

**Advisory Guidelines on Transboundary and
Regional Impacts of the SIEPAC Transmission Line
Project in Central America**

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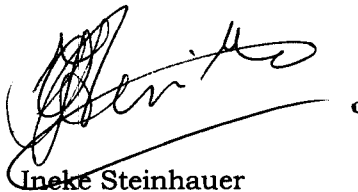
Utrecht, Commissie voor de milieueffectrapportage

**Advisory Guidelines on Transboundary and Regional Impacts of
the SIEPAC Transmission Line Project in Central America**

**Advice submitted to the Central American Commission for Environment and
Development, by a Working Group of the Commission for Environmental
Impact Assessment in the Netherlands.**

Technical Secretary

Chairman



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Utrecht, 24 February 2003

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MAIN POINTS OF THE ADVICE

This report is a combination of a review and a guidelines report. A review has been performed of the 1997 EIA studies for the SIEPAC project as well as of the 2002 IDB ToR for the environmental studies of SIEPAC. Supplementary guidelines are given for information, which has not yet been covered by the IDB ToR, and is considered important for decision making on the project.

The 1997 EIA studies are incomplete, purely descriptive and qualitative. They form however good starting documents for the EIA-studies still to be drafted. An essential shortcoming is the lack of a clear justification of the SIEPAC project within the strategy of the PPP. The Commission recommends to clearly relate the rationale of SIEPAC to the main objectives of the PPP.

The 2002 IDB ToR represent a general and comprehensive basis to guide further EIA studies required to obtain the environmental licences. The Commission is however of the opinion that the ToR sometimes lack focus: not all information has to be worked out with the same level of detail and not all information is relevant. For reasons of efficiency and transparency, the Commission proposes a phased approach. The first phase being the justification of the location of a (relatively wide) corridor, the second (design) phase being the establishment of the detailed alignment. The Commission indicates in the report which part of the IDB-TOR concerns required information corresponding to the first phase and which part could be dealt with in the second phase.

Supplementary guidelines to the IDB ToR address elements which are considered by the Commission as essential information for decision making. These guidelines relate to strategic considerations, to transboundary issues, to harmonisation of criteria, to impacts and public participation. The Commission suggests in which chapters of the IDB-ToR these supplementary guidelines could be inserted. Below the most important elements are summarised:

Project justification:

The Commission observes that the capacity of the SIEPAC (300 MW in the first phase) is very limited when compared with the total installed electricity generation capacity of 6543 MW (year 2000) in the 6 countries. Moreover, only 5 % of the total energy consumption would be managed by the international connection. An essential factor for success is co-operation between countries in the electrical sector. Major potential benefits are associated with the capability of transmitting energy but also with the prospectives of optimising energy generation at regional level.

The Commission recommends to justify the SIEPAC project through:

- presenting the autonomous development (could objectives still be met if SIEPAC is not constructed)
- drafting a medium and long term plan or policy for expansion of the electricity sector, taking into account the sources of energy, constraints and priorities to be satisfied
- indicating complementary political and institutional requirements to guarantee that the investment achieves the stated objectives.

Transboundary issues:

The SIEPAC project presents a good opportunity to pursue other objectives of the PPP such as the development of boundary regions. The EIA studies should consider options for the SIEPAC project to favourably contribute to the development of these regions and mitigation of direct and indirect negative impacts it may cause. This can be done through:

- provision of low cost energy, the multiple use of project construction facilities (accesses, camps) to be part of permanent regional infrastructure and the provision of better electrical services through well positioning of substations near/in boundary regions.
- create positive synergy between SIEPAC and other developments in boundary areas (tourism development, small scale enterprises).

The EIA study therefor has to develop a SIEPAC alternative with maximum benefit for poverty alleviation in boundary areas. Major transboundary impacts can be perceived as changes which may occur gradually as a result of SIEPAC, in electricity sector practices and operation. This again emphasises the importance of the issue of regional energy planning, including power generation, to be addressed in the EIA studies.

Harmonisation of environmental criteria:

SIEPAC has to comply with the EIA requirements and regulations of 6 countries, including underlying criteria/procedures, which, although not contradictory, are heterogeneous. The Commission recommends that the EIA studies pay special attention to harmonisation of environmental criteria used in different countries, of methodologies and procedures for EIA and of environmental management principles and plans. This entails the choice of environmental indicators and weights, environmental evaluation methodology and instruments, impact forecasting, classification and quantification and harmonisation of preventive, corrective and compensatory measures. CCAD could be instrumental in this effort.

Natural risks, ecological and social impacts:

Natural risks such as earthquakes, volcanic eruptions, landsliding and flooding have implications for route selection. The Commission gives guidelines for which information is required for corridor justification and which information is necessary for detailed alignment. Ecological impacts which should receive priority attention are fragmentation of habitats and impacts on migrating birds. The Commission provides guidelines for how relevant information can be obtained: summarise available information, conduct expert workshops and design a mitigation/compensation plan. Social impacts on vulnerable groups in boundary areas and indigenous groups need specific analysis.

Public participation:

There is an apparent lack of adequate information as related to PPP, including the SIEPAC project. This has strongly contributed to speculations, mistrust and opposition to the PPP and SIEPAC. The Commission therefore recommends that a process of public information/consultation be started immediately at an adequate level. In such a process the environmental authorities of the countries involved should play a key-role, together with EPR. EPR should consider to have a specific budget allocated for public participation purposes, to be managed by the national environmental agencies, leading to a better mutual understanding and to further incorporation of social and ecological concerns in SIEPAC and PPP.

1. INTRODUCTION

1.1 The Initiative: Sistema de Interconexión Eléctrica de los Países de América Central (SIEPAC)

The initiative forms part of the so-called Puebla-Panama Plan (PPP), which promotes regional development in order to overcome poverty and increase the quality of life of the people of Mesoamerica. The Plan proposes a strategy for the region that includes a series of initiatives and projects, which are designed with two goals: to promote integration, and to foment dialogue between authorities and the civil society to help consolidate a shared vision of economic and social development¹.

The projects that form the basis of the PPP were proposed by the Secretary General of the System for the Integration of Central America (SICA) in March 2001. These proposals were considered by the Presidents of the eight countries in the region and were decided to form the basis for the formulation of a common strategy for the transformation and modernisation of the region. One of them is the SIEPAC project.

The SIEPAC project involves two parallel and simultaneous tasks. The first one entails the creation of a Regional Electricity Market (MER, for its acronym in Spanish). Using technical co-operation resources, it will support the design of regional standards and establish two regional institutions (a regulating agency and an operator) that will be responsible for enforcing and updating the regional standards. The second task is to build the SIEPAC line (see map appendix 5). The infrastructure project includes the construction of approximately 1,830 Km of 230-kV power transmission lines and connections to substations in each country, from Panama to Guatemala, in order to integrate and strengthen the power transmission networks of Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama. The creation of the MER and the construction of the SIEPAC line should help attract private investment in large power plants designed to serve the regional market, using modern technologies and cheaper and more efficient fuels. Over the next decade, Central America will need to invest around \$700 million a year in power generation.

The SIEPAC project has been selected as a first and pioneering project of PPP. The stated objectives of the project are:

- reduce operation and investment costs in general as a consequence of a co-ordinated planning and operation of electrical grids
- significant economy-of-scale resulting from this integration and consequent reductions of electricity prices to the countries
- advantages on safety, quality of services, integration and regional complementarity

¹ As a reference a short overview of this Plan, including the general vision, structure and composing initiatives and objectives, is presented in annex 6.

1.2 Current situation

EPR (Empresa Proprietaria de la Red) was established to design, construct, operate and maintain the SIEPAC network. EPR shareholders are the electricity companies of Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panamá and Spain.

In 1997 an Environmental Impact Assessment (EIA)-study on regional scale was presented based on the preferred route at that date. The Interamerican Development Bank (IDB) reviewed the EIA-study and found that there was 'acceptable progress reached' on environmental matters until that date in order to start formalities in relation to project financing.

At this moment national EIA-studies have to be undertaken to obtain corresponding environmental licences, according to the legal requirements of the countries involved.

In 2002, IDB drafted Terms of Reference (ToR) with the objective of being able to give social and environmental approval for the SIEPAC project (appendix 2). The ToR are meant:

- to comply with the administrative procedures in relation to environmental licensing in each of the countries.
- to analyse the validity of the 1997 EIA-study contents
- to support public participation requirements and
- to realise complementary studies

1.3 Request of the CCAD and involvement of the Commission

In October 2002, during a meeting in Costa Rica of the Technical Committee on EIA of the Central American Commission on Environment and Development (CCAD), it was agreed by all EIA directors of the Central American countries that on basis of the IDB-ToR each country would add specific requirements according to their own EIA-regulations and that these would be put together into one document with additional requirements to the IDB-ToR².

In November 2002, the CCAD invited the Netherlands Commission for EIA³ (see letter appendix 1), to assist CCAD in addressing the regional and trans-boundary impacts of SIEPAC.

In order to prepare an advisory report on this specific request, the Commission formed a working group of experts, representing the Commission, which comprises the following disciplines: civil engineering/energy, ecology and nature conservation, geology, risk assessment and natural hazards, EIA application. The working group members of the Commission are listed in appendix 3.

² Observaciones a los TdR propuestas por el BID para el Proyecto SIEPAC, borrador, diciembre 2002

³ Henceforth referred to as 'the Commission'

This working group visited Central America from 25-31 January 2003 (see appendix 4, working programme). The purpose of this visit was to collect project- and site specific information and discuss matters with several government authorities and non-government organisations and institutes. The findings of the working group were presented and discussed with the EIA directors in the meeting of the Technical EIA Commission in Antigua, Guatemala on 30 and 31 of January 2003.

1.4 Rationale and justification of the approach taken by the Commission

For this project, the EIA process was designed to meet the requirements of IDB and the 6 Central American countries involved. ToR were prepared by IDB in 2002 and supplemented with observations of each country. These were used by the Commission as a review framework.

The aim of this report of the Commission is to give guidelines for information to be gathered in additional EIA-studies to guarantee the full integration of environmental and social considerations in decision-making, with a special emphasis on regional and transboundary impacts⁴.

In order to be able to formulate supplementary guidelines, the Commission decided to follow a step-wise approach:

- Step 1: Study the 1997 EIA, with the aim of getting background information on the project, and evaluating the validity of contents
- Step 2: Read and evaluate the IDB ToR and the observations made by the six countries on the ToR.
- Step 3: Check if transboundary and regional aspects have been taken into account in these ToR and if not, add sections on these specific topics through supplementary guidelines. The results of step 1 and 2 will be taken into account.

These steps were taken partly through conducting preparatory desk studies in the Netherlands, and taken again during the Commission's visit to the region. The step-wise approach as proposed by the Commission was agreed by CCAD. Although this was not a specific item in the request of the CCAD, the Commission could not fail to be exposed to different issues and aspects of the PPP and their bearing on the SIEPAC project. The comments and recommendations presented in the sequence are the result of such observations as well.

⁴ The Commission defines transboundary and regional impacts as impacts related to questions like:

- Screening and appraisal of proposed routings. Was the preferred route in 1997 the most environmentally friendly and socially acceptable route? Have other routes be considered since? Have realistic routes been excluded from description in the EIA?
- Is information dealt with at the same level of detail in each of the individual countries?
- Procedures in relation to mutual information requirements
- Are environmental requirements (eg. in licensing) similar in each of the countries
- Compensation issues: eg. when the route crosses a vulnerable area in one country because of connection to the route in other countries, which mitigating/compensating measures are proposed or which protocol is followed?

2. CONCLUSION AND RECOMMENDATIONS ON THE 1997 EIA (STEP 1)

The information in the 1997 EIA-study does not provide sufficient information to get a good overview of possible impacts of the project and the way the impacts are going to be mitigated and compensated for. These shortcomings are not necessarily the result of a poor methodology or poor terms of reference but of the incompleteness and superficiality of the work done and mostly of its strictly qualitative character. The EIA-study may, however, be used as a starting document to carry out the national EIA studies which still are needed.

An essential shortcoming of the 1997 study is the lack of a clear justification of the SIEPAC project within the strategy of the PPP. The Commission has observed during its discussions with NGOs in the region that there is a strong mistrust of the objectives of the PPP, which is certainly partly based on the lack of knowledge on these objectives.

- The Commission recommends to clearly relate the rationale of SIEPAC to the main objectives of the PPP⁵ (see also 4.1). It is also proposed to execute a Strategic Environmental Assessment of the strategic coherence between the PPP and the list of 10 proposed initiatives, as well as the coherence between the individual initiatives.

The Commission gives its detailed observations on the review of the EIA-study in appendix 7. Shortcomings are listed. Recommendations are given for supplementary information and are integrated into step 3, chapter 4.

3. CONCLUSIONS AND RECOMMENDATIONS ON THE IDB-ToR (STEP 2)

During its visit to Central America, it became clear to the Commission that the IDB ToR will form the minimum requirement for the contents of the EIA studies to be undertaken by the 6 consultancy firms in each country. It is not within the mandate of the Commission to review and adapt the existing IDB-ToR, only to supplement the ToR with guidelines for important elements, which remain untouched. Nevertheless, the Commission is of the opinion that these ToR sometimes lack focus: not all information has to be elaborated with the same level of detail. Therefore, the Commission proposes a phased approach in the **EIA process** (and thus in the IDB ToR) to enhance efficiency and transparency. This is explained below. Lacking **EIA contents** will be addressed in chapter 4.

EIA is a continuous and iterative process embedded in the progress of the work of EPR. Some decisions have been taken already (e.g. on the corridor for SIEPAC) and others are still to be taken (e.g. detailed alignment).

⁵ par: 1.2 and 1.10 of the "Plan Puebla-Panama - Propuesta Preliminar de Proyectos", San Salvador, May 30, 2001

The EIA-study should therefore start with a justification for the chosen corridor, in which, besides technical/economic criteria, the socio-economic aspects (including indigenous groups), valuable forest and protected areas, bird migration, regional development (integration with other planned projects), general geomorphology, volcanic and seismic hazard assessment and trans-boundary aspects have been taken into account. The EIA-study should make clear why for example a Caribbean or axial corridor have been set aside in an early stage.

In this *first phase* three alternative options should be presented:

- the autonomous development (what would happen if SIEPAC is not constructed, could objectives still be met?), see also par. 4.1
- the alternative corridor which contributes most to environmental sustainability and poverty alleviation, see also par. 4.2 and 4.4-4.6
- the preferred alternative of EPR (this could overlap with the above mentioned corridor).

These options should be presented and compared at a scale of 1: 250.000 or 1: 500.000. The Commission expects no delay for this phase as most of the information is already available in the EIA-study of 1997. The preferred alternative corridor (width some 30 km) should be justified in relation to the stated objectives of the PPP.

In a *second phase* the detailed alignment (width of some 3 km) including alternative options should be presented at a scale of 1: 50.000. Insight has to be provided in the weight of selection criteria used and the comparison and weighing of alternatives, preferably summarised in a 1 page overview, using a matrix showing the preferred option followed by a substantiated conclusion. In this second phase only selected information⁶ is necessary, thus avoiding duplication of information and collection of irrelevant information.

- The Commission recommends that for reasons of transparency and efficiency⁷, the EIA process consist of two phases The first phase being the justification of a (relatively wide) corridor, the second (design) phase being the establishment of the detailed alignment. This process can be set up in such a way that a number of general components of the EIA are discussed and substantiated in phase 1 in a parallel public participation process and decided at supranational and national level⁸, whereas the detailed alignment choice within the corridor in phase 2 is focusing on site specific aspects of the EIA and handled in a public participation process at provincial and local level.

In appendix 2 A, the Commission indicates which part of the IDB-ToR should be addressed in the first phase and which part should be dealt with in the second phase.

⁶ such as slope instability, flooding and erosion prevention, land use, access roads, cutting of trees, operational impacts, compensation issues

⁷ According to Honduran law, an EIA-study is valid for a period of 1 year. If construction is delayed longer, a new EIA-study is required.

⁸ This is already an example for the need to harmonize criteria used in the 6 countries: a choice has to be made on the criteria used for justification and the weights to be assigned to potential impacts

4. SUPPLEMENTARY GUIDELINES AND RECOMMENDATIONS FOR SIEPAC (STEP 3)

4.1 Project justification (ad 2, IDB-ToR)

The general technical characteristics of the project have been defined. A choice has been made on the voltage, general route, location of substations and other major parameters on the basis of a 15 years operation planning horizon.

Pending studies and definitions are related to:

- Options for a later stage expansion of transmission line capacity (additional line following the same route or double circuit line implemented in two phases)
- Optimisation of stretches of the line to avoid harmful encroachments from the environmental and social point of view
- Detailed design of the transmission line, its supporting structures, foundations, accesses, constructive support
- Detailed design of substations (possibly including their location), operation control centres

Such features are expected to incorporate the results of environmental studies to be conducted in 2003/2004.

As a general observation, the Commission would like to mention that the capacity of the SIEPAC (300 MW in the first phase) is very limited when compared with the total installed electricity generation capacity of 6543 MW (year 2000) in the 6 countries. Moreover, only 5 % of the total energy consumption would be managed by the international connection. For reference purpose, the 300 MW capacity corresponds to the expected growth of electric energy consumption of one year in the region. As a consequence, the SIEPAC project should be understood as being a pilot project to promote and encourage the establishment of an integrated planning, the establishment of national policies taking into account regional complementarities in the electrical sector and promote integrated operation.

In the SIEPAC project an essential factor for success⁹ is co-operation between countries in the electrical sector. This relates to planning, operation and management of an international project and its influence on the adaptation and modification of national practices and procedures and sometimes even legal and institutional frameworks.

Major potential benefits are not only associated with the capability of transmitting energy but mainly with the prospectives of optimising energy generation at regional level.

The Commission noticed, and this was also often raised in the discussions, the lack of broadly based and encompassing medium to long term energy planning exercises.

⁹ Although the SIEPAC Project with its 300 million US\$ investment is not a mega project it still represents an important expenditure (10 US\$/capita of the regional population).

- The Commission recommends that the EIA-studies clearly indicate the rationale for SIEPAC through:
 - paying increased attention to formulation of medium and long term energy planning activities with a horizon extended to the limit of forecasting ability, including projections by development scenarios.
 - indicating which complementary institutional and political measures are in place or need to be put in place to guarantee that such an investment really achieves its stated objectives.
 - explaining if and how the transmission line has been designed in such a way that it can be upgraded and/or doubled without main environmental impacts.

4.2 Transboundary issues (new chapter in IDB-ToR, e.g. after 2)

The SIEPAC project presents a good opportunity to pursue other objectives of the PPP such as the development of boundary regions. These are also the subject of a special initiative of PPP in view of their relatively abandoned state and since they always were end of infrastructure supply. There is potential for substantial transformations of livelihood and demography in the passage from a state of relative lack of mutual neighbour interest to a state of induced co-operation given the opportunity. This all entails positive and negative environmental and socio-economic consequences which better be forecasted and acted upon¹⁰. SIEPAC could contribute to the development of boundary regions, for example through:

- the provision of better electrical services, well positioning of substations at limited distance from the regions of interest
- the planning and implementation of temporary and permanent facilities for the purpose of line construction (camps, accesses) in such a way as to represent a more permanent utility to the regional infrastructure
- the creation of some added opportunities in the boundary regions derived from the availability of electricity at acceptable costs.

The objective of boundary region development can, however, only be achieved if properly acted upon at planning, implementation and operational level.

- The Commission recommends therefore, that the EIA studies consider carefully the options available for the SIEPAC project to favourably contribute to the development of these boundary regions and the mitigation of potential direct or indirect negative impacts it may cause. This can be done through the following guidelines, to be included in the EIA-study:
 - The EIA study should compare the autonomous development in these regions without SIEPAC with a situation with SIEPAC. It should also describe the limitations of SIEPAC to have a greater positive impact on the development of these regions. Therefore the possible relation should be described between SIEPAC on the one hand and e.g. tourism development, rural electrification schemes, public services and development of private initiatives (e.g. small scale enterprise de-

¹⁰ Clear examples of boundary region development in South America have often been associated with the implementation of bi-national projects notably in the water resources and energy sector (e.g. Itaipú, Brazil-Paraguay, Yaciretá, Argentina-Paraguay, Salto Grande, Argentina-Uruguay).

velopment) on the other hand. Special emphasis should be put on possible impacts on alleviation of poverty of vulnerable groups. The EIA study should identify the circumstances under which such positive effects could be maximized or enhanced. This implies also the development of a SIEPAC alternative with maximum benefit for poverty alleviation in boundary areas.

■ As a result of the development of boundary regions negative environmental impacts may occur (often a paradox). The EIA study should describe the possible negative impacts of the autonomous development (no SIEPAC), a development with SIEPAC and the circumstances and demands under which negative environmental impacts can be minimized.

■ SIEPAC is created to start a Regional Electricity Market (MER). Although the transmission capacity of SIEPAC is fairly limited, its creation opens the possibility to generate electricity in one country and consume it in another. In this way it could push in the direction of either more hydropower or more thermo-electric power generation, each with its own environmental consequences. But also both could grow in absolute terms. There will be an obvious need for regional planning of power generation. Likewise there is a need for harmonization of environmental rules and regulation in the Central American countries in order to promote co-operation and avoid false competition. The EIA study should describe such impacts in a scenario of no further harmonization of environmental rules and regulations and a scenario where within some five years these regulations would be harmonized. It should also describe a scenario with and one without regional power generation planning.

Some broader transboundary issues, not directly linked to SIEPAC are dealt with in appendix 8.

4.3 Harmonisation of environmental criteria (ad 4, IDB-ToR)

SIEPAC has to comply with the EIA requirements and regulations of 6 countries, including underlying criteria/procedures, which, although not contradictory, are heterogeneous. It is EPR's intention to develop the EIA studies having the support of 6 different consulting companies (one for each country) This procedure requires special attention to the following aspects:

- strong and effective co-ordination of tasks in order to achieve a well integrated and harmonised study
- harmonisation of environmental criteria used in different countries, of methodologies and procedures for EIA and of environmental management principles and plans
- co-operative work between consultants to define diagnostics and mitigation plans for transboundary and transregional impacts, involving 2 or more countries at a time.

If these aspects are not followed the risk is to achieve 6 partial studies with little in common, by far missing the concept of an integration project.

In essential terms, co-ordination is a task and responsibility of EPR but should be monitored, guided and encouraged by CCAD which should be instrumental in defining common accepted environmental criteria to be used throughout the project and provide a wise focus on the relevant environmental issues, possibly leaving aside an excess of secondary requirements with little consequence.

The EIA studies to be conducted for SIEPAC form an excellent opportunity to:

- compare national requirements for environmental licensing
- propose a set of coherent environmental criteria (in particular for mitigation measures) for the entire project, satisfying all national requirements
- promote the establishment of a reference framework for future integrative projects of similar nature

■ The Commission recommends that a special effort in the EIA study is devoted to such tasks in view of their importance in setting the stage for further expected developments. The Commission endorses the actions already taken by CCAD (e.g. through the PROSIGA and EIA strengthening projects) in conducting efforts towards the further unification of procedures, criteria, requirements in the environmental context.

4.4 Natural Risks (ad 6.2.1-6.2.3 and 7, IDB-ToR)

The characteristics of a high voltage power line, composed of widely spaced pylons will generally lead to minor implications in relation with the occurrence of natural hazardous phenomena such as listed below:

Earthquakes: during the corridor justification in a first phase the seismic hazard zonation maps of the countries involved have to be consulted to establish the accelerations that can be expected to occur within the design period defined. In contradiction to the IDB TOR it is not sufficient to only consider the peak acceleration values but specifically the acceleration values at those frequencies for which the pylons are most vulnerable due to their form and height. The most appropriate anti-seismic design for the pylons can so be developed. The large variation of seismicity in the region may lead to different designs for different parts of the SIEPAC line.

Volcanic eruptions: the corridor justification should be based on an inventory of all active volcanic phenomena in the regions crossed, so as to keep sufficient distance from potential eruption sites. Potential channels for piroclastic flows, lahars, mudflows and lava outflows must be identified during the determination of the detailed alignment as they may generally be crossed by a proper location of the pylons on adjoining higher areas.

Landsliding and accelerated erosion: during the corridor justification it is important to identify strongly dissected, and actively eroding areas as the positioning of pylons in these areas may lead to serious problems or exaggerated costs. During the definition of the detailed alignment and positioning of the pylons in the design stage a careful selection of stable terrain or the design of suitable support measures may require additional geotechnical studies.

Flooding: flooding is not considered to be an important natural hazard for power line construction. However, potential flood channels should be identified in the design stage and pylon locations will have to be selected on adjoining terrain not affected by the flooding or (if necessary) in the flooding channel with appropriate measures for erosion protection.

■ The Commission recommends to include the above mentioned information in the EIA studies.

4.5

Ecological impacts (ad 6.2.5-6.2.7 and 8, IDB-ToR)

The project covers 1830 km of transmission line. Sometimes the line could cross or pass ecologically sensitive areas, but in quite some cases the line will cross areas with little evidence of relatively untouched ecosystems. For example, most of the areas the Commission visited during a field trip from Guatemala City to Santa Ana in El Salvador consist of ecosystems with an already considerable human influence.

Two possible effects (including induced effects) are most critical for the ecological environment and should get priority attention:

- Fragmentation of natural habitats by the construction of the transmission line (together with possible construction of roads for maintenance), leading to quality loss of biodiversity. This fragmentation is generally accompanied by the opening up of relatively undisturbed areas for settlement by farmers. In such areas the influence of the electricity towers on the scenery can also be high (aesthetic appreciation).
- The transmission line being a physical obstacle for birds (causing victims) in regional, intercontinental migration, but probably most of all during daily migration from feeding to sleeping areas.

The Commission's knowledge of the alignment of the transmission line is insufficient to determine such sensitive areas. A first guess includes the following areas:

Fragmentation of habitats: Border area between Guatemala and Honduras and the alignment in Guatemala that is near to the Sierra de las Minas. In these parts important areas of the Meso American Biological Corridor¹¹ (MBC) are located. The Commission also wishes to mention areas where the connection lines with Belize and Mexico are planned to be constructed. These projects are outside SIEPAC but within PPP. The areas crossed are possibly of high ecological value.

Impacts on migrating birds: residing birds might be affected by the construction of the transmission line especially in RAMSAR Sites near the Pacific coast of Meso America: Bocas del Polochic (Guatemala), Laguna El Jocotal, San Miguel (El Salvador), Los Guatusos (Nicaragua), Caño Negro, Tamarindo, Palo Verde and Reserva Forestal Terrabe-Sierpas (all in Costa Rica), and Golfo de Montijo, Veraguas (Panamá).

This list is at the one hand probably not complete. At the other hand advice from experts or detailed study may lead to the conclusion that the impacts on some of these areas may be neglectable.

- The Commission proposes an approach of tiering to identify sensitive areas where such processes might take place as a result of the construction of the transmission line. This approach consists of three steps:
 - Summarize available information on regional and global initiatives like the MBC and RAMSAR sites in maps, together with the proposed alignment for SIEPAC and possible alternative routes.

¹¹ The MBC recognizes three different types of land use within the corridor: protected areas, corridors and proposed new protected areas.

- Conduct (a) regional workshop(s) with representatives of the MBC project, ornithological societies in the region¹² and knowledgeable environmental NGOs and institutes¹³. The objective of the workshop would be to identify the most vulnerable areas the transmission line might pass or cross.
- Then the EIA consultants should make a detailed study of the priority areas and propose alternative routes and mitigation and compensation measures. This third step also implies negotiation with entities responsible for the management of the areas to find acceptable mitigation and/or compensation measures¹⁴.

4.6 Socio-economic impacts (ad 6.3 and 8, IDB-ToR)

Social impacts to be described in the EIA include the following:

- Localisation and social description of the directly and indirectly influenced area because of the establishment of SIEPAC.
- Analysis of social, economic, political and cultural tendencies in these areas, especially in relation to possible effects SIEPAC may have.
- Impacts on transboundary regions (see 4.2).
- The issue of compensation for the lines passing through agricultural lands. What are the criteria and regulations for such compensation? Is it going to be equal in the different countries?
- Identification of indigenous territories which may be crossed by SIEPAC and identification of possible impacts.
- Design of mitigation/compensation measures, using a process of negotiation with the populations involved, including e.g. measures to prevent people from starting living underneath the transmission line.

For the identification of impacts on indigenous territories a comparable methodology as described under the preceding paragraph is proposed: summarise available information, conduct workshops with experts, and design a detailed plan (and budget) for mitigation/compensation.

- The Commission recommends to include the above mentioned information in the EIA studies. These impacts should be specified in nature and intensity and communication strategies should take gender issues and the existence of different ethnic groups into account. Impacts should be described both for the construction and operational phase of SIEPAC.

¹² For example: Birdlife International, FUNDAECO (Guatemala), SalvaNATURA (El Salvador), Universidad de Honduras (Honduras), Fundación COCIBOLCA (Nicaragua), Asociación Ornitológica de Costa Rica, Sociedad Audubon de Panamá

¹³ For example: Coordinadora para la defensa y desarrollo de la flora y fauna del Golfo de Fonseca (Honduras), Fundación Mario Dary (Guatemala) y Fundación Cecropia (Costa Rica)

¹⁴ Mitigation measures to be considered are, among other things:

- Safe design of the transmission line.
- Mitigation measures against electrocution. Such measures depend on bird size and pylon design. Monitoring of the impacts of such measures is important as the impacts and effectiveness may vary from species to species.
- Reduction of collision mortality by the introduction of wire markers, both for static wires and distribution lines. Also here monitoring is essential, as the impact of such mitigation measures on different species may vary much.
- Breeding on towers (pylons) can be controlled by nest platforms to give territorial birds space for their nests. Additional modifications may be necessary to prevent breeding in certain parts of the pylon, especially in the case of colonial breeders.

4.7 Public participation (ad 13, IDB-ToR)

There is an apparent lack of adequate information as related to PPP, including the SIEPAC project. This has strongly contributed to speculations, mistrust¹⁵ and opposition to the PPP and SIEPAC. Public involvement in the development of the ideas entailed by PPP also appears to be largely missing.

The Commission has noticed this almost complete lack of knowledge of what SIEPAC is (only a transmission line, or also including hydropower generation facilities?) or its proposed route in several occasions (e.g. during a meeting the Commission conducted with 15 representatives of civil society groups in Guatemala City). Representatives of SIEPAC, electricity companies and NGOs acknowledged the knowledge gap.

The Commission itself also was hampered in the execution of its task by the lack of exact, quantitative information and lack of detailed information¹⁶ as to the proposed alignment of the SIEPAC transmission line.

Official requirements in most, but not all countries¹⁷ demand public participation only once the EIA study is ready. But waiting until that moment would only increase public resistance to SIEPAC and the PPP.

- The Commission therefore recommends that a process of public information/consultation be started immediately at an adequate level. In such a process the environmental authorities of the countries involved should play a key-role, together with EPR. EPR should consider to have a specific budget allocated for public participation purposes, leading to a better mutual understanding and to further incorporation of social and ecological concerns in SIEPAC and PPP.

Public participation has to be organised depending on the level and stage of decision making. It will be different for an SEA for the PPP and e.g. the second phase of the SIEPAC EIA-study. Some methods and instruments for public participation are provided in appendix 9.

¹⁵ It is important to indicate who will be the beneficiaries of SIEPAC, as the Commission noticed that there is much concern that only private enterprises may benefit from SIEPAC, and that it will not contribute to poverty alleviation in terms of better services and lower electricity prices.

¹⁶ Although the Commission received maps and some additional technical information from EPR during its stay.

¹⁷ In Honduras e.g. the law demands public participation in the definition of ToR for the EIA-study