Sector Policy: Power Generation - Coal

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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 fundamentals 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 Coal Power Generation Policy ("Policy") establishes the eight relevant social and environmental aspects for the segment and classifies them according to their relevance regarding risks and opportunities for this economic segment. This policy will be reviewed periodically within a period no longer than 3 (three) years.

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 coal power generation sector, including, but not limited to, those carrying out construction, maintenance and generation activities.

3. Notes on the Sector

According to the Empresa de Pesquisa Energética ("EPE"), coal and its byproducts accounted for 1,3% of electricity generation in Brazil in 2021.[1] Coal is a solid fossil fuel formed from organic matter from plants deposited in sedimentary basins. EPE highlights that the largest coal deposits[2] and a large part of the thermoelectric power plants in operation in Brazil are located in the southern region[3]. The Northeast region concentrates another significant coal-fired portion of capacity installed; however, the fuel for this is typically imported.

Unlike renewable sources such as hydroelectric, solar, and wind, coal plants are independent from climate variables, which contributes to the stability of the Brazilian electrical system and consequently the energy security of the country. However, as a result of the energy transition, fossil fuel power plants tend to reduce their participation in the electrical matrices. The current energy transition is characterized by the replacement of fossil fuels by renewable sources as the main sources of energy (both fuel and electricity). Such substitution is motivated, on one hand, by the need to reduce

[1] Data available on page 35 of the Decennial Plan for Energy Expansion, prepared by the Empresa de Pesquisa Energética, available at: <http://www.epe.gov.br/sites-pt/publicacoes-dados-abertos/publicacoes/Documents/PDE%202029.pdf >.
[2] Data available on page 225 of the Energia Termelétrica: gás natural, biomassa, carvão e nuclear", prepared by Empresa de Pesquisa Ener, available at: < http://www.epe.gov.br/sites-pt/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-173/Energia%20Termel%C3%A9trica%20-%20Online%2013maio2016.pdf>.
[3] Same as above.

greenhouse gas emissions, on the other hand, by the gains in efficiency, scale, and cost reduction of renewable sources.

Old thermoelectric plants can considerably improve their emissions performance by updating their systems for greater efficiency, and with the implementation of CO_2 reduction technologies. Furthermore, the diversification of energy sources, the adoption of pollution control measures, transparent management of waste and impacts, and greenhouse gas inventory are considered good practices in the sector.

4. Social and Environmental Aspects

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

4.1. Productive Chain and Suppliers

Because the source used for energy generation is coal, special attention must be given to the environmental compliance of deposits, mines and coal processing plants. In addition, as transporting the ore can pose risks to the community, the distance between the deposit, mine, processing facility, and the plant must be checked for the high content of impurities. These factors can pose risks to the image and reputation of the company operating a coal-fired UTE.

4.2. Dependence on Natural Resources and Impacts on Biodiversity

Coal-fired thermoelectric power plants rely on large volumes of water to operate their cooling systems and steam condensers. Water scarcity in the region where the plant is installed could lead to a possible restriction in the use of water in the energy generation process, consequently, risk to the plant's operation.

Another relevant environmental aspect is related to aquatic fauna. Aquatic organisms can be attracted to cooling water intake structures, resulting in damage or death to endemic species. The social and environmental team will verify the existence of mitigating actions taken by the counterparty, such as installing barrier nets (seasonal or throughout the year) at the cooling water intakes, fish handling and return systems, among other measures to protect the ichthyofauna.

4.3. Atmospheric Emissions and Climate Change

The generation of electricity by burning charcoal is responsible for gas emissions such as sulfur dioxide, nitrogen oxide, particulate matter, carbon monoxide, carbon dioxide and heavy metals. Because of this, this sector is considered emissions-intensive in carbon and is subject to climate transition risks, including climate litigation, especially for companies with a significant history of gross emissions[4].

[4] Kaplan, S. A melting glacier, an imperiled city and one farmer's fight for climate justice. Available at: < https://www.washingtonpost.com/climate-environment/interactive/2022/peru-climate-lawsuit-melting-glacier/>

According to 2015 data from the Center for Climate and Energy Solutions, globally coal production and the energy extracted through it accounted for 44% of CO_2 emissions throughout the year[5]. Therefore, this segment has a reputational risk, and there are movements against its use in many countries.[6] This sector could also be impacted by possible taxation of greenhouse gas emissions (carbon pricing), which may represent high operational costs, given its volume of emissions. A plant with 340 MW installed capacity can generate 2 million tons of CO_2 per year.

The intensity of greenhouse gas emissions from coal-fired thermoelectric power plants (tons CO_2e per MWh) varies according to their net efficiency, that is, the efficiency of the system in converting the energy from the fuel into electrical energy, which, in turn, depends on several factors such as dispatch time, the lower calorific value of coal and the generation system. Modern systems, capable of operating with ultra-supercritical steam, can be up to 29% more efficient than traditional thermoelectric power plants operating in Brazil, with operational efficiencies up to 47% compared to 36~37%.

Direct and indirect emission mitigators include systems with circulating fluidized bed boilers (CFB), dry fuel gas desulfurization with limestone (FGD), and biomass co-firing. These technologies allows the reduction of relative emissions to levels similar to or even lower than those of simple cycle gas or oil plants[7]. For even better results, these operational conditions can be combined with (i) maintenance efficiency planning; (ii) pretreatment of coal with quality control and maintenance of low ash content and high calorific value (allowing for more energy generation per kilogram of burned coal), and (iii) decommissioning within the timelines recommended for non-OECD countries[8]. Furthermore, carbon capture and geological sequestration technologies allow power plant operations to drastically reduce their emissions. In this case, CO_2 is separated from the plant effluent, concentrated and injected into a geological sequestration well (such as a depleted oil field), where it remains trapped in the pores of the rock. Lastly, the strategy of the controlling companies is also a mitigating factor as they can incorporate portfolio diversification, reducing their activities related to coal mining.

The aforementioned mitigations allow coal-fired thermoelectric plants to continue contributing to the stability of the electricity supply without the burden of emissions too high above the system average. Therefore, analyses for the sector should consider the operational state of the plants, system update plans and commitments (retrofitting to increase and maintain efficiency or carbon capture) and decommissioning. Transition plans or early decommissioning of coal-fired thermoelectric plants should consider the local social impacts with the decline in demand for coal, as in the case of southern Brazil, where cities tend to depend on extractive activities.

The ESG team will assess the measures the company has adoptied to account for gas emissions resulting from the effects of climate change, in addition to actions related to Net Zero and transition criteria (e.g., decommissioning of coal-fired thermoelectric plants, portfolio transition to renewable energy).

[5] COMPANHIA AMBIENTAL DO ESTADO DE SÃO PAULO (CETESB). Coal Burns Australia's Future. Available in: < https://cetesb.sp.gov.br/proclima/2015/03/17/o-carvao-queima-o-futuro-da-australia/ >.
[6]MILES QC, Wendy J. SAWN, Nicola K. Mudanças Climáticas e Resolução de Conflitos. IN Litigância climática: novas fronteiras para direito ambiental no Brazilil. Joana Setzer, Kamyla Cunha, Amália S. Bottter Fabri Coordination. São Paulo: Thomsom Reuters Brasil, 2019.
[7] IEA. High-Efficiency, Low-Emissions Coal-Fired Power Generation – Technology Roadmap. 2012. Disponível em: <https://www.iea.org/reports/technology-roadmap- high-efficiency-low-emissions-coal-fired-power-generation>
[8] IEA Net Zero Energy Report (2021): sectoral analysis for net-zero by 2050 requires that no new UTE without coal reduction is built as of 2021, phase out existing non-reduction plants by 2030 in advanced economies and in 2040 globally. The same date is indicated in a letter from the UN Secretary General in 2021: https://unfccc.int/news/un-chief-calls-for-immediate-global-action-to-phase-out-coal.

4.4. Waste Management

The waste generated by this segment includes ashes, sediments from the liquid effluent treatment system, and residues originated in the preparation of fuels. Ashes can present soil and groundwater contamination problems. One solution would be to allocate these ashes to industries using them as raw materials, such as cement plants, ceramics, glass and paint factories. According to the Brazilian Solid Waste Policy and other applicable environmental standards, the tailings that cannot be reused in another production cycle must be sent to landfills.

The costs with the decontamination process of an eventually contaminated area can be extremely high, representing a credit risk (impairs the ability to pay the debt).

4.5. Noise

The main sources of noise in the segment are: (i) generators and turbine ancillary; (ii) boiler operation; and (iii) operation of fans, ducts and cooling towers. The effects caused by noise must be foreseen in the project and in the safety measures to avoid damage to health inside and outside the plant.

Prevention measures include installing factories far from possible recipients (communities), using silencers, noise monitoring programs, and development of project design to prevent noise leakage and installing natural and/or artificial acoustic barriers. The ESG team will consider these aspects during the social and environmental assessment.

4.6. Occupational Health and Safety

Below are identified risks for workers and prevention measures. Requirement is to carry out (i) a survey of risks to employees and respective prevention measures (according to Medical and Occupational Health Control Program and Environmental Risk Prevention Program – OMHCP and ERPP); and (ii) training on the subject, in addition to carrying out action plans for any irregularities identified.

Impact	Risk	Mitigators
Heat	- Operation and maintenance of combustion units. -Pipes and equipment.	-Regular inspection and maintenance of pressure vessels and piping. - Providing adequate ventilation in work areas to reduce heat and humidity.
Noise	-Turbine of generators and ancillaries; boilers -Cooling towers	-Acoustic isolation control rooms, identification areas with high noise and require wearing Personal Protective Equipment (PPE) 100% of the time
Confined Spaces	- Turbines, Condensers and Cooling Water Towers	-Wearing of PPE
Dust	-Transportation of solid fuels, ash	-Dust controls (exhaust ventilation) - Regular inspection and maintenance of asbestos to prevent asbestos particles in the air

4.7. Human Rights

Large-scale works generate a migratory flow of workers who demand housing, health, and sanitation during the construction phase of the coal-fired thermoelectric power plant. A sudden increase in the population can increase violence, traffic accidents, child prostitution and sexual exploitation, increase of STD rates and consumption of alcohol and other drugs, in addition to the employment of child labor and/or slavery-like labor. These factors can lead to an overload on public services, such as healthcare, education and social assistance.These findings are translated into human rights violations.[9]

In general, recommendation isto 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 revalidate 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.

4.8. Community

The greatest impacts on the community linked to this segment are related to the competition on 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 aggravate respiratory diseases and reduce the lung capacity of the community near the plant.

Besides creating programs to mitigate these impacts, recommendation is to create a communication channel between the community and entrepreneur so any issues are heard with due confidentiality and complaints and reports are solved by an impartial, transparent and predefined proceeding by means of analysis, determination, closure and return of each demand. In general, besides legal risks for any breach of laws, there may be risks to the company's image and reputation.

In coal-dependent cities, the population needs to be informed about transition plans (such as plant conversion or early decommissioning) in order to link economic transition simultaneously with the power plant.

[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.

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

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