recursos humanos
noviembre del 2000

ENVIRONMENTAL MANAGEMENT OF ELECTRICAL ENERGY SYSTEMS: PROBLEMS AND PERSPECTIVES

Resumen / ***Abstract***

En la pasada década, el modelo de desarrollo brasileño fue caracterizado por el crecimiento económico a través de una fuerte industrialización. Una de las principales estrategias del gobierno en ese período, consistió en proveer la necesaria infraestructura a la actividad industrial, principalmente en los sectores del transporte, telecomunicaciones y energía. Los sistemas de transmisión tuvieron una parte fundamental en ese proceso, como elementos distribuidores de electricidad para la atención de necesidades de la industria y la urbanización. Atenuar los eventuales efectos medioambientales y sociales negativos de empresas del sector eléctrico, constituye ahora algo concerniente al gobierno, como lo indica la demanda legal de la evaluación del impacto medioambiental (EIM) para el cumplimiento de este tipo de actividad.

In the last decades, the model of brazilian development was characterized by the economic growth through a fast industrialization. One of the main government strategies, in that period consisted on the supply of necessary infrastructure to the industrial activity, mainly in the transport sections, telecommunication and energy. The transmission systems had a fundamental part in that process, as elements distributors of electricity for the attending to the needs of the industry and the urbanization. The attenuation of the eventual environmental effects and social negatives of enterprises of the electric section are constituted, now, in a government concern, as it indicates the legal demand of the environmental impact assessment (EIA) for the accomplishment of this type activity

Palabras claves */ Key words*

Transmisión eléctrica, planificación energética, desarrollo ambiental, análisis de impacto ambiental
Electric power transmission, energy planning, environment development, environmental impact analysis.

INTRODUCTION

The transmission systems of electric energy had a fundamental part in model of Brazilian development, as elements distributors of electricity for the attending to the needs of the industry and the urbanization.The economic sequence of the power plant and transmission works are established starting from supply approaches and physical viability of implantation, including the evaluation of the environmental subjects.

It is worthwhile to remember that, in the next years (1999/2008), they should be incorporated to the regional, interlinked and isolated systems, about 50,000 km of transmission line and about 96,000 MVA in substations. The installed capacity should grow of 61,300 MW for 104,600 MW. This reinforcement will demand, in the first years, total investments of the order of U$ 4,7 billion a year (Eletrobras, Planning 1999/2008). On the other hand, the Laws 8,987/95 (Public Service) and 9,074/95 (Electric Section), that regulate Art. 175 of the Federal Constitution, they started to demand

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that the concession of public services and of electric energy it should be granted by means of bidding.

With those laws, the planning studies start to indicate the sequence of works under the optics of the economy, without defining before, which the concessionary that will be responsible for the implantation and administration of the enterprise. Thus, several agents can participate and compete for the generation works and commercialization of electric energy, before monopoly of the concessionary of public service.

The crisis of petroleum, 1973, showed an extremely dependent country of imported petroleum. The Brazilian energy model was redirected in the sense of the substitution of the petroleum for other sources of energy. Among the considered alternative sources, the hidroelectric acquired great importance, for the multiple possibilities of its use in substitution to the petroleum.

The strategy of concentration of large investments in a small number of projects, in a situation of shortage of financial resources, limits the development options. This link is characteristic of the countries of the Third World. The success in the implantation of the great projects becomes decisive for them to reach the objectives of the development; the flaws and difficulties in its implantation can have consequences that surpass the restricted field of the sectorial objectives, affecting the economic and social process globally.

The implantation of great projects of the electric section, for its scale, also has an enormous influence in the areas where they are implanted, supplying the infrastructure to the introduction of new productive activities. These projects have been a source of significant ecological and social alterations, that can represent many limitations as new possibilities for the development.[1]

The attenuation of the eventual environmental effects and social negatives of enterprises of the electric section are constituted, now, in a government concern, as it indicates the legal demand of the Environmental Impact Assessment (EIA) for the accomplishment of this type activity.

On one side, the application of EIA is justified for the need of protecting extremely voluminous and strategic investments for the national development, of unexpected risks that could commit its viability. For example to strong erosion in the dam of Anchicaya (Colombia), caused by not considering the capacity of the modified ecosystems to support certain occupation types. The deforesting and the intensive use of the soil in the basin of contribution of the reservoir provoked enormous environmental impact. The shipment and the sedimentation of those solids implied in the colmatation of the reservoir in just twelve years, in a project whose operation was foreseen for a 50 year period.[2]

Besides, the development possibilities for the projects of the electric section have not been explored convenientely. Now, the regional companies of the electric section have been acting according to sectorial objectives limited to the production and transmission of energy. However, the recognition of the strategic importance of the implantation of the great enterprises in the development context, places new challenges and responsibilities for its entrepreneurs, in the sense of the effective integration of those projects to the strategies of local and regional development.

This vision has influence on the conception and the management of projects of the electric section. Instead of concentrating in a primary purpose of production and transmission of energy, these projects should be conceived in the sense of to integrate and to explore the possibilities of multiple uses of the natural resources of the area. This includes a larger emphasis potentially in the exploration of the opportunities created by the accomplishment of the project, implantation of new economic activities (for example sailing, industry, tourism, etc.), support to existent productive activities (for example irrigation, fish) and infrastructure implantation (for example traffic system). Those activities can be constituted in new sources of income and employment for the local communities.

Thus, the environmental management acquires a growing importance in the cycle of the project, instead of limiting to the attenuation of the eventual negative effects of its implantation. Its objectives start to include the identification and the promotion of the development made possibile for the project. In that context, the environmental study of impact is not constituted in mere formal demand, but it becomes one of the main available planning instruments for the accomplishment of these objectives.

In this perspective, they will be discussed to follow the main aspects linked to the accomplishment of the environmental and proposed evaluation some strategic vision for its use for the companies of the electric section, focusing the main conceptual, methodological aspects, organizations and institutional.

ENVIRONMENTAL AVALIATION

From its creation, in 1969, in the North American legislation, the Evaluation of Environmental Impacts (EEI) comes to be used in most of the industrialized countries, and in several countries of America Latin and of Asia. The international financial agencies, have also been adopting this instrument in its processes of decisions. The Organization of the United Nations, through its specialized organisms, has been giving technical support technician to EEI, through the scientific research, of the development of methodologies and guidelines, and of the training.

The international experience of the application of this instrument in the evaluation of projects is being discussed thoroughly. EEI brought some answers to the need of integration of the environmental management in the planning and implantation of great development projects, and its possibilities in that sense were not still explored totally. However, in many cases, EEI was just added to the habitual procedures of approval of projects, being presented as a substitute to the adoption of development politics and including environment, involving the planning and global management of resources. This drove the expectation non realistic in relation to the possibilities of its application to the environmental planning. In consequence, it

brought a certain discredit with relationship to its efficiency and a discussion with relationship to its effective role in the taking of decisions.

The environmental study of impact

In Brazil, the growing concern with the ecological and social consequences of the great development projects led to the introduction of the environmental evaluation in the national politics of environment.

The Environmental Impact Assessment (EIA), according to Brazilian legislation, it is demanded for the licensing of modifyingr activities of the environment, and it should be approved by the state or federal organ of environment. This legal demand is innovative in several aspects, of which is highlighted:

a) The spectrum of the activities submitted to the control of the government environmental organisations is enlarged: the list established by the National Council of environment includes several types of projects, such as dams, highways, railways, ports, etc., whose implantation was not previously submitted to licensing, with relationship to the environmental aspects.

b) The environmental licensing extends equally to the public and private activities: This law introduces a responsibility of the government in relation to its own actions, especially in relation to the great projects of transformation of nature: the government organs of environment were, until then, completely out of the decisive process with relationship to the implantação of these projects.

The adoption of EIA as instrument of the environmental politics can contribute to the identification and discussion of projects alternative based on the social-ecological potentialities of each area, and adapted to the new situations to be faced in a crisis period. The environmental evaluation can also bring a concrete answer to the need of integration of the environmental gerenciamento in the process of planning of large projects, as a practical way to get up and to organize elements for the analysis and decision and also for the identification and negotiation bring about of conflicts.

In that perspective, EIA doesn't summarize to the production of a report demanded by law: as part of a process of environmental management, its development should be integrated into all the phases of the cycle of the project, in constant interaction with the economic management and of engineering.

For that reason, the legal obligation of accomplishment of EIA is not enough condition to guarantee the effective consideration of the great projects. The international experience indicates that is frequent EIA accomplished as an enclosed to the project, for the formal execution of a legal demand, or in response to pressures of the public opinion, but with little or influence in the development of the activities proposals. Thus, the practical results of the accomplishment of EIA, as well as the effective application of its recommendations, are conditioned strongly by the interests society and formal organizations.

CONCEPTUAL AND METHODOLOGICAL ASPECTS

According to the Brazilian legislation, EIA should be accomplished by an independent technical team. Although this measured it tries to guarantee the exemption of the study, it hinders in practice, the incorporation of its results in the process o implantation of the project. Thus, the companies of the electric section don't have direct responsibility in the elaboration of EIA but just in its recruiting and supervision.

In this perspective, we will examine in this chapter some conceptual elements that they can be useful to the establishment o the reference terms, and in the evaluation of the works of the contracted technical teams, activities these of more immediate interest, in the current picture of the attributions of the companies

Environment

The concept of adopted environment has a great influence in the results of the evaluation, determining the dimensions and the content of the analysis. Some important methodological aspects such as the space and temporary limits of the evaluation, the identification of the component elements of the environment, o the approaches of characterization of the impacts, they are conditioned strongly by this concept.

A tendency can be observed to the separation among a little natural and a little social, this last one being considered as a secondary and marginal variant. The identity "environment = a little natural" has important methodological and operationa consequences, excluding of the study problem some fundamental aspects.

This shows the need of a sistematical conception of the environment, that allows the simultaneous incorporation of the social/historic subsystems and of the natural subsystems. This because, on one side, the social groups use the natural conditions in different ways, in each area and in each historical period; or the other hand, the natural picture modified by the man's action conditions the future possibilities of use of its resources.[4]

Of this ecosystem notion some approaches are created, fo the elaboration of the environmental evaluation:

a) The environment is adapted in different ways, for the socia groups. The consideration of the social subsystem will owe therefore, to incorporate to the evaluation a plurality of values and legitimate interests, even if contradictory, current of the relationships ambience/society it sets. Thus, EIA becomes an element in the process of social negotiation of the project.

b) The space and temporary dimensions of the analysis should be projected in function of the complexity of the interfaces project environment. The ignorance of the dynamics of the ecosystems hinders the delimitation of the affected sub-systems. Besides most of the available forecast methods is are inadequate in the treatment of the growing uncertainties associated to the expansion of the space and temporary limits of the evaluation. In

general, the evaluation should not be limited to the group "dam/ plant / reservatory/subestations/transmission lines." That just represents a part of the space affected by the implantação of the project. The construction period, used frequently while it limits analysis time, it also corresponds to a reduced period of the useful life of the project: the temporary dimension of the evaluation should include the operation phases and desactivation of the project.

c) The discussion of alternatives should consider the impacts of the interaction of the project with other existent activities or that it makes possible, and its adaptation to the objectives of the regional and local development should also be examined. For example, the construction of the hydroelectric plant of Balbina (Amazonas-Brazil) it comes being contested, on the part of public opinion, in the sense that other available technologies existed, economically viable and less agressive, to the environment, to assist in the objective of generation of 250 MW. However, the lack of a comparative study deepened between the adopted option and its possible justified alternatives nourished the questions that appeared with relationship to the success of the implantation of the enterprise.

Environmental impact

The notion of environmental impact is also fundamental for the evaluation, conditioning the methodological abordagem, the inclusion of the studies, and even the use of its results. The definition used in the legislation defines the impact as all and any alteration of the environment, caused directly or indirectly for by human activities.[5] This definition, although inspired by the pollution concept adopted by the law,[6] it is all including. Its theoretical foundation, the supposition that the uncertainties will be overcome by the accumulation of the scientific knowledge in the environment, it places some problems of practical order. For example, the methodological vision due to this definition implies in the collection of data about all the possible environmental modifications, without any hierarchization approach, which causes extremely expensive and delayed studies.

Some authors suggest an impact notion with significant effect on the environment, that presupposes a defined valorization socially. This definition presents some advantages:

a) It presupposes the explicitation of the approaches used for the characterization of the impacts, allowing its verification and discussion. Those approaches can be defined in terms of parameters and objectives socially accepted (for example the legal norms of poluents emission), be in function of the political sensibility in relation to the considered aspect (for example the natives protection), or still according to the reliability of the analysis processes (for example the specialists experience).

b) She allows a limitation of the inclusion of the studies, and the distribution of the resources and available technical capacities in function of the objectives and action priorities. Thus, a degree of larger detailment will be necessary, in relation to the more important considered impacts. On the other hand, the conception of the studies can be guided in the sense of defining strategies of environmental management, instead of limiting to the accumulation of scientific knowledge on the elements of the environment.

Uncertainties and forecasts

EIA could also be characterized as an instrument for the consideration of the uncertainties and of the impacts of long period, in the process decisive. The uncertainties are inevitable, in all relative forecast to the environment: the ecosystems operate in a complex way, frequently aleatory and unknown. On the other hand, the human actions can provoke the disturbance of certain processes of reproduction of the ecosystems, that cannot be recuperated, once disturbed. The irreversible character of those modifications can drive to the degradation of the material base of the development, including the affecting of the future generations. Thus, one of the central problems of the environmental evaluation would be the identification and the reduction of the uncertainties, by means of the introduction of the applied science in the taking of decisions. The uncertainty degree in the evaluation depends on technical and social factors. Among these factors, we highlighted:

a) The quality of the information, including the amount of available data, or that can be obtained; its degree of precision, and its reliability while indicators of future situations. The observation programs have a fundamental part in the reduction of the uncertainties, because they allow the reduction of the forecasts and the accompaniment of the evolution of the modified ecosystem, being constituted in a base of information for future projects in similar ecosystems.

b) The existence of appropriate analysis methods: the choice of the evaluation methods should be guided according to the necessary degree of precision, the available information, and the type of decision to be taken. It should be considered that more complex forecasts imply the use of sophisticated methods, that they frequently use a larger volume of information, of technical competences, and of material resources.

c) The social perception of the uncertainties. The uncertainties are noticed and organized in different ways for the social actors, according to private interests. The technical subjects are raised up, and its discussed priority is according to its own systems of values. The real uncertainties and potentials are like this differently appraised, and the social acceptance of the risks and the unexpected are determined by the cultural and political context. Thus, one of the tasks of the environmental evaluation would be the explicit ness of the relationships between technical uncertainty and social and institutional uncertainty.

INSTITUTIONAL ASPECTS

The brazilian environmental legislation is quite detailed, with relationship to the approaches of accomplishment of EIA, and its minimum content. However, the legal obligation of implantation

of the recommendations of those studies doesn't exist. The licensing system, while external interference in an only stage of the cycle of the project, is not enough to guarantee the effective incorporation of the results of the studies in the management of the project. Thus, the responsibility for the effective use of the results of EIA still depends exclusively on internal decision of the proposing company of the project. On the other hand, that responsibility is rarely shared by the company, in the measure in that the current Brazilian institutional picture is not competent to apply in an appropriate way the environmental evaluation.

The institutional capacity

In general, the area affected by a project is under the jurisdiction of several institutions, at federal, state and municipal level, with competences on sectorial aspects (for example production of energy, health), on natural resources (for example forest resources, mining), or on parts of the territory (for example city halls). Frequently, those institutions have objectives and different priorities, even conflictive, and its competences if overlaps on the same territory. The formal mechanisms or informal of coordination of its actions are practically nonexistent. There is still a lack of regional and local institutions capable to contribute in the evaluation process.

Those deficiencies in the institutional capacity hinder the implementation of the protection measures and monitoring of the environment, when these demand the participation of several institutions. In a general way, the Brazilian experience shows that most of the actions of environmental management of projects of the electric section that present positive results are those that are directly controlled and/or executed by the proposer of the project.

Although, as we affirmed previously, the companies of the electric section should guide its performance in the perspective of the regional development, the promotion of the development is not of its specific competence. In consequence, the companies don't have the legal attributions, the technical capacities, and resources enough to centralize that process. Those deficiencies can explain the relative failure of the plans of displacement of population of the flood areas. For example, in the case of Tucuruí, the main objective was of lodging the moved population. In consequence, it was not considered sufficient the creation of new work opportunities and of income for those communities, or the rational use of the natural resources of the area of the reservoir. Even so, there was a relative improvement of the conditions of life of the local population immediately and the means were not created of maintaining it long term.

A strategy adapted for the environmental management of large projects of the electric section should consider two levels of coordination of the activities:

a) An internal coordination of the company, with access to the different instances of decision, and with the function of integrating the works of the several involved sections: the technical teams of project, the team of environmental studies, the section of real state patrimony, the external consultants, etcetera.

b) An external coordination, possibly organized according to a model of "global administration of the enterprise", and with the function of a forum for discussion and of decision. This coordination could gather the several institutions and social actors involved in the process of implantation of the project facilitating the search of negotiables solutions to the eventual conflicts of interests.

The participation of the social actors

As indicated previously, the results of EIA are conditioned by the incorporation capacity, in the evaluation process, of the values and the different social actors' interests. In general, the field of the uncertainties, in relation to the environment, is sufficiently vast so that several legitimate concerns they can be articulated in relation to several acceptable technical positions. In that context, the evaluation becomes a political, exercise even if its speech supports a scientific rationality supposedly neutral and independent of ideologies.

Experience shows that environmental evaluations done as closed technical scientific exercises failed to identify and to evaluate impacts and significant alternatives, and especially, the ones of importance for minority groups. On the other hand, in the measure in that the social and institutional conflicts increase, and the specialists diverge, the credibility of the decisions and the viability of the actions proposed cannot be justified more for the only argument of the scientific responsibility.

In that perspective, the evaluation process can also turn into a channel for the social negotiation, supplying a picture for the proposition and discussion of compatible options with the several interests present, and for the identification and the resolution of eventual conflicts. An opportunity for the development of the trust and of the social commitment is created. Thus, the different social actors participation is fundamental, from the initial stages of the project: in the definition of the evaluation approaches, in the characterization of the impacts, in the formulation of alternatives, as source of basic information about the environmental conditions and the perception of those conditions.

That participation can assume several forms, active or passive (surveys, debates, work groups, sensitization campaigns, etc.) the modalities of the participation should be defined in each case, according to the degree of the social actors' motivation, the moment of the participation in relation to the cycle of the project, and the established relationship type among several protagonists.

CONCLUSIONS

There exists the need of the environmental management certainly, in a country like Brazil, that faces the challenge of a balanced development. In that sense, the possibilities of the application of EIA as an instrument of an environmental politics is still not discussed and explored tottaly.

The practical experience has shown the usefulness of the environmental evaluation for the planning and the environmental

management of large projects. The success of its application, however, it depends on a political will, of an appropriate institutional picture, of the readiness of resources and of information.

In conclusion, some basic strategies, discussed in this work, they are summarized, in the sense of to promote and to support the use of this instrument:

a) EIA should be introduced while it is an integral part of the process of taking decisions of the company, to be applied continually through the planning stages, implantation and management of the project. It is fundamental that the engineering studies and of economic viability of the project they consider the results of the environmental evaluation.

b) The compatibilization of the projects of great transmission systems with the strategies of regional development should be a central concern. This includes the exploration of the opportunities of development of new economic activities potentially created by the project. The multiple and shared use of the resources should also be considered, in the conception of the projects.

c) The application of EIA requires an appropriate institutional support. The responsibility for the environmental management of great transmission systems should not only be attributed to the proposer of the project. It is necessary the creation of a coordination instance between the proposer and the other institutions and involved groups of interest.

d) It is necessary the development of methodologies and evaluation approaches adapted to the available resources and the local conditions, and also to the technical and managerial capacities of the company. The training of human resources should extend at the technical, scientific, managerial and community levels, in the sense of to promote the local capacities of evaluation and environmental management.

e) The local communities effective participation and of the groups of interests affected by the project is essential, from the initial phase of the evaluation. This participation can assume several forms, spontaneous or induced. The public participation can contribute to the identification and negotiation of eventual conflicts of interests, and it can also be a source of information about the environmental conditions and the social perception of those conditions.

f) In face of the recent regulation, by President Fernando Henrique Cardoso, of the Law of Environmental Crimes (Law 9,605), through the ordinance 3,179, it urges more and more, improvements in the methodologies of evaluation of environmental impacts. Previously, the Brazilian Institute of the environment and of the Natural Resources Renewed (Ibama), they could only collect fines of up to U$ 2,600,00 (Out-1999). Starting now, in accordance with the ordinance, the fines can reach U$ 26 million (in the current exchange), depending on the environmental crime made, and the administrative penalties can be applied. In the law, the penalties are divided in infractions made against the fauna, flora, pollution, against the urban order, the cultural patrimony and against the environmental administration.

g) The progresses in the existent methodologies are strategic in the measure that the companies of the electric section, conscious of the benefits and alterations introduced in the environment, by the construction of electrical systems, in consonance with its environmental Politics, it looks to get the certification ISO 14000. The implantation and implementation of Systems of Environmental Administration, with the application of modern methodologies of evaluation of environmental impacts, allow, from the planning to its operation, to establish guidelines that allow it to reconcile the economic and social development with the conservation of the pertinent natural resources.

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