

A Brief Explanation about Environmental Licenses in Brazil

Thaíla de Mello Florêncio

MSc. Student, Universidade Federal do Triângulo Mineiro, Instituto de Ciências Tecnológicas e Exatas, Av. Dr Randolpho Borges Junior, 1250, Univerdecidade, 38064-200, Uberaba, MG – Brazil. E-mail: thailamello@gmail.com. Url: www.uftm.edu.br .

Geoffroy R.P. Malpass

PhD. Professor, Universidade Federal do Triângulo Mineiro, Instituto de Ciências Tecnológicas e Exatas, Av. Dr Randolpho Borges Junior, 1250, Univerdecidade, 38064-200, Uberaba, MG – Brazil. E-mail: geoffroy.malpassuftm@gmail.com. Url: www.uftm.edu.br .

Introduction

Since 1934, more than 130 legal publications by the Brazilian government concerning the environment and its most diverse related issues have been approved and practiced in Brazilian Law. It is possible to say that nowadays in Brazil both economy and industry are entering an era of greater environmental awareness in which policies are protective as well as attentive to all processes that affect, involve, exploit natural, renewable or non-renewable resources; and discharges. In a few words, in order to start, perform and expand any kind of activity it is necessary to be licensed according to certain legal requirements. In order to be licensed industries and enterprises need to undergo a mandatory process called Environmental Licensing¹ that, together with the evaluation of environmental impacts, is one of the most important instruments of the Brazilian National Environmental Policy².

As this process is, in practice, a complex step-by-step procedure which depends on the type of activity to be licensed, the aim of this article is to briefly explain each of the three available licenses, enumerate the types of environmental reports that are required, detail the other governmental offices that act together and suggest how Green Chemistry might play a key role on Brazilian Environmental Licensing.

Environmental Licensing

The formal concept of Environmental Licensing establishes that it is an administrative process by which the environmental agency responsible for such licenses supervises the location, installation, expansion and operation of activities that make use of natural resources and that are considered to be effectively or potentially polluting or activities which may cause environmental degradation in any way³. Environmental Licensing considers legal aspects and regulations as well as the technical standards applicable to each case¹.

The process of Environmental Licensing is decentralized. This means that according to varied aspects, such as the type of activity involved, infrastructure size, geographic location, kind of operation, extent of the environmental impacts, amongst others, the process itself, supervision and concession of the licenses will be performed by a government agency at municipal, state or federal level¹. In other words, if the activity is a complex and dangerous one, highly polluting, and localized at the boundaries of two different states, the agency that will be in charge of analyzing the environmental studies will be at federal level. Some cities/towns have competent and qualified professionals to be able to emit (or deny) licenses at a municipal level. If the city has no expertise to deal with the process, it will be analyzed at state level. Finally, if the activity has an impact (both negative and positive) on a greater scale and involves more than one city, but is not yet not significant enough to affect the country as a whole, the licensing process will be done at state level.

Each state has its own licensing agency and processes can have specific interpretations based on local peculiarities. As a result, the present study applies specifically to the *federal* licensing procedure. Table 1 presents the environmental agencies of each state in Brazil, according to Brazilian Development Bank in 2006⁴. Table 2 points out some examples of the different environmental studies that can be requested by such agencies in order to be licensed. Figure 1 represents political map of Brazil⁴ in which the states quoted in Table 1 can be identified.

Table 1: Environmental agencies per state and in federal instance in Brazil⁴.

State		Abbreviation	Agency Name
AC	Acre	SEIAM	Sistema Estadual de Informações Ambientais
AM	Amazonas	SDS	Secretaria de Estado de Meio Ambiente e Desenvolvimento sustentável
RR	Roraima	FEMACT	Fundação do Meio Ambiente e Recursos Hídricos
RO	Rondônia	SEDAM	Secretaria de Desenvolvimento Ambiental
PA	Pará	SECTAM	Secretaria Executiva de Ciência, Tecnologia e Meio Ambiente

AP	Amapá	SEMA/AP	Secretaria de Estado do Meio Ambiente
MT	Mato Grosso	SEMA/MT	Secretaria de Estado do Meio Ambiente
MS	Mato Grosso do Sul	SEMAC	Secretaria de Estado de Meio Ambiente e Recursos Hídricos do Mato Grosso do Sul
MA	Maranhão	SEMA/MA	Secretaria de Estado de Meio Ambiente e Recursos Naturais
TO	Tocantins	SEPLAM	Secretaria do Planejamento e Meio Ambiente
GO	Goiás	SEMARH/GO	Secretaria do Meio Ambiente e dos Recursos Hídricos
DF	Distrito Federal	SEMARH/DF	Secretaria de Estado de Meio Ambiente e Recursos Hídricos
MG	Minas Gerais	SEMAD	Secretaria de Estado de Meio Ambiente e Desenvolvimento sustentável
SP	São Paulo	CETESB	Companhia de Tecnologia e Saneamento Ambiental
PR	Paraná	SEMA/PR	Secretaria de Estado do Meio Ambiente e Recursos Hídricos
SC	Santa Catarina	FATMA	Fundação do Meio Ambiente
RS	Rio Grande do Sul	SEMA/RS	Secretaria Estadual do Meio Ambiente
RJ	Rio de Janeiro	SEMADUR	Secretaria de Estado de Meio Ambiente e Desenvolvimento Urbano
ES	Espírito Santo	IEMA	Instituto Estadual de Meio Ambiente e Recursos Hídricos
PI	Piauí	SEMAR	Secretaria de Meio Ambiente e Recursos Naturais
CE	Ceará	SEMACE	Superintendência Estadual do Meio Ambiente
RN	Rio Grande do Norte	IDEMA	Instituto de Desenvolvimento Econômico e Meio Ambiente
PB	Paraíba	SUDEMA	Superintendência de Administração do Meio Ambiente
PE	Pernambuco	SECTMA	Secretaria de Ciência, Tecnologia e Meio Ambiente
AL	Alagoas	SEMARHN	Secretaria Executiva de Meio Ambiente, Recursos Hídricos e Naturais
SE	Sergipe	SEMA/SE	Secretaria do Meio Ambiente
BA	Bahia	SEMA/BA	Secretaria de Meio Ambiente e Recursos Hídricos
FEDERAL INSTANCE		IBAMA	Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis

Table 2: Environmental Studies and Reports in Brazil

Abbreviation	Environmental Reports and Studies	Correspondence in English	Reference
EIA	Estudo de Impacto Ambiental	Study of Environmental Impacts	5
RIMA	Relatório de Impacto Ambiental	Report of Environmental Impacts	5
PBA	Projeto Básico Ambiental	Basic Environmental Project	6
PRAD	Plano de Recuperação de Área Degradada	Plan for Recovery of Degraded Area	7
PCA	Plano de Controle Ambiental	Plan of Environmental Control	8,9
RCA	Relatório de Controle Ambiental	Report of Environmental Control	10,9
EVA	Estudo de Viabilidade Ambiental	Study of Environmental Feasibility	9
RAA	Relatório de Avaliação Ambiental	Report of Environmental Evaluation	9
EVQ	Estudo de Viabilidade de Queima	Study of Burning Feasibility	11
RAS	Relatório Ambiental Simplificado	Simplified Environmental Report	12
RAP	Relatório Ambiental Preliminar	Preliminary Environmental Report	13
EAS	Estudo Ambiental Simplificado	Simplified Environmental Study	13
EIV	Estudo de Impacto de Vizinhança	Study of Impact of Neighborhood	14
Inventário Florestal		Forest Inventory	15
Plano de Compensação Ambiental		Plan of Environmental Compensation	15
Plano de Encerramento		Plan for Closure	1
Plano de Emergência Individual		Plan of Individual Emergency	16
Plano de Desativação		Plan for Deactivation	17

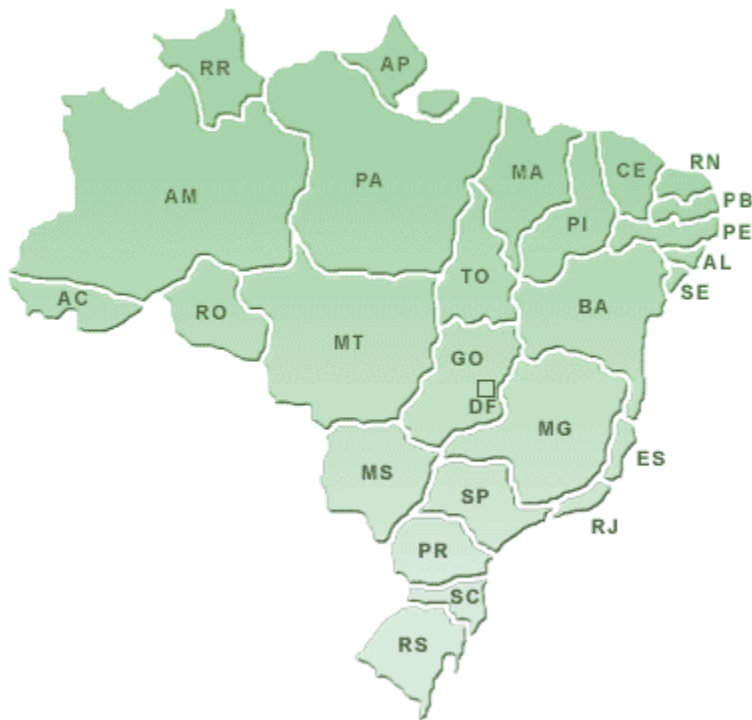


Figure 1: Political map of Brazil⁴.

Basically, the Environmental Licensing process must obey four stages: 1) Presentation of the process; 2) The preliminary license; 3) Installation license and 4) Operating License¹⁵. Nowadays the management of procedures, the observation of deadlines, data provision and operations in general are performed using an online platform called **SisLic**¹⁵.

Presentation of the Process (Instauração do Processo)

The presentation of the process is initiated with an online registration where, besides other requirements, the person responsible for the process has to inform the geographic coordinates of the operation and complete the forms to be submitted. After receiving confirmation of the submission, the Preliminary Licensing starts^{15, 18}.

Preliminary License (LP - Licença Prévia)

One of the first requirements is the elaboration of a Reference Term (RT – Termo de referência) based upon the Standard Reference Term, which is available online at IBAMA website. The RT is a proposal of the guidelines for a EIA/RIMA. The RT has to be presented to the government agency IBAMA. At this point the RT is discussed/analyzed by IBAMA as well as by the other governmental agencies whose involvement may be

necessary. At this stage changes can be suggested, and if the RT is approved, the applicant must publish on newspapers and other media the beginning of the environmental studies of the activity, according to the Law^{1,6,15}.

The Preliminary License must be applied for via IBAMA when planning the implantation, modification or extension of an enterprise, industry or any other potentially polluting activity¹⁵. This license does not authorize project installation but evaluates the environmental feasibility of the project and, if the application is in accordance with environmental legislation and requirements, authorizes its location and technological conception^{15,18,19}. The first step is the submission of two studies, EIA/RIMA (Table 2).

The EIA is a technical/scientific report, while the RIMA is a public consultancy document aimed at acquainting the local community with the issue using simple and objective language^{5,15,19}. The results and conclusions of both reports must be available to population printed and digitalized, as well as sent to the other governmental offices involved related in Table 3. Also, a date is settled to present the environmental study and the project of the proposed activity to the community in a public audience situated nearby the affected area, with the presence of a significant proportion of the local population, non-governmental organizations and who else may be interested, including the media, students and entrepreneurs¹⁵. All complaints, reservations and questions raised at the meeting must be answered within a defined period and must again be presented to the population. Usually, the larger the activity is, the longer it takes to attend and address all doubts and questions.

During the process, it is mandatory for the responsible for the activity to get a municipal certification declaring that the local for installation is in accordance to the local law of use of the soil¹⁵. Also, it is mandatory to inform other governmental offices, according to their particular competence, about the potential risks, damages and impacts of the project, as stated in Table 3.

Table 3: Example of governmental agencies involved in the federal process of environmental licensing in Brazil

Abbreviation	Name of the Governmental Office	Competence concerning the environmental licensing process	Reference
FUNAI	Fundação Nacional do Índio	Analysis and evaluation of impacts caused by activity in lands which belong to natives/indigenous communities, as well as appreciation of adequate proposals with measures to control and mitigate those impacts.	20

FCP	Fundação Cultural Palmares	Analysis and evaluation of impacts caused by activity in lands which belong to escaped slave communities, as well as appreciation of adequate proposals with measures to control and mitigate those impacts.	20
IPHAN	Instituto do Patrimônio Histórico e Artístico Nacional	Analysis and evaluation of the existence of safeguarded goods/belongings identified in the area of direct influence of the activity, as well as appreciation of adequate proposals to rescue them.	20
MS	Ministério da Saúde	Stands for Ministry of Health. Analysis, evaluation and recommendation concerning the impacts and their influence factor to the occurrence of malaria cases, if the activity is located in endemic areas of malaria.	20
ICMBio	Instituto Chico Mendes de Conservação da Biodiversidade	Analysis and procedures for requests and concession of Authorization for Environmental Licensing to activities or enterprises which affect federal protected areas, its buffer zones or surroundings[ref In 5/2009	21
ANA	Agência Nacional de Águas	Determines and grants an authorization for use of water according to surface distribution and mediate its multiple uses (water for drinking, irrigation, industry demands etc).	22

A recent and celebrated example would be the hydroelectric power plant of Belo Monte, which is being constructed on the Amazon river, in the Xingu region. On one hand, there are the economic benefits and public need for energy; on the other hand there are the environmental (e.g. sedimentation and deforestation problems^{23,24}) and social implications, made even more meaningful due to the presence of a national park and native Indian reserve²⁵, protected by law.

The complexity of an EIA report is revealed by the mandatory topics to be assessed:

- **Environmental Diagnosis** of the area previous to the installation of the planned activity, characterizing physical, biotic, civil and economic aspects: soil, subsoil, water, air, climate, mineral resources, topography, soil types and aptitude, rivers and other water bodies, hydrological cycle, marine and atmospheric currents,

fauna, flora, species that are indicators of environmental quality, endangered, rare species, species of high economic or scientific value, protected areas, use of soil (economical aspects), use of water, archaeological, historical and cultural sites and monuments, dependence aspects of the local society as well as their potential use in the future^{5,18}.

- **Analysis of Environmental Impacts** of the project itself *and alternative options*: Involves identification and interpretation of the magnitude of probable significant impacts, describing them as positive or negative, direct or indirect, immediate or in the medium/long term temporary or permanent. In addition, the degree of reversibility, synergic and cumulative properties, **social benefits and social onus distribution**^{5,18} are analyzed
- **Definition and elaboration** of measures to mitigate negative impacts: these must include equipments for control and systems for treatment of waste and effluents, evaluating efficiency of each and every one^{5,18}.
- **Monitoring and Supervision Schemes**: must define a program for monitoring and supervising both positive and negative impacts, indicating factors, aspects and parameters to be taken into account^{5,18}.

Other documents requiring important and specific information such as anthropologic characteristics and public health situation may also be required. The EIA constitutes an exhaustive and detailed investigation of the region and its area of influence and must be carried out by a multidisciplinary team constituted of specialists from each area⁵.

The RIMA reflects the conclusions obtained in the EIA⁵. It must be elaborated in clear, easy-to-understand language, with figures, images and other visual aids and, as a minimum, must address the following points:

- Aims and justification of the project/activity, its relation and compatibility to local and governmental policies^{5,18},
- Project/activity description and its technological/localization alternatives highlighting and detailing each category in the building and operating stages: raw material, labor, energy resources, operational processes/techniques, possible effluents, emissions, residues, waste of energy, direct and indirect employment offers^{5,18},
- Results, in an abridged form, of the studies of environmental diagnosis of the influenced area^{5,18},
- Description of probable environmental impacts due to installation and operation of the activity, considering all aspects of the project^{5,18},

- Characterization of the environmental quality of the influenced area, establishing a comparison between the project and the possible alternatives, as well as the possibility of non-execution of the proposed project^{5,18},
- Description of the expected effects caused by the measures proposed to mitigate the negative impacts, mentioning also those that cannot be avoided and their effects^{5,18},
- Program and schemes for monitoring and supervising the impacts^{5,18},
- Recommendations about the most favorable alternative, conclusion and general commentaries^{5,18}.

Installation License (LI - Licença de Instalação)

In order to obtain the LI, it is necessary to submit a PBA, a Plan of Environmental Compensation and in case of activities that will involve substantial modifications (like a mining site) a PRAD and a Forest Inventory (in cases where vegetation removal is demanded, this report is required to obtain an authorization for removal of vegetation)^{15,18,19}.

The PBA is mandatory, as this document will point out all measures to be taken to reduce negative impacts and improve the positive ones, and all the mentioned reports must be elaborated according to the EIA/RIMA reports and must also be sent to all governmental agencies involved^{15,18,19}.

This license authorizes the infrastructure of the activity to be built in a period that must not exceed six years. In other words, the schedule of construction must be complete within the period established by IBAMA.

Operating License (LO - Licença de Operação)

The Operating License must be solicited before initiating the proposed activity as this license gives permission to initiate day-to-day running of the proposed activity. In order to get the LO, a number of reports is demanded, describing environmental mitigation measures, including those which were not mentioned or were not accurately detailed during the Installation License process. Inspection visits may occur at this stage^{15,18}.

This Operating License will only be conceded after the inspection of all details involved with the proposed activity and its project. At this stage it will be verified if all requirements demanded by IBAMA and other legal environmental offices during the Installation License, and also during previous licenses, were attended and how the measures for mitigation will be projected. This license is valid for a period of between four to ten years. This means that those responsible for the activity itself have between four and ten years to attend, from

cradle to grave, all processes steps in order to attend the legal environmental requirements^{15,18,19}.

Summarizing, IBAMA recommends following these steps^{15,18}

- 1) Identify the competence for the licensing process: Municipal/State/Federal
- 2) Apply for the Preliminary License
- 3) Elaborate the Basic Engineering Project
- 4) Apply for an Installation License
- 5) Apply for Operating License

Problems

Whilst this system could be a reference for sustainable development, setbacks make the procedure tiresome and bureaucratic, thus implying that there is much to be improved, and some examples mentioned in the literature²⁶⁻²⁹ are briefly summarized below:

- Each EIA/RIMA is consistently based upon an RT. However, its character is limited as Reference Terms for different projects can sometimes be very similar, thus resulting in a superficial report that will not be accepted by local inhabitants or by the government. Under such circumstances, the project may stall, turn cold or be abandoned, wasting time and effort, not to mention money, spent by the multidisciplinary team.
- Also, when the Public Audience has its date fixed, the process of licensing is at an advanced stage and sometimes the alternative options are not presented. In this case the local community does not have access to the reports or there is no incentive to attend the audience as those responsible for the project do not want to spread information in order to avoid being opposed by the local population and NGOs. In addition, regulations can be contradictory and in some cases, decisions can even be considered unconstitutional.
- Another problem involves civil/social issues. When the economic side is highlighted in importance, social/cultural concerns may left to one side. Danger resides in the contribution of increased crime rates, poverty levels and concentration of capital and information by a small minority. Added to what can be termed "Indifference to Nature", thousands of acres of unique biodiversity can be lost (without even being studied and described by the scientific community) with the aim of progress at any cost.

Green Chemistry and the Environmental Licensing Process

Typically, the Environmental Licensing process involves the application of previously established technologies and in many cases the application of truly innovative, green-from-cradle-to-grave technology is limited. In Brazil the concept of Green Chemistry has not yet received the dissemination seen in other countries, even at academic levels, although this is changing. Basic Green Chemistry is very rarely taught as separate course module (usually being lumped together with Environmental chemistry) and more specific modules (for example Green Organic Chemistry) are practically unseen. In fact, most chemistry students will have contact with Green Chemistry through seminars and short courses. As a result any subsequent interchange between chemists and other areas, for example with engineers, is subsequently limited in this respect.

On the other hand, given the commercial nature of many engineering projects, sustainable technologies are receiving a greater insertion in the market place. This is especially true in the civil engineering area, where simple measures such as planning for rain water recapture and reuse, use of recycled wood/building materials, tree planting etc. can be used as factors to mitigate environmental impacts during the licensing process. However, in the opinion of the present authors, such measures simply, in the majority, affect the environmental impact at the point of use.

Green Chemistry aims to reduce at the most fundamental level the risk associated with chemical processes and as a result reduce possible environmental (and health) impacts. In many cases the complexity of determining if the process is “green” or not, is complex³⁰. In the chemical and related industries there are numerous industrial case studies where the application of Green Chemistry principles has been applied and the environmental benefits are easily identified in the licensing process. The greater challenge lies in the application of Green Chemical technology in other areas where the chemical process is “invisible” in the end product, but where a careful chemical Life Cycle Analysis can identify the points where the process can be improved³¹.

Overall, the key to greater inclusion of Green Chemistry concepts is to increase awareness of engineers, starting at undergraduate level³². One important initiative by the Brazilian government that should help in this matter is the “Science Without Borders” program which aims to fund the placement of circa 101 thousand scholarships for Brazilian students³³ (undergraduate and post-graduate) at top universities in the United States, Canada, Europe and Asia over the next few years.

Final Considerations

Brazil has a promising system of evaluation for potentially hazardous activities in which environmental, civil and economic aspects are analyzed as a whole and benefits are discussed along with the harms caused to the environment. The Principles of Green

Chemistry can be applied in the very beginning of the process, especially when it comes to mitigate impacts. A judicious analysis of the steps that leads to a harmful or dangerous co-product enables finding the reagent or the stepping stone and replacing it by another one less prejudicial, not to mention other related conditions. Thus, the application of Green Chemistry will be relevant in the process of Environmental Licensing in Brazil.

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