Paris Alignment Assessment of the Manzanillo Bay Combined Cycle Gas Turbine (CCGT) Project

Summary Note

The following is an executive note on the technical assessment that informed IDB Invest's analysis and approval of the Manzanillo Bay CCGT Project ("MZB" or the "Project"). While this disclosure is not required by the Bank's policies, by sharing the underlying analysis, we aim to provide stakeholders a clear understanding of the evidence and reasoning behind our approach to Paris Alignment for this transaction.

This assessment represents a first-of-its-kind effort for our institution, involving two complementary studies, performed by two independent consultants, to ensure a robust evaluation of the Project's climate implications. The process combined initial screenings with in-depth scenario modeling, applying internationally recognized methodologies to assess economic, technical, and environmental outcomes.

Acronyms

Acronym	Full Form
BESS	Battery Energy Storage System
CAPEX	Capital Expenditure
CBDR	Common But Differentiated Responsibilities
CNE	Comisión Nacional de Energía (Dominican National Energy Commission)
CCGT	Combined Cycle Gas Turbine
DR	Dominican Republic
GHG	Greenhouse Gas
IDB	Inter-American Development Bank
KPI	Key Performance Indicator
LMP	Locational Marginal Price
LOL	Loss of Load
Mt CO_2	Million metric tons of carbon dioxide

MRM	Minimum Reserve Margin
MZB	Manzanillo Bay CCGT Project
NDC	Nationally Determined Contribution
OC	Organismo Coordinador (Dominican grid operator)
PA	Paris Agreement
RE	Renewable Energy
SENI	National Interconnected Electricity System (Sistema Eléctrico Nacional Interconectado)
SIDS	Small Island Developing States
S&P	S&P Global Commodity Insights

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1. Context

The Dominican Republic (DR) faces an energy trilemma: ensuring grid reliability, supporting a low carbon transition, and maintaining affordable electricity. The National Interconnected Electricity System (SENI) has historically struggled with underinvestment, aging thermal plants, and high reliance on expensive, polluting fuels. The 2020 entry of the Punta Catalina coal plant improved reliability but increased coal dependency.

In its revised Nationally Determined Contribution (NDC) under the Paris Agreement, the DR commits to a 27% greenhouse gas (GHG) reduction by 2030 (relative to business-as-usual), with a strong focus on transforming the power sector. The MZB project—a new 850 MW natural gas-fired plant—was proposed to support this transition by providing reliable, lower-emission baseload capacity, enabling the retirement of older, more polluting plants, and facilitating greater renewable energy (RE) integration.

The DR increased renewable installed capacity by 103% between 2020 and 2023, has over 1,300 MW of solar PV under construction, and reduced energy intensity by 47% between 2000 and 2022. The legal framework actively promotes renewables and energy storage, and the Country has committed to phasing out coal, including the cancellation of new coal projects and endorsement of a Coal Transition Investment Plan with IDB Group support.

S&P Global and Commodity Insights was selected by IDB Invest to conduct an independent assessment that could serve as the basis for concluding whether the Project is considered aligned to the Paris Agreement, following the Joint MDB Methodological Principles for Assessment of Paris Agreement Alignment. The analysis, methods and the conclusions of alignment of the Project are presented below.

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2. Methodology

2.1. Analytical Framework

The assessment used the PLEXOS energy market simulation platform to model the SENI's evolution from 2025 to 2054. The analysis compared the economic, technical, and environmental impacts of integrating the MZB plant versus alternative scenarios, focusing on Paris Agreement alignment.

2.2. Scenarios Considered

A Base Case and seven scenarios were modeled:

- **Base Case:** SENI expansion with MZB included.
- **Case 1:** SENI expansion without MZB.
- **Case 2:** MZB replaced by a portfolio of solar PV, wind, and battery storage (BESS).
- **Case 3:** Higher LNG prices for MZB.
- **Case 4:** Longer-duration BESS (8 hours) in the RE replacement portfolio.
- **Case 5:** Introduction of carbon pricing (using Chile as a benchmark).
- **Case 6:** Early retirement of coal plants, with carbon pricing.

Each scenario was evaluated using nine Key Performance Indicators (KPIs) covering economic, technical, and environmental dimensions. The KPIs chosen were as follows:

- **Average Locational Marginal Price (LMP):** The average price of electricity across the SENI, reflecting the marginal cost of serving the next unit of demand at each location.
- **Capital Expenditure (CAPEX):** The total capital costs of installed capacity (yearly), reflecting the investment needs for each expansion plan.
- **Installed Capacity:** The total generation capacity installed in the SENI per technology, indicating the scale and diversity of the generation mix.

- **Generation in 2030:** The amount of energy generated by each technology in the year 2030, capturing the short-term impact of MZB's entry into operation.
- **MZB Capacity Factor:** The average capacity factor for MZB, for each year. Relevant for evaluating emissions and stranded asset risk.
- **Minimum Reserve Margin (MRM):** The percentage by which available capacity exceeds peak demand in the SENI, averaged yearly, indicating system reliability.
- **Loss of Load (LOL):** The number of unserved energy hours for each year, averaged over 2025–2054, representing system reliability and adequacy.
- **Total Scope 1 Emissions:** The total SENI-level GHG emissions from electricity generation, averaged annually, focusing on direct (Scope 1) emissions.
- **Emissions Intensity:** SENI-level emissions per unit of electricity generated, averaged annually, highlighting the environmental efficiency of the energy mix.

2.3. Guidance Questions

The analysis was structured on the basis of five core questions:

1. Is there a more beneficial alternative to the Project?
2. Will the Project avoid new oil/coal capacity or displace existing fossil plants?
3. Is the Project inconsistent with the DR's NDC?
4. Does the Project facilitate RE and storage integration while minimizing carbon lock-in and stranded asset risk?
5. Is the baseline scenario the most beneficial, even under stress testing?

These questions provided inputs to enable IDB Invest to reach a conclusion on the following topics, aligned with the Joint MDB Methodological Principles for Assessment of Paris Agreement Alignment and the IDB Group's Paris Alignment Implementation Approach.

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3. Key Findings

KPI	Base Case (MZB)	Case 1 (No MZB)	Case 2 (RE+BESS)	Case 3 (High LNG)	Case 4 (Long BESS)	Case 5 (Carbon Price)	Case 6 (Coal Retire)

Avg. LMP (USD/MWh)	**64**	**73**	**64**	**66**	**64**	**75**	**87**
CAPEX (Billion USD)	**18.2**	**17.4**	**20.2**	**18.2**	**20.7**	**18.2**	**18.2**
Installed Capacity (GW)	**27.7**	**26.9**	**30.9**	**27.7**	**30.9**	**27.7**	**27.7**
Loss of Load (hrs/year)	**4**	**99**	**51**	**4**	**18**	**4**	**12**
Scope 1 Emissions (Mt CO_2)	**484**	**487**	**421**	**490**	**417**	**470**	**453**
Emissions Intensity (kg/MWh)	**313**	**350**	**250**	**320**	**245**	**290**	**270**
Reserve Margin (%)	**27**	**17**	**31**	**27**	**32**	**27**	**23**
MZB Capacity Factor (%)	**85**	**N/A**	**N/A**	**69**	**N/A**	**87**	**87**

3.1. Alternatives and Trade-offs

- **No alternative scenario (including aggressive RE+BESS buildout) outperformed the Base Case (with MZB) across all KPIs.**
    - RE+BESS alternatives (Cases 2 and 4) reduced emissions but resulted in higher capital costs and significantly lower system reliability (measured as increased unserved energy hours).

3.2. Displacement of Fossil Generation

- **MZB enables the retirement of older, more polluting coal and oil plants, and prevents the need for new coal/oil capacity.**
    - In scenarios without MZB, coal and oil generation increased to cover the reliability gap, raising emissions and system risk.

3.3. Relationship with the NDC

- **The MZB project is not inconsistent with the DR's NDC.**

- The Project supports the NDC's call for new natural gas plants, RE expansion, and the retirement/conversion of oil-fired units.
- All scenarios modeled included significant RE additions, in line with national targets.
- The DR's revised NDC (2020) commits to a 27% GHG reduction by 2030, expressly including natural gas as a transition fuel to displace coal and fuel oil. The NDC also targets 30% renewables by 2030, while recognizing the role of gas in maintaining system reliability. MZB is not inconsistent with the NDC, as it supports near-term mitigation goals, energy security, and affordability.

3.4. Flexibility, RE Integration, and Stranded Asset Risk

- **MZB enhances system flexibility and supports RE integration.**
  - The plant's technical characteristics (high ramp rates, low minimum load) facilitate the integration of variable renewables.
  - The risk of MZB becoming a stranded asset is low, with modeled capacity factors remaining above 70% even under adverse conditions (e.g., high LNG prices).
  - MZB helps minimize carbon lock-in by displacing coal and oil generation.
  - The Project's technical flexibility (high ramp rate, low minimum load) supports future integration of renewables. While the Project is compatible with the country's low-GHG trajectory in the short-to-medium term, long-term consistency with decarbonization goals depends on policy safeguards (e.g., carbon pricing, retirement planning, and limits on future fossil infrastructure). The exclusion of upstream LNG emissions in the modeling of the Project was due to unavailability of data to cross-compare the baseline and alternative scenarios transparently regarding scope 3 impact, as leakage emission figures were not provided by the LNG's vendor, and the origin of the LNG is not linked contractually to a single sourcing location but from a portfolio of global commodities.

3.5. Robustness under Stress-Testing

- **The Base Case (with MZB) remains the most robust scenario, even when stress-testing key variables (fuel prices, carbon pricing, storage duration).**

- No RE+BESS portfolio could match the reliability and overall KPI performance of the Base Case, and all scenarios with RE+ BESS are significantly more cost intensive.
- Higher LNG prices reduced MZB's competitiveness but did not undermine its system value.
- Carbon pricing further favored MZB over coal, improving its emissions profile.

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4. Conclusions

- **Paris Alignment:** MZB is aligned with the mitigation objectives of the Paris Agreement. It represents a balanced, context-sensitive solution for the DR's energy transition, supporting decarbonization, affordability, and energy security.
- **Role in Transition:** MZB is a transitional asset, not a permanent fossil fuel lock-in. It enables rapid RE integration, displaces higher-emission generation, and provides essential grid services (inertia, voltage control, black start capability) that renewables and batteries alone cannot yet fully deliver.
- **Systemic Value:** The Project's inclusion in the SENI expansion plan avoids new coal/oil capacity, supports NDC implementation, and ensures reliable, affordable power during a period of rapid demand growth.
- **Trade-offs:** While RE+BESS alternatives offer environmental benefits, they entail higher costs and lower reliability under current conditions. Achieving equivalent reliability would require unprecedented investment and development speed.
- **CBDR:** While global decarbonization pathways call for a rapid phase-out of unabated fossil fuels, the Project's alignment must be assessed in light of the DR's status as a Small Island Developing State (SIDS), its limited share of global emissions, and its concrete progress in renewable energy deployment. The Project is framed as a transitional, time-bound solution to address near-term energy security and reliability needs, while enabling the retirement of more carbon-intensive assets.
- **Recommendation:** The Project is the most viable option for the DR's energy transition through 2054, providing a foundation for a future renewable-led grid and supporting the country's climate and development goals.

References:

- S&P Global Commodity Insights (2025). Economic, Technical and Environmental Impact Assessment of Manzanillo Bay CCGT Plant Integration and Alternative Scenarios in the Dominican Republic with a System Based Approach.
- Mercados Energéticos Consultores (2023). Paris alignment Analysis for the Manzanillo Thermoelectric Power Plant.
- Dominican Republic NDC (2020), National Energy Plan (2025–2038), OC and CNE data.