Sector Policy: Power Generation - Natural Gas

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1. Policy's Purpose

BTG Pactual drafted this Policy with several policies to identify the social, environmental and climate risks of its many operating segments, complying with the principles and grounds outlined in its Social, Environmental and Climate Responsibilities Policy.

To prepare each Sector Policy, a detailed analysis was carried out of the social and environmental issues involving BTG Pactual's many operating segments during all stages of its production processes, i.e., from opening new areas and obtaining raw materials, throughout the production, distribution and closing of all business activities. To this end, reports and documents were consulted from the sector's main players, such as IFC guidelines, international references for social and environmental risk analysis and technical knowledge of BTG Pactual's internal team.

The Natural Gas Power Generation Policy ("Policy") establishes the nine social and environmental aspects relevant to the sector and classifies them according to their relevance regarding risks and opportunities for this economic segment.

2. Application Scope

This Policy must be applied by the ESG team, considering the relevance and proportionality principles in all segments of BTG Pactual, worldwide, that have entered or intend to enter into a relationship with legal entities and/or individuals in the natural gas power generation sector, including, but not limited to, those carrying out construction, maintenance and generation activities.

3. Notes on the Sector

Natural gas can be found in fields, on land or at sea. According to a study by the Empresa de Energia Energética (EPE), most Brazilian reserves are located at sea and are linked to oil.[1] In addition to industrial use (e.g., raw material in the production of resins and fertilizers), natural gas can also be used to generate electricity[2].

In thermoelectric plants, natural gas is burned, converting thermal energy into mechanical energy and later into electrical energy. Unlike other fossil fuel sources, natural gas produces lower emissions of gases (such as sulfur dioxide) contributing to the greenhouse effect due to the low concentration of contaminants in its composition.[3] In order of magnitude, a natural gas plant generally has an emission factor (tCO_2/MWh) lower than 50% of that presented by a coal plant.[4]

[1]For more information see: Energia Termelétrica: Gás Natural, Biomassa, Carvão, Nuclear Thermoelectric Energy: Natural Gas, Biomass, Coal, Nuclear/[/ Mauricio Tiomno Tolmasquim (coord). – EPE: Rio de Janeiro, 2016. Study available at: <http://www.epe.gov.br/sites-pt/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-173/Energia%20Termel%C3%A9trica%20-%20Online%2013maio2016.pdf>.
[2]There is a recent move by the Federal Government to form a gas market for the private segment called the "New Gas Market Program". This program aims to promote a natural gas market that favors competition, Brazilian and foreign investments, in addition to reducing energy prices. For more information, access: < http://www.mme.gov.br/web/guest/conselhos-e-comites/cmgn/novo-mercado-de-gas>.
[3]Even the EPE study justifies the low sulfur dioxide emission in gas plants "due to the low sulfur concentration in the processed natural gas, sulfur dioxide emissions are also low".
[4]Information from the EPE study mentioned above.

Unlike renewable sources, such as hydroelectric, solar and wind, gas plants are independent of climatic variables, contributing to the stability of the Brazilian electricity system and consequently the energy security of the country.

Another advantage is that the gas-fired thermoelectric plant can be built close to the consumption center, as it is a small unit. This eliminates the need to build transmission systems and reduces the risk of energy loss during this process, in addition to the possibility of selecting locations with less social and environmental sensitivity (examples: indigenous lands, *quilombola* communities, areas of high environmental conservation value) and/ or with land-use conflicts.

Regarding the participation of natural gas in the Brazilian energy matrix, recent data show an 8.0% share.[5]

4. Social and Environmental Aspects

Below, we list the nine most relevant topics in this sector that BTG Pactual will analyze.

4.1. Productive Chain and Suppliers

Because gas is used for energy generation, special attention must be paid to the environmental compliance (i) of the areas from which natural gas is extracted, (ii) of the natural gas transformation units into liquefied natural gas (LNG) (if necessary) and (iii) the transportation of LNG to the thermoelectric plant.[6]

The production of natural gas in Brazil in general is linked to the production of oil in offshore fields. In this case, the production of natural gas generates impacts on fishing and tourism activities, in addition to changing the landscape (if the activity is carried out close to the coast or on land) and changes in water quality, which may impede maritime traffic, disorient schools of fish and even contaminate marine biota.

Specifically regarding the drilling of wells, special attention must be given to the correct disposal of solid waste from drilling, considering its great potential for contamination.

The natural gas-to-LNG transformation units can change air quality (natural gas burning[7]) and water quality (as a result of accidents involving oil spills) if they are not operated with the proper mitigation and prevention programs and within the applicable standards.

As for its transport, which can be done by trucks, trains or ships, recommendation is: (i) to identify risks for each type of transport; (ii) to adopt safety measures to avoid environmental accidents; and (iii) to get proof of the effectiveness of these measures.

[5] ANEEL – the system in numbers, verified in December 2023. Available at: < https://www.ons.org.br/paginas/sobre-o-sin/o-sistema-em-numeros>.
[6] This process allows natural gas to change from a gaseous state to a liquid with cooling at temperatures of -162C.
[7] Burning natural gas will cause emissions of fine particulate matter and gases such as carbon monoxide, nitrogen oxides, carbon dioxide, sulfur dioxide, volatile organic compounds.

All these factors can represent operational risks to the plant (in case of accidents or stoppages resulting from sanctions from environmental agencies) and/or reputational risks.

4.2. Use of Water Resources

In the case of a combined-cycle gas-fired thermoelectric power plant, having two stages of electricity production: a gas turbine and a steam turbine. The water consumption necessary to generate the steam is relevant. Depending on the region in which the plant is installed (a region with water scarcity), there may be a restriction on water use (compared to the priority use of water for human consumption), which may bring operational risk.

The risk related to water resources can be minimized with the adoption of low water consumption technologies or the consumption of recycled water.

4.3. Impacts on Fauna and Flora

The implementation of a gas-fired thermoelectric plant, similar to the installation of any other undertaking, can affect the flora as a result of vegetation suppression (necessary for the implementation of access roads and the plant itself) and the introduction of waste without proper management in the ecosystem.

Furthermore, the burning of natural gas, which is necessary for energy generation, releases pollutants directly affecting the surrounding vegetation. According to specialists, pollutants emitted by plants of this nature can affect the growth of nearby vegetation, including the whitening of the leaves of this vegetation because of acid rain also caused by these pollutants.[8] Periodic monitoring of the vegetation is recommended to verify these negative impacts and, if necessary, adopt mitigation measures.

Regarding fauna, the development and implementation of programs to drive away, rescue and manage fauna (with the presence of biologists to direct fauna to safe areas), generally required by environmental agencies, can mitigate these risks.

4.4. Atmospheric Emissions and Climate Change

During the plant's construction, the main sources of atmospheric emissions are removal of vegetation cover, earthworks, movement of vehicles, civil works procedures and demobilization of the construction site. During the operation phase, the main emissions are related to gas-burning for energy generation and material transport.

EPE's study (mentioned above) highlights nitrogen oxide as the main atmospheric emission substance, which can bring about changes in air quality, negative effects on population health and acidification of rainwater.

[8] According to Ugocione & Cardoso, nitrogen dioxide is a limiting nutrient for plant growth in many ecosystems. For more information access: < https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0100-40422002000300003&lng=en&nrm=iso >.

In general, the social and environmental team will verify if the counterparty performs mitigation and prevention procedures such as (i) monitoring of emissions (especially carbon monoxide, nitrogen oxide and carbon dioxide); (ii) construction of chimneys suitable for dispersing pollutants; (iii) implementation of a green curtain to minimize the outflow of gases and dust outside the project; and (iv) choice of location favoring atmospheric dispersion.

These measures can mitigate legal and operational risks (if emission limits are not met), in addition to reputational risk.

Even though, in general, natural gas in the electricity sector being less critical to the greenhouse effect than other fossil fuels, this still receives a lot of opposition in the context of the energy transition. In this sense, mitigants include efficient systems (such as combined cycle generation), monitoring leaks and transitioning the portfolio to renewable energy. The ESG team will evaluate which measures the company is adopting to account for greenhouse gas emissions, in addition to actions related to decarbonization commitments, as well as the transition criteria (e.g.: conversion of plants, portfolio transition to renewable energy).

4.5. Noise

The main sources of noise during the construction phase of the thermoelectric gas plant correspond to vehicle traffic and the use of machinery. During the social and environmental due diligence, verification must be made whether the counterparty performs the following procedures: (i) maintenance of vehicles and equipment to control noise and vibration emissions; (ii) prioritization of equipment with low noise levels; and (iii) imposition of speed limits on internal roads.

For the operation phase, the main noise sources are from the handling of machinery and equipment and the transportation of people and materials. Evaluation must be made whether the counterparty monitors noise levels to verify whether emissions are within the standards of the applicable legislation.

4.6. Effluents and Solid Waste

The main effluents sources in gas-fired thermoelectric plants are water generated in the process (cooling system/boilers) and sanitary sewage. If the effluent is released without proper treatment, it may cause changes in the quality of the soil and watercourses, interfering with aquatic biota.

The social and environmental team must verify whether the counterparty performs the proper treatment and disposal of its effluents and waste, adopting continuous monitoring (of wastewater and the receiving body) within limits imposed by law.

Failure to manage waste and effluent can impact the soil and increase the risk of contamination. The costs of the decontamination process in the area can be high, representing a credit risk (impairs the ability to pay the debt).

4.7. Occupational Health and Safety

For this item, the social and environmental team must verify whetherthe counterparty performs the following procedures: (i) assessment of risks to employees and respective preventative measures; (ii) specific admission and periodical examinations for each of the functions; and (iii) training on the subject, in addition to action plans to correct any irregularities identified. Below are the main identified risks and preventative measures.

Impact	Risk	Mitigators
Noise	-Turbine of generators and auxiliaries; boilers. -Cooling towers.	-Acoustic isolation control rooms, identification areas with high noise, and require the use of PPE 100% of the time.
Confined Spaces	- Turbines, capacitors and cooling water towers.	-Wearing Personal Protective Equipment.
Dust	-Operation of vehicles and machines. -Installation and mobilization of the construction site. -Landscaping.	-Wearingf Personal Protective Equipment. - Vehicle fleet maintenance.

4.8. Human Rights

Regarding the construction phase of the gas-fired thermoelectric plant, operations may attract workers from other regions that may increase the demand for public services (health and infrastructure) to the point of overloading it, in addition to potentializing violence, traffic accidents, prostitution and child sexual exploitation, consumption of alcohol and other drugs, in addition to the employment of child and/or slave-like labor. These findings are translated into human rights violations.[9]

In general, recommendation is to assess the negative impacts of the project's installation and operation on human rights. On this subject, Brazilian Decree 9,571/2018 brings the following mitigating measures to be adopted by companies:[10]

- Periodically validate conditions regarding human rights to identify, prevent, and mitigate the risk of human rights violations.
- Develop and constantly improve risk control and monitoring procedures.
- Maintain clear and transparent accountability for the operational risks regarding human rights and measures taken to prevent them.

Considering the identified risks, other documents may be considered for evaluation in social and environmental due diligence, such as the UN Universal Declaration of Human Rights; Declaration on Fundamental Principles and Rights at Work of the International Labour Organization; UN International Covenant on Economic, Social and Cultural Rights; UN International Covenant on Civil and Political Rights; and the IFC Performance Standards.

4.9. Community

[9]Human rights are those mentioned in (i) UN Universal Declaration of Human Rights – United Nations; (ii) Declaration on Fundamental Principles and Rights at Work of the International Labour Organization; (iii) UN International Covenant on Economic, Social and Cultural Rights (iv) UN International Covenant on Civil and Political Rights.
[10]Brazilian Decree 9571/2018, which establishes the Brazilian Guidelines on Companies and Human Rights.

The greatest impacts on the community linked to this segment are related to the competition for the use of water resources in the region between human consumption and consumption by the thermoelectric plant, as well as the high rate of atmospheric emissions from the operation of this thermoelectric plant, which can bring changes in the quality of the air, negative effects on the health of the population and acidification of rainwater.

In addition to creating programs to mitigate these impacts, it is advisable to establish a transparent and reliable communication channel between the community and the entrepreneur, so that any issues can be heard with the necessary confidentiality and resolved. Communication channels will be evaluated, according to the analyzed risk, for their method of dissemination, accessibility, confidentiality, non-retaliation against the complainant, and transparency of treatment and response procedures. In general, besides the legal risks for potential non-compliance with legislation, there may be risks to the company's image and reputation.

Annex: Sector Categorization Matrix - Social, Environmental and Climate Risk Document

Risks	Description	Category
Social Risk	Consolidated assessment	Low
	Slave labor	Irrelevant
	Child labor	Irrelevant
	Occupational health and safety	Low
	Damage to populations or communities	Low
	Other factors	Irrelevant
Environmental Risk	Consolidated assessment	Medium
	Energy: use and conservation	Low
	Water: use and conservation	Medium
	Water: pollution	Low
	Waste: management and disposal	Medium
	Air: pollution	Medium
	Biodiversity and natural resources: use and conservation	Low
	Hazardous materials: disasters	Irrelevant
	Soil: contamination	Low
	Other factors	Medium
Physical Climate Risk	Consolidated assessment	Low
	Adverse weather conditions	Low
	Long-term changes	Irrelevant
	Other factors	Low
Climate Transition Risk	Consolidated assessment	High
	Public policies/Legislation	High
	Technology	Medium
	Markets/Consumers	Medium
	Other factors	High