providing funds for the 'basin committees' to help them manage water resources.

71. The Basin Plan concept overlaps territorially and thematically with the electricity sector IEA. While the concerns associated with allocating water for hydropower plants or with major environmental issues in specific river basins are strategic, problems arising from changes in water quality or from the flooding of natural habitats are definitely project-related. Both agencies (ANA and EPE), fully aware of the need to move ahead with development plans firmly based on environmental sustainability, are working to ensure compatibility between these major concerns.

72. In the light of existing alternatives and experiments, *a two-stage process is suggested for modifying the current licensing process (focused on the Preliminary License for individual projects) by focusing on the issuance of Preliminary Licenses for a given set of projects.*

73. The first stage would involve the *IEA being used for indicating alternative locations for hydropower plants, identifying their cumulative impacts and for undertaking a preliminary assessment of the program's overall environmental feasibility, as well as its feasibility in a specific river basin.* The outcome of the IEA would assist the licensing process by eliminating otherwise unfeasible proposals and, most importantly, by providing information that would help speed up the preparation of higher-quality and more specific Terms of Reference for project-related EIA/RIMA.

74. In parallel, the ANA river basin plans would be improved to serve as a source of information on the environmental aspects of hydropower developments, e.g. proposals to divide the watershed, the exact location of hydro developments as a result, the proposed quotas, the type of technology proposed (run-of-river, reservoirs, etc.). It may also be necessary to further improve consultation and decision-making procedures to ensure the participation of different stakeholders.

75. At the second stage, the improved river basin plans would feed into the PL, which would continue to be analyzed and issued by IBAMA, thereby avoiding the need for an EIA/RIMA to be done for each potential development at the PL stage (since the environmental feasibility for the whole

set of hydropower plants in the program would have been previously assessed by the Basin Plan). This procedure would satisfy the original intention of issuing the "Preliminary License" during the *preliminary* project design stage as a means of certifying its *environmental feasibility*. It would also address one of the constant criticisms of the EIA/RIMA regarding its failure to analyze alternatives to a particular hydro development or its location, since these questions would have been addressed more appropriately in the river basin plan, therefore simplifying the EIA/RIMA. *It should be noted that at no stage is the elimination of the PL from Brazil's licensing system proposed. Neither is there any proposal to transfer issuance of the PL from the competent environment body to any other entity.*

76. *The EIA/RIMA for each specific project would include the presentation of a detailed engineering project for obtaining the IL, with the entire process focused on identifying the potential direct impacts of the development as well as the steps that could be taken to prevent or mitigate such impacts.* In addition, the Terms of Reference for the EIA/RIMAs would be much more focused on the specific project, addressing specific aspects of the engineering project for the proposed development.

77. **RECOMMENDATION #8: Preparation of the TOR by a multidisciplinary team based on a preliminary analysis of the development and of the region in which it will be located, utilizing secondary information and undertaking at least one field visit.** A 30-day dissemination and consultation process involving the draft version of the TOR should target governmental and civil society institutions and organizations as well as local communities and the wider public (e.g., published on the IBAMA webpage on the internet, holding open public meetings to gather comments and suggestions).

78. **RECOMMENDATION #9: Preparation of an 'Operations Guide' by a multisectoral technical unit** consisting of experienced licensing professionals as well as experts drawn from different fields of expertise (fauna, flora, fishing, indigenous peoples, water resources, hydropower plants, etc.). This guide would define the approaches to be used (e.g. landscape ecology) in each situation and would contain guidance on: (i) the type and level of information required for obtaining the license and (ii) the procedures for ensuring public access at different stages of the project.

79. **RECOMMENDATION #10: Technical capacity-building and upgrading and diversifying the professional skills of SISNAMA and private sector bodies involved in the licensing process.** Based on clearly established guidelines, principles and criteria, the SISNAMA bodies, jointly with higher education institutions, could develop a curriculum for a specialized course focusing on capacity-building for technical staff, to include training for EIA/RIMA preparation and analysis. In the medium term, specific skills training of this type would ideally become a basic requirement for the senior technical staff responsible for coordinating the preparation of EIA/RIMAs. Moreover, it is important for the licensing body to increase its staffing levels by hiring more professionals with qualifications, knowledge and experience in other technical fields. This is especially true for the 'social' field, given the wide range of social problems arising from hydropower developments. Qualified civil engineers familiar with the design and operation of different types of hydropower plants should also be recruited.

80. **RECOMMENDATION #11: Establishment of a Governing Council, already recommended under the National Environment Policy Law** to be responsible for several overseeing progress of some of the aforementioned actions. This Council would encourage liaison between government agencies with a view to contributing to improving the overall planning process. It would not replace CONAMA as the body charged with ruling (within its specific remit) on environmentally important norms and standards.

