

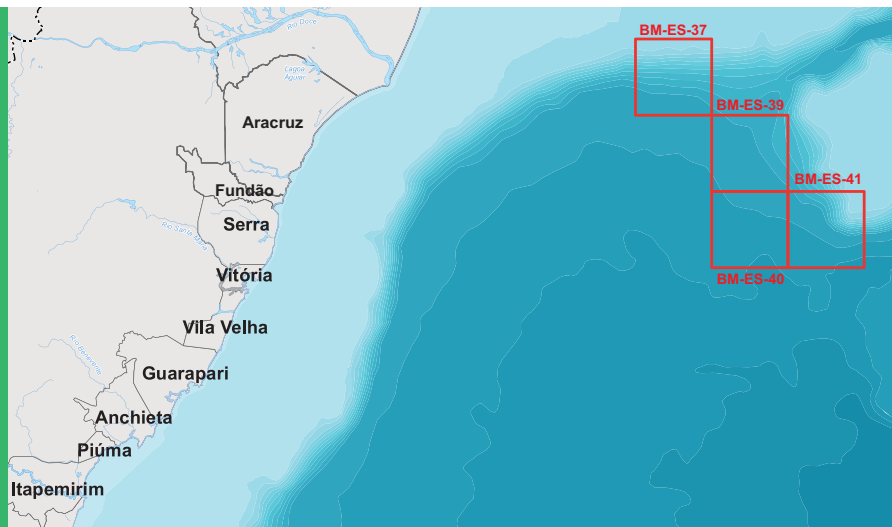


The **Workers' Environmental Education Project** is part of the Environmental Projects implemented by **PERENCO** as a mitigating and preventive measure of environmental impacts associated with offshore drilling activity in blocks **BM-ES-37**, **BM-ES-39**, **BM-ES-40** and **BM-ES-41**, in the Espírito Santo Basin.

THE DRILLING ACTIVITY

In March 2013, Perenco Petróleo e Gás do Brasil Ltda. begins its second exploration campaign, where drilling activities will be carried out in blocks BM-ES-39 and BM-ES-40, in Espírito Santo Basin. The activities will last about six months and the wells to be drilled are Caju-1 (BM-ES-39) and Dende-1 (BM-ES-40).

These blocks are located at a minimum approximate distance of 110 km far from the coastline.



ACTIVITY INFRASTRUCTURE

The offshore drilling activity will be performed by the semisubmersible drilling rig **Ocean Star**, the supply vessels **UOS Navigator**, **Far Sagaris** and **Chouest Bongo**, and the dedicated vessel **Carmem**. The onshore support base will be **Nitshore**, located in Niterói - RJ.

The duty of the supply vessels is to support the activity, such as, for instance, carrying materials, equipment and waste.

The Onshore Support Base Nitshore aims to provide, receive and store materials from the rig and supply vessels, and receive waste of the activity.



Ocean Star



Far Sagaris



UOS Navigator



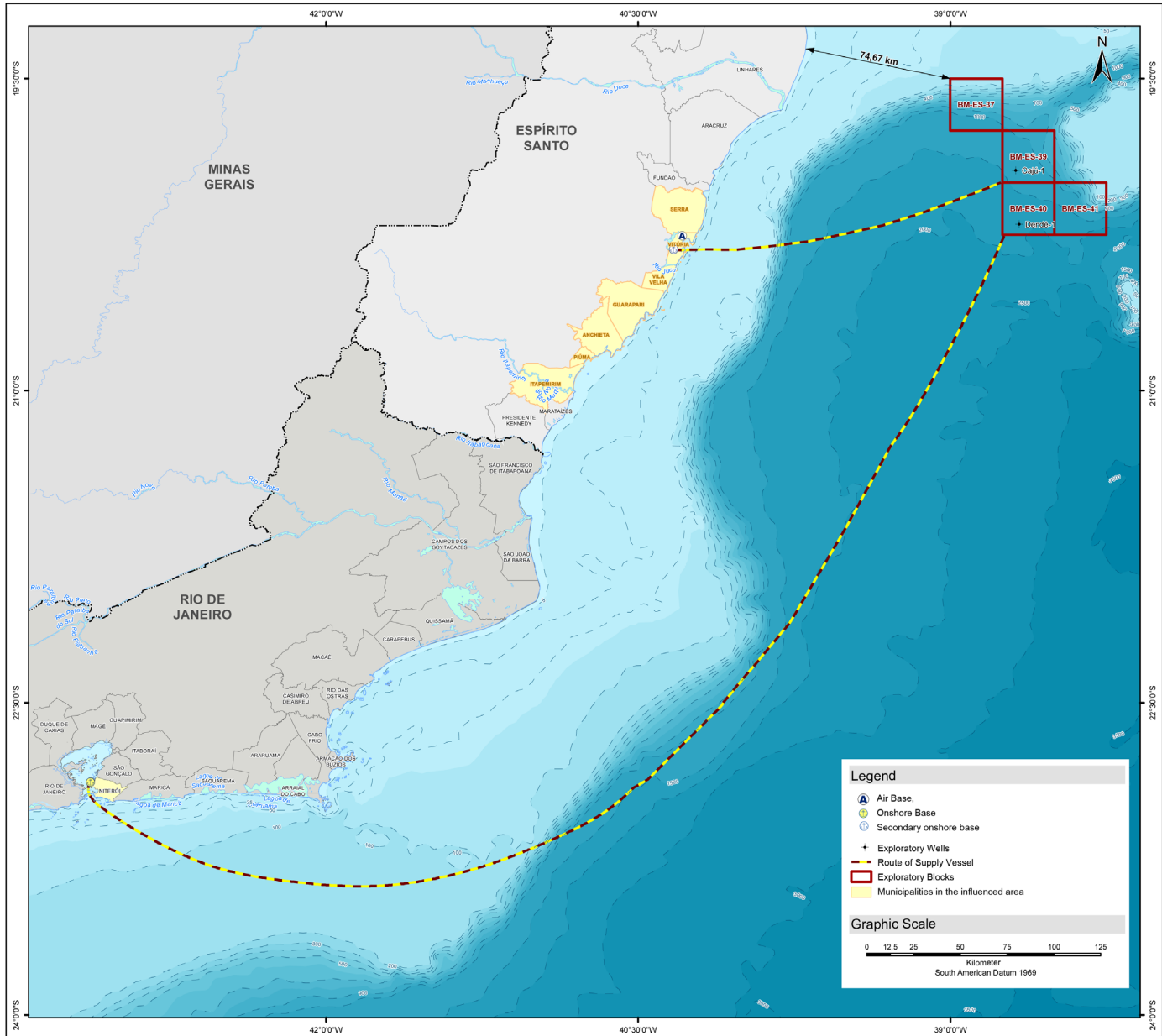
"The accomplishment of the Workers' Environmental Education Project is a mitigating measure required by the Federal environmental permitting carried out by IBAMA."

AREA OF INFLUENCE

It is the area that may be affected by the activity either positively or negatively.

The area of influence set for this activity was as follows:

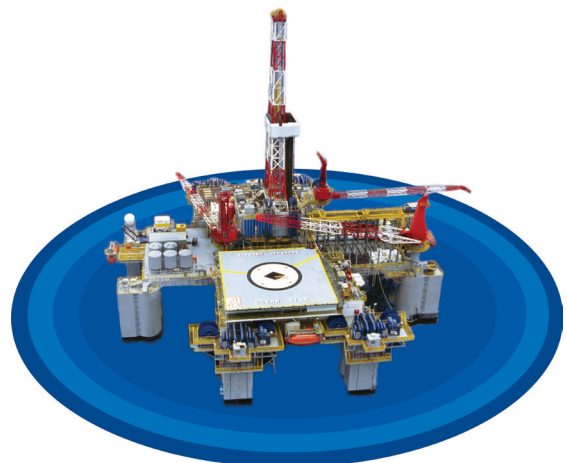
- Total area of blocks BM-ES-37, BM-ES-39, BM-ES-40 and BM-ES-41;
- Route of vessels (between the onshore support base and the rig);
- The municipality of Niterói - RJ, which houses the onshore support base; and
- The Municipalities of Serra, Vitória, Vila Velha, Guarapari, Anchieta, Piúma and Itapemirim, in Espírito Santo;



CAUTION!

The 500-meter-area around the drilling unit is prohibited for unauthorized vessels (NORMAN 08/DPC). If any fishing vessel is seen close to the operation area, please report it immediately to the Environmental Technical Officer on board the drilling unit and/or immediate supervisor in supply vessels.

We rely on everyone's help!





CHARACTERISTICS OF THE REGION

PHYSICAL ENVIRONMENT

The blocks that will be drilled by Perenco are located within the Espírito Santo Basin. This basin has an area of approximately 123,130 km² and has quite important oilfields with light oil and natural gas reserves. Its southern boundary is the Campos Basin and its northern boundary is the Cumuruxatiba Basin.

The Espírito Santos Basin covers part of the center-north coast of the State of Espírito Santo and the southern edge coast of the State of Bahia. Its climate is characterized by two well-marked climatic seasons: the rainy season, which occurs from November to April, and the dry season, which occurs from May to October.

BIOLOGICAL ENVIRONMENT

The region has several ecosystems of great biological importance, such as beaches, salt marshes, mangroves, estuaries, rocky shores, ocean islands, reefs and coralline formations.

In the coastal region of Espírito Santo, there are 26 conservation units, being 14 municipal, 9 State and 3 federal conservation units. Example: APA de Setiba – Guarapari; Reserva Biológica de Comboios - Linhares/Aracruz, among others.

Several species of commercially important fishes and birds are found in the region, such as Tuna, mahi-mahi or common dolphinfish (*Coryphaena hippurus*) among others.

SOCIOECONOMIC ENVIRONMENT

Due to their natural beauties, most coastal municipalities have the tourism, in addition to fishing, as their main source of income. However, the area of influence is also characterized by the existence of urban areas.



Conservation Units – “...territorial space and its environmental resources, including the jurisdictional waters, with relevant natural characteristics, legally created by the public authority, aiming at the preservation and definition of borders, being under a special administration regimen, to which the proper guarantees of protection are applicable”. SNUC, 2000 (Sistema Nacional de Unidades de Conservação) [English: National System of Conservation Units].



Did you know?

Atlantic yellow-nosed albatross are on the list of vulnerable species at risk of extinction.

Caution!

At the sight of an animal in the water and/or debilitated birds, please immediately notify the Environmental Technical Officer!



ENVIRONMENTAL IMPACTS

Impact is any CHANGE in the natural or socioeconomic environment caused by oil exploration activities. The impacts can be real when they are related to the regular operation of the activity and they are potential when they are related to an accident or impacts of uncertain occurrence.



Environmental Factor	Environmental Aspect	Impact	Mitigating Measures	Qualification
PHYSICAL ENVIRONMENT				
Bottom sediment	Disposal of cuttings and drilling fluid; Positioning and decommissioning of rig.	Tilling and change of chemical characteristics and composition of sediments.	Control of volume of cuttings and fluids disposed of. Separation of fluid for cuttings disposal.	Negative
Water	Disposal of cuttings and drilling fluid; Positioning and decommissioning of rig. Disposal of ground food, deck water and processed sanitary sewage.	Change of chemical and physical characteristics of water. Tilling sediments with water turbidity.	Control of volume of cuttings and fluids disposed of. Separation of fluid for cuttings disposal. Maintenance and monitoring of effluent processing equipment.	Negative
Air	Fuel burning by power generators and diesel engines. Gas flaring in formation test.	Emission of air pollutants.	Maintenance of power generators and diesel engines.	Negative
BIOTIC ENVIRONMENT				
Turtles / Marine Mammals / Fishes / Plankton	Noise production; Presence of offshore units; Disposal of organic material.	Disruption of organisms; attractive effect; collision with offshore units.	Workers' guidance on the presence and importance of these organisms; Monitoring of animals' presence. Food grinding (processing).	Negative
Benthos (sea bottom organisms)	Disposal of cuttings and drilling fluid; Positioning and decommissioning of rig.	Burial and contamination of organisms.	Testing contents of metals and toxicity in drilling fluid.	Negative
SOCIOECONOMIC ENVIRONMENT				
Fishing	Use of the sea area	Exclusion of fishing areas	Dissemination of information and awareness. Fishing Landing Monitoring Project. Environmental Education Project (PEA).	Negative
Trade / Services / Labor	Purchase of materials, equipment, supplies and services.	Generation of skilled jobs, income and tax revenue.	N/A	Positive

Impact	Control Measures	Response Measures
SPILLAGE OF DIESEL OIL; CHEMICALS AND CRUDE OIL		
Change of air and water quality, contamination and death of marine organisms; Contamination of seashores with the death of birds and animals; Change in fishing and tourism activities.	Inspection and maintenance of safety and emergency systems and equipment; Accomplishment of drills.	Activation of the Oil Spill Response Plan

ENVIRONMENTAL PROJECTS

The environmental projects deployed are mitigating and/or controlling measures of real and potential impacts of the activity.

WORKERS' ENVIRONMENTAL EDUCATION PROJECT (PEAT): It raises awareness, promotes reflection, discussions and encourages the development of attitudes, interests and skills required for preserving and improving workers' environment, not only in their professional activities, but also in their daily lives.

POLLUTION CONTROL PROJECT (PCP): It establishes the operating procedures for a proper management of liquid effluents (sewage and oily water), solid waste and atmospheric pollutants, in order to minimize the impact of the activity on the environment.

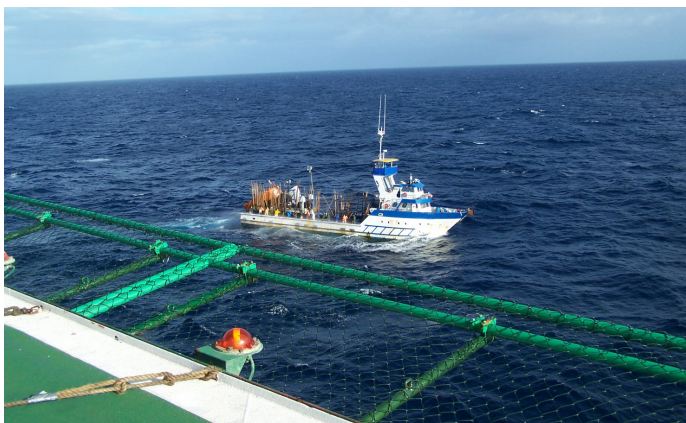


Caution!

We rely on your participation in waste segregation!

ENVIRONMENTAL EDUCATION PROGRAM (PEA): It promotes educational and formative actions of participatory nature to artisanal fishermen communities located in the Area of Influence of the activity.

SOCIAL COMMUNICATION PROJECT (PCS): It establishes a communication channel between PERENCO and the communities in the municipalities of the area of influence, in order to answer their questions regarding the activity, its impacts and mitigation measures.



Caution!

Immediately report to the Environmental Technical Officer and/or Radio Operator in case you see any fishing vessel.

FISHING LANDING MONITORING PROJECT (PMDP): It gets information on fish production, identifying the species caught, the fishing gears and vessels used.

The Project will monitor all vessels operating in the area within a radius of 2 km around the rig. There will be a technical officer on the vessel Carmen and an Environmental Technician on board the rig. Immediately report to the Environmental Technical Officer and/or Radio Operator about any fishing vessel seen in the area.

MESOSCALE CIRCULATION CHARACTERIZATION PROJECT: This project intends to collaborate with the understanding of the circulation standard of the local ocean current, with especially emphasis on Vitória Vortex, which is considered an important phenomenon in the Espírito Santo Basin.

Moreover, the project aims to characterize the behavior of the mesoscale circulation in the region of the Vitória-Trindade Chain, considering the complex current system in the region.

ENVIRONMENTAL MONITORING PROJECT (PMA): It evaluates and continuously monitors the physical, biological and chemical characteristics in the area of influence, allowing a better environmental management of the project. This project is divided into five subprojects, as follows:

1 - Sediment Quality Monitoring: It comprises the monitoring of the sediments in order to check any change that may affect the environment;

2 - Monitoring of Benthic Macro fauna: it aims to monitor the benthic macro fauna to verify, quantify and qualify the potential impacts of the activity on these organisms. The Macro fauna corresponds to the group of animals that live in the substrate of aquatic ecosystems and that are visible to the naked eye;

3 - Identification and Registration of Local Marine Fauna: It corresponds to the daily watching efforts during the whole period of activity, finally ending in the recording of the biota that gets closer to the operating unit;

4 - Monitoring of Cuttings and Drilling Fluids: The subproject aims to evaluate the controlling and adjustment procedures of volume of cuttings and fluids disposed of, their characteristics and ecotoxicological levels, ensuring the proper disposal in accordance with their specific characteristics and guidelines of the permitting agency.

5 - Visual Inspection of Well Location: It aims to inspect seabed at wells location in order to check the existence of sensitive biological communities and structures. If any sensitive biological community or structure is identified, the well location will be analyzed again and a new location will be proposed.

6 - Reinforcement of the Seabird Rehabilitation and Release Structure: This is a subproject that aims to complement other projects that are already being implemented in the region by other oil and gas exploration and production companies, and consists of veterinary care, rehabilitation and release of seabirds, especially penguins that arrive debilitated at the beaches of the area of influence of the activity.

7 - Identification, Registration and Classification, per fishing gear and target species, of fishing vessels that attempt to get closer to the drilling units: it corresponds to the daily watching efforts throughout the drilling activity term to identify fishing vessels. Whenever possible, there shall be established a communication with the vessel in order to get information about it, type of fishing, target species, besides informing on the 500-meter-security zone around the rig.

ENERGY SOURCES

There are several sources of energy available in our planet, and these sources are divided into two types: RENEWABLE and NON-RENEWABLE energy sources.

The non-renewable sources are theoretically limited because they depend on the resources that exist on our planet, such as, for example, the fossil fuels.

On the other hand, the renewable energy sources are those inexhaustible sources, such as, for example, the wind and solar energies.

NON-RENEWABLE SOURCES

Fossil fuels are part of the non-renewable energy sources and are substances made of carbon compounds, resulting from a long decomposition process of the organic matter (fossil deposits, buried forests, etc.), that are subject to specific conditions of low oxygen, high pressure and temperature.

COAL: the production of coal worldwide grew 65% over the past 25 years. The reserves are plentiful and it is estimated that they will last at least further 164 years - more than the oil or natural gas reserves. It is also the fuel that emits more greenhouse gases proportionally, taking into account the energy it produces.

OIL: although it has been known for many centuries, only recently that it began to be used as a fuel. It is primarily responsible for the generation of electricity in many countries worldwide. Despite the recent expansion of the hydropower and diversifying sources of electric power generation noticed in recent decades, the oil still accounts for about 8% of all electricity generated in the world.

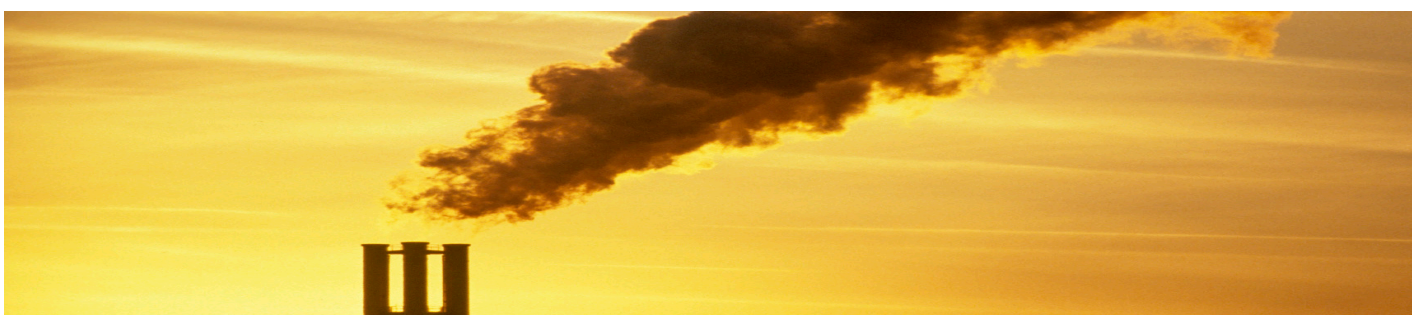
The electric power generation from oil byproducts occurs through the burning of these fuels in boilers, turbines and internal combustion engines.

In Brazil, where historically the electric power generation is predominantly hydroelectric, the thermal generation has played an important role in meeting the peak demand of the electrical system and, especially, in the supply of electricity to municipalities and communities that are not served by the grid system.

NATURAL GAS: It is a mixture of light hydrocarbons found in the subsoil, in which the methane (CH_4) is present by over 70% of the volume. The natural gas composition can vary greatly depending on factors relating to the location where the gas is produced, production process, conditioning, processing, and transport.

The natural gas flaring is cleaner than oil and coal burning, because it emits less carbon dioxide (CO_2). Its contribution to the total primary energy demand shall increase 25% by 2030. It is a major source for energy generation and industrial production. The liquefied and compressed gases are also used in vehicles.

Besides fossil fuels, we have the nuclear energy as a source of non-renewable energy.



THERMONUCLEAR ENERGY: the nuclear energy, also called atomic energy, is obtained from the fission of the nucleus of the atom, releasing large amounts of energy. The division of this nucleus into two parts causes the release of the energy required to keep it together.

Currently, the U.S. leads the production of nuclear energy; however, the countries that are most dependent on nuclear power are France, Sweden, Finland and Belgium. In France, about 80% of its electricity is derived from nuclear power plants.

In late 60s, the Brazilian government began to develop the Brazilian Nuclear Program, designed to deploy the production of atomic energy in the country. The country has a nuclear power plant in Angra dos Reis, Rio de Janeiro, consisting of three units (Angra 1 Angra 2 and Angra 3). Currently, only Angra 2 is operating.

This energy source is liable for a lot of controversy and suspicion due to the lack of safety of the plants, with the possibility of occurrence of accidents, and the disposal of nuclear waste.

Fukushima Nuclear Accident, in Japan

The Fukushima nuclear accident in Japan occurred in 2011 due to a major earthquake and tsunami that caused damage to the nuclear power plant, located in the northeast part of the island. Leaks were recorded and an impending nuclear disaster mobilized the international community.

At the time of the earthquake, 11 plants located in the region began their shutdown processes. As part of the procedure, the reactors need to be cooled, since nuclear fission continues occurring even after stopping energy generation. About an hour after the quake, the Fukushima plant was hit by the tsunami. The cooling system was damaged and the Japanese technicians now have adopted alternative measures, such as the injection of sea water into the reactors. Even so, there were three explosions.

According to information provided by the Japanese government, there was a radioactive leak, but the reactors are preserved. Radiation levels around the plant exceeded eight times the safety limit, forcing the evacuation of the population within a 20 km-radius around the plant.

Source: revistaescola.abril.com.br

RENEWABLE SOURCES

Renewable energy sources will supply 80% of energy by 2050. Biomass, the wind and solar energies are, among the renewable sources, the ones that will contribute more to energy supply in the world within 40 years. However, this requires that governments adopt public policies that enable the replacement of fossil fuels with cleaner energy sources. According to the scenarios examined by the Intergovernmental Panel on Climate Change (IPCC), the renewable sources may reduce CO₂ emission in the atmosphere from 220 Gt to 560 Gt (gigatonnes) between 2010 and 2050.

Today, the renewable sources account for 12.9% of the primary energy supply in the world. No less than 10.2% correspond to biomass, but within this, the largest portion (8.1%) refers to the traditional (and polluting) use of firewood for cooking, which is a typical practice in developing countries. Modern applications of biomass account for only 2.1% of current primary energy supply, against 2.3% of the hydraulic energy. Other renewable sources, combined, account for only 0.4%.

Nevertheless, the IPCC report shows that the availability of the renewable energies has been growing rapidly in recent years, thanks to the governmental incentive policies in some countries, the falling costs of several technologies and price increases for fossil fuels. In 2009, despite the global financial crisis, the installed capacity of energy from renewable sources continued to grow rapidly.

There are no limitations to the technical potential of use of the

renewable sources. According to the IPCC report, technically, they could supply, comfortably, all the current energy needs of the planet. The limitations are related to economic (cost of generation and distribution higher than market prices), environmental and social issues (as it is the case of some raw materials for the production of biofuels and their impacts on the environment, competition with food production and the effects of construction of hydroelectric power plants on biodiversity and livelihood of the local community).



ELECTRIC ENERGY: It is a form of energy based on generation of differences in electric potential between two points, which allows the establishment of an electric current between them. It is a form of energy that mankind uses more nowadays because it is easy to carry and also due to the low energy loss index during conversion.

The electric energy is mainly acquired through thermoelectric power plants, hydroelectric plants, wind farms and thermonuclear plants.

HYDROELECTRIC POWER PLANTS: in Brazil, more than 80% of the electricity generated comes from hydroelectric power plants. The generation of this energy is associated to the flow rate of rivers, that is, the amount of water available at a certain time and the height of its fall. The greater the volume, the water velocity and height of the fall, the greater is its potential for use in electric power generation. Thus, the energy is generated by the current of the rivers, which turns turbines installed in these waterfalls. In general, the technology is considered clean, since it virtually emits no greenhouse gases.

The major environmental and social problem caused by the hydroelectric power plants is that in order to use the hydroelectric potential of a particular river, its regular course through the dam is usually interrupted, causing the formation of an artificial lake referred to as reservoir. This causes flooding in extensive areas, causing not only the removal of the communities who live there, but also losses to the local ecosystem, and the regional fauna and flora. Moreover, there is a substantial loss of archaeological sites and historical and tourist locations.



WIND ENERGY: the great dependence on the climate is also a problem of the wind farms, where the wind moves turbines that, in turn, drive propellers. This alternative cannot be used alone. There must be a system to complement it. However, it is a successful alternative because it is environmentally friendly and the energy source with the lowest emission of greenhouse gases.

An alternative for this is to make wind and hydroelectric power plants complement each other. This is the fastest growing plant in the world. However, it is not very powerful, and requires the setting of several plants side by side to achieve good results. In Europe, there are already communities who complain of visual pollution that impairs tourism.

In Brazil, the presence of wind energy in the matrix almost doubled, and put the country among the 15 top countries that invest more in wind power. The five countries that most use wind energy for power generation are China, United States, Germany, Spain and India.

SOLAR ENERGY: produced from solar radiation, it can be used for heating (solar thermal energy) or for the direct production of electricity (Photovoltaic solar energy). Its environmental impacts are reduced, but the costs are high.

Despite abundant incidence of sun in Brazil, the solar energy supplies less than 1% of our energy demand. Meanwhile, even without the aid of nature, other countries of the world are far more advanced in the exploitation of this renewable source. The five countries that use solar energy as an energy source are Germany, Italy, Spain, Japan and China.



BIOFUELS: is a renewable energy source derived from plant and animal products. The main raw materials for production are sugar cane, sugar beet, palm, sunflower seed, castor, maize, cassava, soybeans, wood, forest residues, animal dung, crop residues, algae, among others.

The processing of this organic material produces an oil that can be mixed with oil byproducts (gasoline, oil diesel, etc.) or used pure. The main biofuels are ethanol, methanol, biodiesel, biogas, ethanol, vegetable oil, among others.

Experts say that the use of biofuel offers a number of advantages, such as lower greenhouse gas emissions during combustion, contributes to increased employment in rural areas, is a renewable source and reduces dependence on fossil sources. However, some people are contrary to the use of biofuels on a large scale, claiming that the raw material (food) should be directed to the population, in addition to a number of environmental problems that may be generated by the intensification of crops, such as loss of soil nutrients, erosion, deforestation, etc.

