



STRENGTHENING COMMUNITIES SHAPING TOMORROWS

**GEODYN SOLUTION TECHNICAL
EXPLANATION, ENVIRONMENTAL
BENEFITS, AND CARBON
MANAGEMENT PLAN**



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SYSTEM OPERATION

HOW THE POWER PLANT WORKS

The proposed 250MW modular LNG-based power plant integrates three key technologies to maximize efficiency and flexibility:

PRIMARY GENERATION – MODULAR TURBINES (150 MW)

- Mobile turbine-generator modules convert LNG into electrical power.
- Each unit is trailer- or container-mounted for rapid deployment and relocation.
- Advanced combustion systems ensure low emissions while maintaining high efficiency.

HEAT RECOVERY STEAM TURBINE (HRST, +75 MW)

- High-temperature exhaust gases (~500–600°C) from the turbines are captured.
- These gases pass through Heat Recovery Steam Generators (HRSGs) to produce high-pressure steam.
- The steam drives a steam turbine, adding ~75 MW of electricity without additional fuel input.
- This process raises system efficiency from ~40% (simple cycle) to ~54%.

ORGANIC RANKINE CYCLE (ORC, +25 MW)

- After HRST extraction, lower-temperature exhaust (~100–200°C) is still available.
- The ORC uses a working fluid with a lower boiling point than water (often pentane or refrigerant-like fluids).
- This fluid evaporates under waste heat, drives a turbine, and generates an additional ~25 MW.
- This final layer of energy recovery boosts overall plant efficiency to ~58%, reducing fuel requirements per MWh.

Together, these integrated systems achieve 250MW net capacity with a three-stage recovery cycle, maximizing output while minimizing LNG consumption.





vs

PROJECT OVERVIEW

FUEL EFFICIENCY & REDUCED EMISSIONS

- By converting waste heat into electricity, fuel consumption per MWh is reduced by 35% compared to simple-cycle turbines.
- This results in 37% lower CO₂ emissions per MWh, supporting Dominican Republic's carbon reduction commitments.

AIR QUALITY IMPROVEMENTS

- Dry Low NO_x (DLN) combustion technology reduces NO_x emissions by 80–90%, improving local air quality.
- Sulfur Oxide (SO_x) emissions are effectively eliminated since LNG contains negligible sulfur.
- Particulate Matter (PM) emissions are reduced by ~88% compared to fuel oil plants.

WATER & NOISE MANAGEMENT

- Closed-loop cooling systems minimize freshwater withdrawals, critical in water-stressed regions.
- Acoustic enclosures and silencers ensure noise levels comply with World Bank/ IFC standards.

LAND USE OPTIMIZATION

- The compact modular design requires only ~15 acres, far less than coal or oil plants of comparable size.
- This minimizes habitat disruption and enables deployment on existing industrial sites.





CO₂



CARBON MANAGEMENT STRATEGY



To align with carbon neutrality pathways and global ESG requirements, Geodyn Solutions proposes an integrated Carbon Management Plan:

CARBON ACCOUNTING & MONITORING

- Install continuous emissions monitoring systems (CEMS) to measure CO₂, NO_x, and methane slip in real time.
- Data is digitally logged and integrated with AI-driven analytics for compliance and optimization.

CARBON REDUCTION MEASURES

- High-efficiency HRST and ORC systems reduce LNG consumption per MWh.
- Explore biogenic LNG blends (bio-LNG, synthetic methane) as they become commercially available.
- Implement methane leak detection and prevention systems across fuel handling infrastructure.

CARBON OFFSETTING & CREDIT TRADING

- Participate in international carbon credit markets (EU ETS, CORSIA, and regional exchanges in Japan and Luxembourg).
- Credits generated from efficiency gains and avoided emissions can be tokenized and traded.
- The project can generate Certified Emission Reductions (CERs) under the UN Clean Development Mechanism.

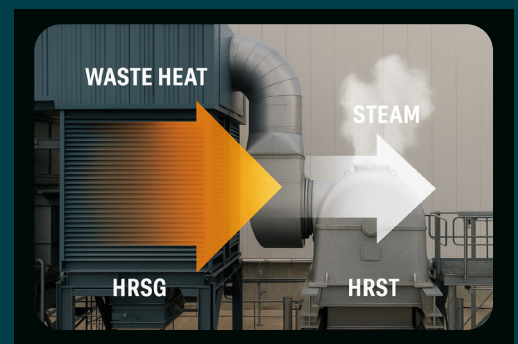
CIRCULAR ECONOMY INTEGRATION

- Condensate water from HRSGs can be reclaimed and reused for auxiliary cooling and cleaning.
- Waste heat recovery reduces fuel needs, avoiding long-term LNG import dependence.

- Surplus CO₂ (captured via optional carbon capture units) can be supplied for food/beverage industry or greenhouse applications, aligning with industrial symbiosis practices.

LONG-TERM TRANSITION PLAN

- The modular design allows conversion from 100% LNG to blended hydrogen-LNG firing as hydrogen infrastructure develops in the Caribbean.
- Geodyn will establish a Carbon Neutrality Roadmap (2025–2040) for phased integration of hydrogen, CCUS (Carbon Capture, Utilization, and Storage), and renewable hybridization.



CONCLUSION

The 250MW modular LNG power plant combines technical innovation, environmental responsibility, and carbon management:

- High Efficiency (58%) → Less fuel per MWh, lower CO₂ emissions.
- Environmental Safeguards → Reduced NO_x, SO_x, PM, noise, and water footprint.
- Carbon Compliance → Integrated monitoring, offset trading, and pathway to carbon neutrality.
- Future-Ready → Adaptable to hydrogen, carbon capture, and renewable hybridization.

This ensures the Dominican Republic gains immediate energy security while aligning with Paris Agreement goals and ESG investor standards.





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