

# Oil and gas exploration and production activities in Brazil: The consideration of environmental issues in the bidding rounds promoted by the National Petroleum Agency

Jacqueline Mariano\*, Emilio La Rovere

*Programa de Planejamento Energético/COPPE/UFRJ, Centro de Tecnologia, Bloco C, Sala C-221—Cidade Universitária, Ilha do Fundão—CEP: 21945-970, Brazil*

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## Abstract

This paper aims to address and analyze the environmental issues related to the Brazilian bidding rounds for exploration and production of oil and natural gas held by the National Petroleum Agency (ANP) from 1999 to 2005. To do so, after a brief retrospective of the seven rounds, the four main points of the bidding process are analyzed from an environmental perspective: the selection criteria for choosing the areas to be offered, the Minimum Exploration Program required by ANP, the eligibility criteria for the oil companies to take part of the bids and the concession agreements. Thus, it is possible to present the evolution of the environmental component insertion from the first to the seventh bidding round, and then to assess its efficiency in each round, apart from offering suggestions for its improvement. The suggestions presented are based on the related international experience and on the lessons learned during the last seven years.

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## 1. Introduction

In August 1997, Federal Law No. 9478 was enacted in Brazil, determining the flexibilization of the state monopoly in the oil and gas industry, under *Petróleo Brasileiro S.A.* (Petrobras,—a state-owned company), since 1953, when it was created. This Law, known as the Oil Act, established a new regulatory framework for the industry and created the National Petroleum Agency—ANP, with the responsibility for regulating, overseeing and contracting activities for the industry. Other ANP responsibilities include “enforcing good practices for the conservation and sound use of oil and natural gas and for the preservation of the environment, namely, to ensure environmental protection, operational safety and conservation of oil resources”.

The Oil Act determined that, in the new sectoral model, contracting exploration and production (E&P) of the oil and natural gas deposits, and of other liquid hydrocarbons, would be executed through concessions preceded by calls for tenders.

The bidding rounds are at the core of the planning of the expansion of the Brazilian oil and natural gas industry (current production, and projections for short- and long-term production, reflects Petrobras’ strategic planning, which, in fact, still owns most of the oil and gas production in the country) insofar as it is through them that the rights to E&P are awarded to entrepreneurs.

ANP begins the tenders process by defining the areas to be offered, establishes technical qualification criteria for the candidates to be eligible to participate in the auction, defines the minimum exploration program (MEP) to be carried out in each area and drafts the concession agreement. Clearly, environmental issues permeate all these stages and need to be considered to the extent that these are determining factors for the

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\*Corresponding author. Tel.: +55 21 21128362; fax: +55 21 21128129.  
E-mail addresses: [jacqueline@ppe.ufrj.br](mailto:jacqueline@ppe.ufrj.br) (J. Mariano),  
[emilio@ppe.ufrj.br](mailto:emilio@ppe.ufrj.br) (E. La Rovere).

Table 1  
Characteristics of the bidding rounds held by ANP

Bidding round	First round (1999)	Second round (2000)	Third round (2001)	Fourth round (2002)	Fifth round (2003)	Sixth round (2004)	Seventh round (2005)
Offered blocks	27	23	53	54	908	913	1134
Awarded blocks	12	21	34	21	101	154	251
Awarded onshore blocks	0	9	7	10	20	89	n.a.
Awarded offshore blocks	12	12	27	11	81	65	n.a.
Awarded area (sq km)	54,660	48,074	48,629	25,289	21,951	39,657	194,739
Awarded offshore area (sq km)	54,660	37,846.7	46,266	14,669	21,254	36,811	7735
Sedimentary basins	8	9	12	18	9	12	18
Successful companies	11	16	22	14	6	19	41
New operators	6	8	8	5	1	n.a.	n.a.
Average local content—exploration phase (%)	25	42	28	39	78.8	85.7 <sup>a</sup>	74 <sup>b</sup>
Average local content—development and production stage (%)	27	48	40	54	85.6	88.8 <sup>a</sup>	81 <sup>b</sup>
Minimum 2D seismic survey (km of lines)	43,000	45,850	44,700	17,000	83,700	Variable	Variable
Minimum number of exploratory wells to be drilled	58	96	136	83	210	Variable	Variable
Signature bonus (million US\$) <sup>c</sup>	181.0	262	241	34	9	222	485
Minimum investment in the first exploration period (US\$ million in three years)	65	60	51	28.5	121 <sup>d</sup>	681 <sup>d</sup>	828.9 <sup>d</sup>

Source: ANP (2005a–c).

<sup>a</sup>Weighted average from the fourth quarter on.

<sup>b</sup>Only exploration blocks (marginal fields with mandatory minimum local content of 70%).

<sup>c</sup>These figures are expressed at the dollar exchange rate of the day of the auction, they were not updated to 2006 dollars.

<sup>d</sup>Amounts expressed in dollars at the going rate on the day of the round, supplied in work units.

decisions of the company that applies for the concession of an offered area.

In order to evaluate the type and effectiveness of the approach to environmental issues in the bidding rounds held by ANP, the following topics will be analyzed in this paper:

- The criteria for selecting the areas to be offered in the rounds.
- The technical qualification criteria for the eligibility of the companies that apply to participate in the rounds and which are published in each of the calls for tenders.
- The MEP defined for each of the rounds.
- The concession agreements signed by ANP and the successful companies in each of the rounds.

As a result of this analysis, suggestions will also be presented for improving the most crucial points, based on international experience, as well as on the lessons learned over the seven years since the monopoly was made more flexible.

## 2. The bidding rounds promoted by ANP

ANP has held seven bidding rounds for blocks since 1999, annually. Before that, in 1998, the ANP and Petrobras signed 397 concession agreements. This process

became known as the round zero of concessions. Table 1 summarizes the information about the seven rounds.

After concessions are acquired, successful companies must obtain the environmental licenses for the specific exploration, production and development activities they intend to carry out from the competent environmental agency (in the case of offshore activities or when the areas fall under the jurisdiction of two or more states where the competent agency is IBAMA—the Brazilian Institute for the Environment and Renewable Natural Resources<sup>1</sup>, and in the case of onshore activities, the environmental agencies of the states).

In the environmental licensing model currently used in Brazil, there is no prior licensing during the planning stage, as in other countries. This is one of its weak points and the greatest source of complaints by investors and future concessionaires. In the prevailing model, the government (through ANP) first auctions the areas and then issues the licenses (through IBAMA). Nevertheless, this format contributes to increasing wariness and tension among investors who wish to operate in the country, as well as to the loss of its credibility abroad, because of the increased risks for those who come to operate in Brazil (Malheiros, 2002).

<sup>1</sup>Federal body under a special legal regime with the responsibility for assisting the Ministry of the Environment in the formulation and coordination of environmental policies.

Table 2  
Environmental licensing for E&P of oil and natural gas and respective requirements

Activity	ANP requisite	Environmental license	Required environmental study	Aim
Acquisition of seismic data	Authorization to carry out survey of non-exclusive marine seismic data or concession agreement for the block that provides for research, including survey of exclusive marine seismic data	Seismic research license—SRL	Class 1: Surveys at a depth of less than 50 m, or in areas of environmental sensitivity, subject to the development of PECS and SES/SEIR Class 2: Surveys at a depth of between 50 m and 200 m, subject to the development of PECS and SES/SEIR Class 3: Surveys in depths greater than 200 m, subject to the development of PECS	Authorizes, after approval of the required studies, the start of the collection of marine seismic data
Drilling	Minimum Exploration Program contracted with ANP	Prior drilling license—PDL	Environmental control report—ECR	Authorizes drilling activity
Production for research	Authorization for long-term testing—LTT	Prior license for production for research—PLPR	Environmental feasibility study—EFS, which must contain the description of the drilling activity, environmental risks, identification of impacts and mitigating measures	Authorizes long-term testing—LTT
Installation of units and systems for production and transfer	Authorization for production and transfer systems in new field or block—approbation of the development plan approved	Installation license—IL	Environmental impact assessment and environmental impact assessment report—EIA/EIAR or environmental assessment report—EAR, which should contain an environmental diagnosis of the area where the activity is located, description of the new works or expansion, identification of the environmental impacts and mitigating measures to be adopted, taking into account the introduction of other undertakings.	Authorizes, after approval of the EIA/EIAR, and respective public hearing, the installation of systems and units required for production and transfer
Operation of units, installations and systems part of the activity	Authorizations for operation	Operation license—LO	Environmental control project—ECP, which should contain the executive projects for minimizing the environmental impacts assessed in the PDL, PLPR and IL, with their respective documents.	Authorizes, after meeting the IL conditions <sup>a</sup> , approval of the ECP, of the individual emergency plan—IEP—and after technical inspection, the start of the operation of the undertaking

Source: IBAMA (2004) and ANP (2005a–c).

<sup>a</sup>The environmental agency will establish conditions according to the following categories: (i) general conditions, which include the set of legal requirements related to environmental licensing and (ii) specific conditions, which include a set of restrictions and technical requirements specifically related to the activity being licensed.

Thus, because the environmental variable was not considered during the phase of definition of the areas to be offered, various problems were generated for the entrepreneurs and also for the environmental authorities. The main problems raised were:

- Offering of blocks in extreme sensitive areas, which generated many conflicts between the oil E&P industry and other sectors of the economy, such as fishing and tourism.
- Constant and crescent conflicts between seismic activities and fishing activities.
- Delays on the obtention of the environmental licenses of some companies, with the possibility of compromising the execution of the MEP, contracted with ANP.

- Asks for environmental licenses refused by IBAMA (enterprises: Devon and Sipetrol asks for drilling licenses in sensitive areas, in 2001, Newfield, in 2005).
- Removal of extreme sensitive areas that were already being announced for fifth and sixth bidding rounds, by ANP.
- Conflicts with NGOs about some of the offered areas (blocks located in very sensitive areas), before the fifth bidding round, in 2003.

Table 2 shows the environmental studies required to obtain each of the environmental licenses and its relation with the attributions of ANP.

### 3. Criteria for selection of the areas offered in the bidding rounds

In the new sectoral model, ANP, in accordance with the guidelines of the National Energy Policy Council—CNPE,<sup>2</sup> defines the areas that will be offered in the bidding rounds. The definition of the blocks is one of the decisive moments of the process and it strongly influences its results.

By the end of 2005, ANP had already held seven bidding rounds to offer areas for oil and natural gas E&P activities. Nevertheless, until the fourth round, held in 2002, the process of defining the areas to offer was essentially based on geological prospecting data and prognoses, environmental aspects were not considered. According to ANP, the decision to place a certain area under bidding, took into account, above all, the existence of enough geological and geophysical data for an adequate technical analysis of the blocks located in these sectors.

For the Agency, “enough” meant that there was sufficient amount of information to determine the exploratory risks associated to each block. In the areas in which the amount of data were not deemed adequate, the Agency sought to carry out exploratory activities to acquire data, so as to enable these areas to be offered in future bidding rounds and to foster exploratory activities in the region in question. In choosing the areas, other factors were also considered such as the situation of the national and international oil markets and the existence of oil industry infrastructure in the regions where they were located.

Furthermore, not providing environmental information before the block auctions, until the fourth bidding round, increased the risks to which entrepreneurs were subject. The oil industry, in addition to the market risks inherent to all sectors of the economy, incurs an exploratory risk, associated to geological issues, an internal and external political risk associated to uncertainties in the different levels of government and a regulatory risk. The latter is strongly influenced by environmental licensing issues.

Specifically with regard to environmental impacts, until 2002, ANP believed that the environmental legislation prevailing at the start of the bidding rounds did not require prior environmental studies. Specifically with respect to environmental licensing, all associated proceedings and costs remain the responsibility of the future concessionaire. Nevertheless, this strict legal provision did not prove to be adequate in practice because, in several cases, the concessionaire was not able to obtain the license, and, as a result, the MEP was jeopardized. Due to these problems, the Federal Audit Court<sup>3</sup>—TCU—determined, in 2003,

that ANP must, from that point on, detail the environmental conditions used as criteria for defining the areas offered in the bidding rounds.

Both the experience of other countries and the various problems faced in Brazil by concessionaires showed that inclusion of environmental considerations in the process of selecting the offered areas reduces the regulatory risk, associated to the uncertainties of environmental licensing, thus improving the conditions for new upstream market agents. Therefore, the number of MEPs that are not executed because licenses have not been granted has been reduced. Furthermore, an adequate environmental mapping, in addition to possible restrictions to the development of the economic activity itself, is useful information to help agents determine the level of technical–operational difficulties, as well as the costs and time required for the environmental licensing process of each venture.

In the case of E&P contracts for oil and natural gas, not obtaining the environmental license and, as a consequence, interrupting activities is a contractual risk undertaken by the concessionaire. If the responsibility of the environmental agency in the licensing process is not proved, the full burden arising from the impossibility of implementing the undertaking is borne by the investor. Not obtaining environmental licenses for E&P in an awarded area could prevent execution of the MEP, and, in this case, the concessionaires lose the money used for the signature bonuses and in exploratory investments, in addition to being subjected to enforcement of guarantees and sanctions.

Because of these facts, the entrepreneurs harshly criticized ANP. In response, it alleged that environmental information was being used in the definition of blocks as far as it was made available by the competent environmental agencies. That is, if the environmental agencies (IBAMA and state environmental agencies) did not make the data available, then it was not possible to take them into account. Nevertheless, the selection criteria for the blocks offered up to the fourth bidding round and published by the ANP show that the areas were for the most part defined by the interest shown by investors and by the amount of available geological data. This also demonstrates that the lack of environmental information was never an impediment to selection of a given area for bidding, since several of them were in environmentally sensitive areas. Furthermore, neither the Federal Government (through CNPE) nor ANP established a bidding schedule that allowed these areas to be offered in the future, after the offer of less environmentally sensitive areas, as is the practice in some developed countries, such as the USA and the UK.

*(footnote continued)*

entities of the direct and indirect administration, with respect to their legality, legitimacy, economics and inspection of the application of grants and waiver of income. The Federal Audit Court—TCU—is a collegial body and its decisions are made in Plenary or in its two chambers.

<sup>2</sup>The Oil Act (Federal Law 9.478/97) has created the CNPE, in order to substitute the National Energy Commission. CNPE is a Council of the Federal Government, which has the attribution of purposing to the President national policies and specific measures related to the energy question.

<sup>3</sup>As established in the Federal Constitution, the Federal Audit Court, in assisting the National Congress, can exert accounting, financial, budgetary, operational and property oversight of the Federal Government and

As a result of the aforementioned problems and the decision of the Federal Audit Court, ANP began, in 2002, to consider the inclusion of environmental aspects during the definition of the blocks to be auctioned, starting in the fourth bidding round, and in 2003 it defined the main goals to be achieved. These were:

(a) Use of environmental criteria in the process of selecting areas:

*Criteria:* Exclusion of sensitive areas.

*Objective:* Avoid superimposing conflicting uses of soil.

- Protected areas: Conservation units and their respective buffer zones (10 km radius, or according to the management plan of the respective area).
- Urban areas.
- Indigenous areas.

Since the fourth bidding round, the areas classified as priority areas for biodiversity conservation were also added to the exclusion criteria, using IBAMA definitions and recommendations.

(b) Adoption of new procedures:

- Presenting the areas in advance to the environmental agencies, establishing dialogue and cooperation with them.
- Adapting to the best practices adopted by industry. and
- Reporting the levels of environmental requirements of the areas under bidding, helping in the decision making process of companies (ANP, 2003a, b).

### 3.1. Round zero—1998

Definition of areas awarded to Petrobras during Round Zero was guided essentially by technical criteria, based on the analysis of the documentation sent to the Agency by the company. Taken into consideration were: the effective state of production of the requested fields, the existence of past activity and the commitment to investments in the areas of exploration and development as well as compatibility among the existing conditions, the proposed programs and the requested areas.

### 3.2. First round (1999)–Third round (2001)

To define the areas offered in the first bidding round, ANP adopted as criteria the availability of technical data and prospectivity of the blocks, as a means to attract interested investors. In any of these rounds, no information was supplied to entrepreneurs on environmental aspects.

It is important to mention that during the period from 1998 to 2002, the IBAMA authorities warned ANP about further problems with the environmental licensing of the areas offered, criticizing not considering the environmental questions during the planning phase. Until 2001, the institution had serious problems with lack of equipments and technicians that were not enough to do the necessary

work and to issue the licenses in a reasonable period of time.

### 3.3. Fourth round—2002

This was the first round in which ANP included an environmental criterion during the definition of the blocks to be offered, and this criterion was the existence and location of environmentally sensitive areas. IBAMA, together with MMA, carried out the environmental mapping of the marine and coastal blocks offered in the fourth bidding round. Mapping consisted of superimposing the blocks offered with the map of environmental sensitivity related to drilling wells, with respective specifications. These specifications identified the basic requirements for licensing the activity in each of the offered blocks. The environmental sensitivity map for drilling was developed taking into account the environmental characteristics relevant to the direct impacts of the activity (the criteria include fishing resources, biodiversity, the existence of protected areas, socioeconomic aspects, the coastal zone and the area of influence of the activities). Nevertheless, the interaction of drilling activities with other anthropic activities (such as fishing, tourism, etc.) was not considered, but the risks of impacts on sensitive areas by oil spills were taken into account. The sensitivity map established a scale of 1–5 to designate the level of requirements needed for licensing by the environmental agency. The greater the detected sensitivity (level 5), greater will be the difficulties the entrepreneur will face to license the block, and as a consequence, more environmental studies, financial resources and time will be required for the process.

However, IBAMA, in the licensing guidelines for the fourth round, mentioned that there was a big lack of environmental information necessary to support them, about the human activities and about the environmental resources potentially affected by the E&P activities, which generated direct implications on the environmental licensing process, more specifically on the environmental studies necessary to get the licenses. This, according to IBAMA, reflected on the quality of the studies, and also on the duration of the licensing process, which is incompatible with the dynamics of the sector (IBAMA, 2002; ANP, 2002).

Prior knowledge of the environmental sensitivity proved to be successful during the fourth round, because instead of inhibiting the interest of participants, it contributed to reducing uncertainties and risks (Tribunal de Contas da União, 2002,b).

### 3.4. Fifth round—2003

During the fifth round, ANP, following IBAMA recommendations, excluded 162 blocks from the Espírito Santo and Potiguar Basins because of their environmental sensitivity, meeting the demands of the NGO Conservation International, which carried out a study called



“Assessment of the Impacts of Exploration and Production of Hydrocarbons in the Abrolhos Bank and its Surroundings”.

Second editions of the Guide for Licensing Seismic and Drilling Activities were also published, with the levels of requirements for environmental licensing of seismic activities and drilling for oil and gas for the blocks offered in the fifth bidding round.

### 3.5. Sixth round—2004

In this round, the same procedures were used as for the fifth round, through the third edition of the Guide for Licensing of Exploration and Production, with the same objectives of the earlier editions. Environmental considerations excluded 61 blocks of the 975 that were initially offered by ANP because they were close to protected areas or were located in areas of ecological interest. The guide to the sixth round was more detailed in comparison to earlier editions.

In addition to issuing the licensing guides, IBAMA also established technical guidelines for modeling oil spills in the sea.

### 3.6. Seventh round—2005

In this round, the same procedures were used as for the sixth round, through the fourth edition of the Guide for Licensing of Exploration and Production, containing the environmental guidelines and the levels of requirements for licensing seismic activities and drilling in the offered blocks, to reduce the uncertainties and to ensure environmental protection and sustainable development of the oil and natural gas industry. IBAMA also issued, for the seventh round, guidelines for modeling oil spills in the sea.

For the first time, according to IBAMA, all the blocks offered in the seventh round are apt to obtain environmental licensing, since their offer was the result of a joint decision of the Ministry of Mines and Energy and ANP on the one hand, and between MMA and IBAMA on the other. The environmental guidelines presented to the entrepreneurs resulted from an agreement signed among the parties. Evidently, the licenses will be obtained since the entrepreneurs complain with all the requirements of IBAMA, regardless of environmental studies and other conditioning measures, such as emergency response plans.

Finally, it is also important to mention that IBAMA, from the fourth round on, complained with ANP that the time necessary for the environmental analysis of the areas to be offered to the issuing of the licensing guidelines was very small, smaller than that necessary to give accuracy to the mapping.

Other important problem faced by IBAMA during the last eight years is the lack of environmental information and data about the Brazilian regions. It is the cause of the excessive use, by the institution, of the cautionary principle.

This conservative orientation has been criticized both by ANP and the entrepreneurs, as considered excessive.

Other important problem caused by the lack of an official environmental data bank is the fact that environmental studies about the same regions are done several times by different enterprises that ask for licenses. Thus, the same environmental information is collected several times by different consulting firms, so as to carry out the same studies for different enterprises. The data collected are not made available in a public bank. Currently, National Observatory is developing an environmental data bank (BAMPETRO), with resources from CTPETRO.<sup>4</sup>

## 4. Technical qualification of companies and the environment

In the calls for tenders of the Brazilian bidding rounds, criteria for technical, legal and financial qualification are defined to establish the eligibility of oil companies to participate in the auction. The technical qualification criteria are based on their proven experience in E&P of oil and natural gas. With respect to the environment, ANP started to establish in the second bidding round, a technical qualification item, corresponding to a type of “environmental qualification”, which consists in companies proving their experience in operations in environmentally sensitive areas, in addition to a history of environmental preservation. However, ANP did not define what is an environmentally sensitive area, or neither what consists a history of environmental preservation.

From the second to the sixth round, a scale of points was defined and its variation is shown in Table 3. It is important to note that this item represents only 6% of the total points that can be obtained by the enterprises, which want to take part in auctions, in the technical qualification. For the seventh round this item was excluded of the Final Tender Protocol, and ANP did not inform the reasons why.

It is also important to mention that the Article No. 100 of Federal Law No. 9.605/1998, dealing with environmental crimes, determines that the companies found guilty of environmental crimes in Brazil may not take part in public tenders for a period of five years, if they have been condemned for crimes with malice, and for three years in the case of crimes with fault.

## 5. The MEP

When the applying companies become concessionaires, they commit themselves with ANP to explore the awarded area according to a minimum program of exploration activities, the so-called MEP, which is established in the concession agreement and varies according to the round in

<sup>4</sup>CTPETRO is a sectorial fund for the oil and natural gas industry that aims to stimulate development and innovation in the sector, through partnerships between companies and universities and/or research centers. It is supported by the royalties' payment.

Table 3  
Maximum points for the technical qualification criterion: environment item for bidding rounds

Criterion/bidding round	First	Second	Third	Fourth	Fifth	Sixth	Seventh
Volume of production (boe)	–	40	40	40	40	40	20
Onshore exploration activities	–	10	10	10	10	10	10
Onshore production activities	–	10	10	10	10	10	10
Offshore exploration activities	–	15	15	15	15	15	10
Offshore production activities	–	15	15	15	15	15	10
Deepwater exploration activities	–	10	10	10	10	10	10
Deepwater production activities	–	10	10	10	10	10	10
Exploration and production activities in adverse environments	–	20	20	20	20	10	10
Operation in sensitive environments and history of environmental preservation	–	10/-999	10/-999	10/-999	10/-160	10/-150	–
International experience	–	20	20	20	20	20	25
Experience in services	–	10	10	10	10	10	–
Technical board with experience	–	–	–	–	–	–	36
Maximum total points	–	170	170	170	170	160	151
% environmental criterion (%)	–	6	6	6	6	6	0

Source: ANP (1999, 2000a,b, 2001, 2002, 2003a,b, 2004a–d, 2005a–c); ANP—Comissão Especial de Licitação (1999, 2000, 2001, 2002, 2003, 2004, 2005).

Table 4  
Minimum exploration programs for the ANP bidding rounds for offshore areas

Round (duration of MEP period, in years)	First period	Second period	Third period	Total number of wells
First round (3+3+2) or (3+3) or (3+2+2)	Seismic <sup>a</sup>	2 wells	3 wells	5
Second round (3+2+2) or (3+3+2)	Seismic	2 wells	3 wells	5
Third round (3+2+2) or (3+3+2)	Seismic	2 wells	2 wells	4
Fourth round (3+3+2) or (3+2+2)	Seismic or a well	2 wells	2 wells	4
Fifth round <sup>b</sup>	*	*	*	*
Sixth round	*	*	*	*
Seventh round	*	*	*	*

Source: ANP (1999, 2000a,b, 2001, 2002, 2003a,b, 2004a–d, 2005a–c); ANP—Comissão Especial de Licitação (1999, 2000, 2001, 2002, 2003, 2004, 2005).

<sup>a</sup>Each sq km of 3D seismic research is deemed to be equivalent to 5 km of 2D seismic research.

<sup>b</sup>Start of the definition of MEPs by the applying companies.

which the E&P rights were acquired. The MEP consists of the definition of exploration activities that the concessionaire must execute at the very minimum over a previously established period of time (carrying out 2D and 3D seismic research and drilling of exploratory wells), and these activities are all subject to obtaining environmental licensing. In this context, it is crucial that the environmental variable is considered when the MEPs are defined and dimensioned for the rounds.

In rounds 1–4, ANP divided the MEP into three periods. For the seven bidding rounds held by ANP until the end of 2005, the MEPs of the marine blocks are shown below in Table 4.

In order to better analyze this issue, we should evaluate the fourth bidding round, since this was the first round to have a mapping of environmental sensitivity of the offered marine areas, carried out by IBAMA. Table 5 presents a summary of the MEP and of the environmental sensitivity of the marine blocks offered in the fourth round.

Table 5 shows that all the marine blocks offered in the fourth round had to have the same number of wells drilled as in the second and third periods, regardless of their environmental sensitivity. With respect to the seismic

activity, it can be seen that the minimum required amount is fairly proportional to the area of the block, but there is no relation to its sensitivity. For environmental licensing purposes, drilling is a far more critical activity than seismic activity, due to the potential impacts on the environment.

With respect to the length of the exploratory periods, it was also not possible to identify any type of correlation between their increase and greater environmental sensitivity of a given area (the maximum environmental sensitivity, according to the licensing guide, is 5). Once again, it can be seen that strictly technical criteria guided the definition of these variables.

With respect to the results of the fourth round, concessions for three of the seven blocks with maximum environmental sensitivity (equal to 5) were successfully acquired, as were three blocks with an environmental sensitivity of 4. Thus, it may be said that some entrepreneurs were not disturbed when faced the possibility of a complex environmental licensing process.

Starting in the fifth round, the companies, with their signature bonus offers, define a proposal for MEPs, expressed in work units (WUs), which also became another assessment factor (WUs were previously defined by ANP).

Table 5  
Summary of the MEP and of the environmental sensitivity of the marine blocks offered in the fourth bidding round

Basin	Block	Exploratory periods (years)	Area (km <sup>2</sup> )	First period (seismic km)	Second period (number of wells)	Third period (number of wells)	Environmental sensitivity—drilling (1–5)	Concession
Barreirinhas	BM-BAR-2	3+3+2	5125	3000	2	2	4	No
	BM-BAR-3	3+3+2	2180	2000	2	2	5	Yes
Campos	BM-C-20	3+3+3	2232	2000	2	2	1	No
	BM-C-21	3+2+2	1073	1000	2	2	4	No
	BM-C-22	3+2+2	973	1000	2	2	4	No
	BM-C-23	3+2+2	1073	1000	2	2	4	No
	BM-C-24	3+3+2	603	1000	2	2	2	Yes
	BM-C-25	3+3+2	960	1000	2	2	3	Yes
Cumuruxatiba	BM-CUM-3	3+2+2	1392	1500	2	2	5	No
	BM-CUM-4	3+3+2	1718	1500	2	2	4	No
Espírito Santo	BM-ES-16	3+2+2	904	1000	2	2	5	No
	BM-ES-17	3+2+2	685	1000	2	2	4	No
	BM-ES-18	3+2+2	738	1000	2	2	4	No
	BM-ES-19	3+2+2	1216	1500	2	2	5	No
	BM-ES-20	3+2+2	1219	1500	2	2	5	Yes
Foz do Amazonas	BM-FZA-2	3+3+2	7683	5000	2	2	4	No
	BM-FZA-3	3+3+3	7548	5000	2	2	2	No
Jequitinhonha	BM-J-2	3+2+2	743	1000	2	2	5	Yes
	BM-J-3	3+3+3	1856	2000	2	2	4	Yes
Pará-Maranhão	BM-PAMA-5	3+3+2	3077	3000	2	2	1	No
	BM-PAMA-6	3+2+2	2949	3000	2	2	2	No
	BM-PAMA-7	3+3+2	2821	3000	2	2	1	No
Pelotas	BM-P-1	3+3+3	11,043	5000	2	2	2	No
Pernambuco-Paraíba	BM-PEPB-1	3+3+3	3555	3000	2	2	5	No
Potiguar	BM-POT-11	3+2+2	983	1000	2	2	4	Yes
	BM-POT-12	3+2+2	826	1000	2	2	4	No
	BM-POT-13	3+2+2	841	1000	2	2	3	Yes
	BM-POT-14	3+3+2	1655	1500	2	2	3	No
	BM-POT-15	3+3+2	1920	2000	2	2	3	No
Santos	BM-S-28	3+2+2	1495	1500	2	2	1	No
	BM-S-29	3+2+2	2092	2000	2	2	1	Yes
	BM-S-30	3+2+2	2105	2000	2	2	1	No
	BM-S-31	3+2+2	2118	2000	2	2	1	Yes
	BM-S-32	3+3+2	2059	2000	2	2	1	No
	BM-S-33	3+3+2	2076	2000	2	2	1	No
	BM-S-34	3+3+2	2762	2500	2	2	1	No
	BM-S-35	3+3+2	2311	2500	2	2	1	No
Sergipe-Alagoas	BM-SEAL-8	3+3+2	4018	4000	2	2	1	No
	BM-SEAL-9	3+2+2	1089	1000	2	2	4	Yes

Source: ANP (2002).

The process then becomes more efficient, at least with respect to the environment, to the extent that in having available the data on the environmental sensitivity of the region (previously disclosed in the round's Guide for Seismic Activities and Drilling), the entrepreneur is better equipped to estimate what will be environmentally feasible, as well as to plan the schedule of activities.

## 6. Concession agreements

The concession agreement model used in Brazil takes into consideration several aspects such as: the Oil Act, the Brazilian legal framework, specificities of the oil and natural gas industry, international practice and experience, as well as suggestions received during the virtual public



hearings, held during the periods in which ANP receives suggestions from the entrepreneurs for improving the concession agreements.

The agreements have a clause that provides for environmental control and liability for environmental damages, and the requirements included in this clause refer exclusively to the awarded areas. These are:

- The concessionaire must adopt, at his own cost and risk, all the measures required for conservation of reservoirs and other natural resources, and for protecting the air, soil and surface of the water or subsurface, subject to Brazilian legislation and environmental regulations and, in their absence, must adopt the best practices of the oil industry.
- The concessionaire must adopt measures to ensure that operations do not lead to damages or losses that affect other economic or cultural activities in the area of concession, such as agriculture, herd raising, forestry, extractivism, mining, archeological, biological and oceanographic research and tourism, or that disturb the well-being of indigenous communities and urban and rural applications.
- The concessionaire must send copies of the environmental studies required for obtaining environmental licenses, whenever so requested by the Agency.
- The concessionaire must immediately inform whenever any spill occurs or any leakage of petrol or natural gas, as well as the measures already taken to address the problem (ANP, 2004a–d).

This clause has been included in every agreement, from the first to the seventh bidding rounds (both Part A—blocks with exploratory risk, and Part B—marginal fields). The concession agreements in all the bidding rounds also state that the concessionaire will be fully responsible for all damages and losses to the environment that arise, directly or indirectly, from the execution of their operations.

In the concession agreement for Part B (marginal fields) of the seventh round, there is another paragraph, which determines that the new concessionaire will be responsible for complying with the provisions of the corresponding environmental license, and that the environmental damage resulting from the action of the concessionaire is liable to penalties, according to the legislation in effect. The Article 28 item 2 of the Oil Act states the following: “If the concession is terminated for any reason, the concessionaire will, at his own cost, remove the equipment and materials that are not subject to reversion, and must repair or compensate for the damage arising from their activities and carry out the environmental recovery measures established by the competent bodies”.

## 7. The international experience

The international experience demonstrates that developed countries discuss the environmental issues before the

concession of the areas, trying to anticipate the benefits and disadvantages of the oil and natural gas upstream activities, and considering the environment already at the sector-planning phase.

In developed countries, environmental management of the upstream oil industry is addressed in a differentiated fashion, with the exception of areas considered environmentally sensitive: in general, environmental impact assessments are not required for individual projects, as is the case in Brazil. Normally, licenses or authorizations are granted by the responsible government agencies after analysis and planning of each operation.

Nevertheless, this type of environmental licensing is only possible because these countries have the basic instruments that allow the adoption of this type of model. Some examples of the environmental management instruments used in the oil and natural gas industry in certain developed countries include a detailed environmental database, the use of the strategic environmental assessment (SEA) of the areas to be offered, and a set of consolidated laws and regulations specifically for oil E&P.

The use of these instruments does not only lend a greater transparency to the processes for bidding for areas and for environmental licensing, resulting in greater security for entrepreneurs and ensuing reduction of regulatory risks to which they may be subjected, but it also provides a greater efficiency to the subsequent environmental management of the areas, since the most relevant aspects of upstream activities are taken into account.

In this context, Brazil can learn many lessons with the international experience, particularly from the experience of those countries that are at the forefront of managing environmental issues of offshore oil and natural gas industry activities, such as the USA, Norway, Australia, Canada and the UK, whose actions are mentioned below.

### 7.1. USA

In the USA the oil and natural gas activities developed on places distant up to 3 miles (4.8 km) from the shoreline are regulated by the states. From 3 miles on, these activities are under federal regulation, and the Minerals Management Service—MMS—is the federal agency responsible for the E&P licenses in the offshore areas. MMS is a bureau in the Department of the Interior.

The MMS implements, every five years, a program with the licensing of the oil and natural gas activities schedule for the next five-year period. This program is called Five-Year Program, and purposes different planning alternatives to achieve the supply objectives of the country. Thus, the Five Year Program is submitted to an environmental assessment, which determines what is the best between the alternatives purposed, under the environmental point of view. Although this assessment is not called SEA, it has the same objectives. The USA is a pioneer in this kind of initiative, already provided for in law since 1969, when it instituted its National Environmental Policy Act—NEPA.

## 7.2. United Kingdom

In the UK, the environmental licenses are issued by the Department of Trade and Industry—DTI, and there is no need for environmental impact assessment studies for each project. However, SEAs have been carried out in UK since 1999, annually, for each bidding round, and have supported the process of concession of offshore areas to the oil and natural gas E&P activities. The SEA process guarantees previous and detailed knowledge about the areas offered and about the sensitive periods of time for each biological resource. For every round, specific and distinct measures of environmental protection can be stated, such as the enlarging of protected areas and the prohibition of some activities during certain periods of time. The applicant enterprises for operating in the offered areas must comply with the requisites of the *Joint Nature Conservation Committee* (JNCC), that is, the UK Government's wildlife adviser, undertaking national and international conservation work. This is also a requisite for the obtaining of the licenses.

## 7.3. Canada

In the oil and natural gas sector, the environmental assessment process that is being used in Canada begins with a call for bids for offshore activities. At this step, it is carried out as an SEA or any other kind of comprehensive environmental assessment to identify the major issues and principal concerns. The study can lead to the decision of not offering an area or parts of areas.

In the next step, the public review, the SEA is made available for comments by the interested public and by the social agents involved. Hence, the final statement is submitted to the Council of the Provinces, the Federal Minister and the Minister of the Province approbation, in order to proceed with the licensing process. In this way, the carrying out of the SEA is only the beginning of a process that culminates with the concession of the areas for the oil and gas E&P activities to the oil companies (LIMA—Laboratório Interdisciplinar de Meio Ambiente, 2002).

Besides that, in Canada, the E&P of oil and natural gas permitting process is carried out through licenses and authorizations, annually renewable, issued by the National Energy Board. The application of SEA to the oil industry is accounted to the Councils of the Provinces (Canada—Nova Scotia, Newfoundland and Labrador Offshore Petroleum Board), promoting agents and regulators, responsible for the environmental protection throughout all the phases of the offshore activities, from exploration to decommissioning (La Rovere et al., 2002).

## 7.4. Norway

In Norway, before the Federal Government opens areas for oil and natural gas E&P activities, an assessment of the social agents involved and of the potential impacts and

consequences of the upstream activities on industry, commerce and environment are made. The risks of pollution and its social and economic effects are also assessed. This study is called regional environmental assessment that, although having another name, has the same objectives and characteristics of the SEAs. The Norwegian Government also stipulates that the enterprises must consider the cumulative and synergistic aspects of its projects and remarks the needs for pollution control and effluents monitoring. In Norway, two types of licenses are issued: exploration licenses and production licenses. On each license it is determined that the licensee cannot hold back the exploration of other natural resources existent within the licensed area, since there is no significant interference. In such situations, one of the activities can be interrupted and it can be the petroleum activity.

## 7.5. Australia

In Australia, each state or territory has autonomy to create specific regulations for the offshore regions within the limit of 3 miles from the shoreline, which can generate distinct licensing procedures in the country. Beyond this limit there is a major uniformity of the procedures used. In sensitive areas, an environmental impact assessment for each operation is necessary. In the other cases, the authorizations are issued by the Minerals and Energy Department, which imposes spatial and time restrictions for some activities, in order to protect calving and breeding areas. The species considered more important and sensitive are marine mammals and turtles.

Besides these provisions, the Minister for Industry, Science and Resources and the Minister for Environment and Heritage have been working together since 2000, in carrying out an SEA process so as to verify the environmental feasibility of the oil and natural gas exploration activities that will take place at the Australian continental shelf (EA, 2004).

## 8. Critical analysis of the procedures adopted and suggestions for their improvement

### 8.1. Selection of areas to be offered

Although IBAMA began to issue a set of recommendations for the offered areas since the fourth bidding round, at no point was there any guarantee by the environmental agency that the environmental licenses would be granted to the concessionaires when so requested. Thus, at least theoretically, it is possible that areas are still being offered with such environmental difficulties that it becomes unfeasible to carry out oil and natural gas E&P activities. The only difference, after the introduction of the guidelines, was that future concessionaires have more information with regard to the degree of future difficulties in obtaining environmental licenses for each of the areas.

So, although environmental aspects are already being considered when the blocks are defined, licensing of activities and projects individually is still necessary (although not guaranteed), differently to what happens in other parts of the world. Furthermore, the guides prepared by IBAMA merely give an overview to future concessionaires of the level of requirements of the environmental studies that must be carried out to obtain the licenses. These are preliminary studies that indicate the sensitivity of the areas, but still do not address the issue of impacts on the environment.

Thus, we may conclude that the system for defining blocks was improved when it began to consider environmental information, starting in the fourth bidding round. Nevertheless, the selection criteria are still mostly concentrated on the availability of geological data and on the interest shown by companies (attractivity for the investors). The environmental variable has only been used in determining the exclusion areas, whereas it is possible and feasible to use it in a more comprehensive manner.

The main criticism to be made with respect to the licensing guides is the lack of adequate consideration of the economic and social aspects resulting from the interaction of the offshore oil industry with other sectors whose uses are conflicting, in particular tourism and fishing.

It is also important to mention that the fact that ANP did not use environmental information until the fourth bidding round was, to a certain extent, associated to external factors, such as the unavailability of sufficiently consolidated or complete environmental databases, as well as the lack of closer coordination among the Ministry of Mines and Energy (to which the ANP is associated) and the Ministry of the Environment (to which IBAMA is associated).

### 8.2. *Technical qualification*

Notwithstanding the determination of defining parameters for the “environmental qualification” item, the points received by the companies represent a high degree of subjectivity, insofar as there is no definition as to how (qualitatively and quantitatively) the criteria are accounted for, nor what means each parameter. Thus, there is no way a company can assess its qualification previously, despite the Agency’s evaluation.

The ideal situation would be the adoption of some basic and comprehensive criteria for the qualification of the companies wishing to participate in the bidding rounds. Analysis would include verification of meeting minimum requirements, which would make the whole process simpler and clearer. Examples of these criteria are:

- Environmental background of the company.
- History of environmental accidents.
- Existence of legal proceedings for environmental crimes in other countries.
- Certification of the Environmental Management System of the company by an internationally recognized entity.

- Existence of environmental liability of the company, including in other countries.

As an example of international experience, the UK analyses the environmental background of the company’s performance in other similar undertakings.

### 8.3. *Minimum Exploration Program—MEP*

It would be more suitable that the Agency would prepare differentiated MEPs according to the environmental sensitivity of the areas being offered. In this sense, the best would be if the Agency could define longer exploratory periods for the areas with greater environmental sensitivity, because the licensing of these areas tends to be more expensive and more drawn out.

Improving this point would be another benefit arising from the inclusion of the environmental variable in the definition of blocks to be auctioned, since it would allow ANP to assess, individually, the targets and deadlines for meeting the MEP according to the environmental specificity of a certain area, in which the period could be longer or shorter.

### 8.4. *Concession agreements*

The environmental clause of the ANP concession agreements is very general. It does not establish any kind of detail regarding the attention required for the environment. In other parts of the world, there has been a substantial and gradual increase in the scope and volume of environmental provisions over the past few years. More modern and specific provisions include:

- Mandatory submission of independent environmental reports.
- Mandatory submission of a comprehensive environmental management plan.
- Designation of environmental responsibilities in the organization of the operating company.
- Mandatory independent audits or permission for audits to be carried out by the government agency, to verify and assess practices and compliance, and to identify the largest environmental risks and the most effective risk mitigation and disaster management programs.
- Mandatory securities or guarantees to cover environmental liability and to include environmental liability in the mandatory insurance.
- Mandatory recovery of degraded or depleted areas (Martins, 1997).

Although it is desirable to improve the contracts with regard to environmental issues, it is not very realistic to expect that an oil agreement could address all of them in detail. The best arrangement would be to ensure that the agreements include the formal commitment of the concessionaire and leave an opening, through which

internationally accepted environmental management and protection standards and procedures could be incorporated in the concession agreements. The addition of clauses that represent a concrete protection against possible damage to the environment will not diminish the attractiveness of Brazil to foreign investments.

#### 8.5. Suggestions for improvements

As demonstrated before, there are still many opportunities to improve the bidding process currently being employed by the National Oil Agency, with respect to environmental issues. The critical point among those described in this paper seems to be the definition of the areas being offered in the bidding rounds, and ensuing application for environmental licenses required to conduct E&P activities.

In this context, the importance of the SEA of the areas to be offered in the Brazilian bidding rounds, prior to the tender process, is clear, as it is done in the developed countries whose experience was mentioned. The carrying out of SEAs could support the issue, by ANP with IBAMA, of an environmental previous license to the E&P activities, or at least, to guarantee that the enterprises will be able to get the licenses. It would be the ideal procedure to solve the main problems presented, to reduce the risks faced by the entrepreneurs and to ensure the environmental protection. The international experience demonstrates the efficiency and the benefits of the utilization of this tool in the oil and gas sector, and it can be easily suited to the Brazilian specificities.

In 2000 January, the ELPN's Chief, Mrs. Telma Malheiros, defended publicly the emission of previous environmental permits, for the sedimentary Brazilian basins, so as to simplify the environmental licensing process and to improve the federal control over the upstream activities. She was also strongly favorable to the carrying out of SEAs, during the planning phase, by ANP (Malheiros and La Rovere, 2000 and Malheiros, 2002).

Even in case the issue of an environmental previous license for an area (a sedimentary Basin, or a set of blocks, for example) shows to be unpractical (for unless, the carrying out of the MEPS), the SEA adoption could simplify the requirements of the studies necessary to the entrepreneurs to get the licenses, as it is done in the USA. It also could reduce the bureaucracy and the time of licensing.

It is important to note that the carrying out of SEAs prior to the offering of the areas does not exclude the use of the currently procedures adopted by ANP and IBAMA, jointly. The environmental exclusion criteria can be used prior to the definition of the areas to be assessed by the SEA and licensing guides for seismic and drilling activities (with the addition of guidelines for the development and production activities) can also be issued, signaling the exigency levels for the environmental licensing of specific projects, and could be simplified. In a new context, the

Technical Directions for Oil Spills Modeling could be used to feed the SEA process, helping the selection of the areas to be offered.

## 9. Conclusions

The flexibilization of the state monopoly of oil and gas industry introduced a series of changes and challenges that still must be faced by the regulatory agency (ANP) and by the environmental agencies, especially IBAMA, with respect to the consideration of the environmental issues in the sector-planning phase.

A similar situation occurred with the Brazilian power industry. In 2004, the Brazilian Federal Government concluded the institutional reorganization of the power sector. The new model reestablishes long-term industry planning and determines that new generating projects can only be included in calls for tenders once they have the prior environmental license, which certifies the prior environmental feasibility of the undertaking. Thus, the prior license needs to be obtained by the government before placing the undertakings in calls for tenders. This measure is part of a set of rules included in the new model to reduce the risks to investors and this same experience could be used in the oil and natural gas industry, with the adoption of similar rules adapted to their context. The SEA of the areas to be offered could be the management tool that would permit the issue of an environmental previous license for the E&P activities, unless to the MEPS.

The adoption of measures like that, with the implementation of the other suggestions presented in this paper, would represent a significant advance to the bidding rounds process currently held by ANP, aligning it with the most modern international tendencies, and contributing to the reduction of the inherent uncertainties of the oil and gas industry, specially strong in Brazil.

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