GEODYN SOLUTIONS™

200 MW LNG POWER PLANT OR POWER BARGE FOR THE DOMINICAN REPUBLIC

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RESUMEN EJECUTIVO

Geodyn Solutions, in collaboration with its strategic technology partner, proposes two advanced 200 MW LNG-based power generation solutions for the Dominican Republic: (1) a land-based combined cycle gas turbine (CCGT) power plant, and (2) an LNG power barge, both powered by proprietary technologies co-developed to maximize efficiency and reliability. Deployed at a coastal site (e.g., Santo Domingo or Puerto Plata), either option will deliver 200 MW to the grid at $0.14/kWh, supporting energy security and sustainability. The proposal compares costs, ROI, job creation, and environmental impacts, leveraging the Dominican Republic's LNG infrastructure (e.g., AES Andrés terminal).

OPTION 1

LAND-BASED LNG COMBINED CYCLE POWER PLANT

TYPE: Combined Cycle Gas Turbine (CCGT) power plant, using the proprietary GeoCycle-200 system, co-developed by Geodyn Solutions and its partner.
CAPACITY: 200 MW electric (MWe), achieved with one GeoCycle-200 gas turbine (150 MW) and a steam turbine (50 MW).
EFFICIENCY: 64% net efficiency (LHV), among the highest for CCGT, reducing fuel consumption.

KEY TECHNOLOGIES:

- Gas Turbine: GeoCycle-200 turbine, co-developed with advanced low-NOx combustion (GeoFlame technology, <12 ppm NOx) and hydrogen co-firing capability (up to 25% by volume).
- Heat Recovery Steam Generator (HRSG): Proprietary triple-pressure HRSG with integrated selective catalytic reduction (GeoSCR), achieving 92% NOx removal.
- Steam Turbine: Co-developed high-efficiency steam cycle with proprietary blade cooling (GeoCool), enhancing thermal performance.
- Digital Controls: GeoSmart-AI, a joint AI-based control system, optimizes fuel efficiency and predicts maintenance, reducing downtime by 35%.
- Carbon Capture Readiness: Modular GeoCapture design allows retrofit of post-combustion capture, capturing up to 90% CO_2.

FUEL: LNG (99% methane), sourced via AES Andrés terminal, with backup diesel capability.
ADAPTATIONS:

- Climate Resilience: Co-developed corrosion-resistant alloys for tropical conditions (27°C, high humidity).
- Grid Integration: 60 Hz grid-compatible, with fast-start capability (25 minutes to full load) for renewable integration.

OPTION 2

LNG POWER BARGE

TYPE: Floating Power Plant (FPP), non-self-propelled barge, using the proprietary GeoCycle-200B system, co-developed by Geodyn Solutions and its partner.
CAPACITY: 200 MW electric (MWe), achieved with four 50 MW GeoCycle-200B aeroderivative turbines in simple cycle configuration.
EFFICIENCY: 43% net efficiency (LHV), optimized for rapid deployment and flexibility.

KEY TECHNOLOGIES:

- Gas Turbines: GeoCycle-200B turbines with co-developed dry low-emission (GeoDLE) combustors, achieving <20 ppm NOx and 12-minute startup.
- Power Generation System: Compact, modular generators with proprietary air-cooling (GeoAir), eliminating marine water use.
- Hull Design: Co-developed double-hulled barge (150 m long, 40 m wide, 10 m high; 20,000 tonnes) withstands Category 5 hurricanes.
- Digital Controls: GeoSmart-B AI system, a joint innovation, enables real-time optimization and remote monitoring.
- LNG Storage: Onboard 10,000 m^3 LNG tanks, with weekly refueling via shuttle tankers.

FUEL: LNG, sourced via coastal transfer from AES Andrés, with diesel backup.
ADAPTATIONS:

- Climate Resilience: Co-developed anti-corrosion coatings and air-cooled systems for marine conditions.
- Grid Integration: Submarine cables for 60 Hz grid, with load-following for renewable support.
- Mooring: 1-2 km offshore, minimizing coastal disruption.

OPTION 1:

LAND-BASED LNG POWER PLANT

CAPITAL EXPENDITURE (CAPEX)

- **Base Cost:** $250 million ($1,250/kW, reflecting proprietary technology development).
- **Infrastructure:** $60 million (LNG pipeline, grid connection, cooling towers, site preparation).
- **Licensing and Permitting:** $10 million (environmental assessments, local approvals).
- **Total CapEx:** $320 million.
- **20% Contingency:** $64 million.
- **Total CapEx with Contingency:** $384 million.

OPERATING COSTS

- Annual Operating Cost: $34 million/year, including:
  - Fuel: $21 million (LNG at $8/MMBtu, 7.4 MMBtu/MWh at 64% efficiency).
  - Staffing (50 personnel): $3 million.
  - Environmental Compliance: $2 million (emissions monitoring, GeoSCR maintenance).
- Levelized Cost of Electricity (LCOE): $47/MWh, cheaper than solar with storage ($60-100/MWh).

RETURN ON INVESTMENT (ROI)

REVENUE ASSUMPTIONS:

- Tariff: $0.14/kWh.
- Annual output: 200 MW × 8,000 hours (91% capacity factor) = 1,600 GWh.
- Annual revenue: 1,600,000 MWh × $0.14/kWh = $224 million.

PAYBACK PERIOD:

- Net annual profit: $224 million - $34 million = $190 million.
- Payback: $384 million ÷ $190 million ≈ 2.0 years.

ROI OVER 20 YEARS:

- Total revenue: $224 million × 20 = $4.48 billion.
- Total costs: $384 million (CapEx) + ($34 million × 20) = $1.064 billion.
- Net profit: $4.48 billion - $1.064 billion = $3.416 billion.
- ROI: ($3.416 billion ÷ $384 million) × 100 ≈ 889%.

OPTION 1:

LNG POWER BARGE

CAPITAL EXPENDITURE (CAPEX)

- **Base Cost:** $290 million ($1,450/kW, reflecting proprietary barge and turbine costs).
- **Infrastructure:** $80 million (submarine cables, mooring systems, port upgrades).
- **Licensing and Permitting:** $12 million (marine environmental assessments, approvals).
- **Total CapEx:** $382 million.
- **20% Contingency:** $76.4 million.
- **Total CapEx with Contingency:** $458.4 million.

OPERATING COSTS

Annual Operating Cost: $41 million/year, including:

- Fuel: $27 million (LNG at $8/MMBtu, 8.4 MMBtu/MWh at 43% efficiency).
- Maintenance: $9 million (turbine and barge upkeep).
- Staffing (60 personnel): $3.5 million.
- Environmental Compliance: $1.5 million (emissions monitoring, marine compliance).

Levelized Cost of Electricity (LCOE):
$55/MWh, competitive with natural gas ($40-80/MWh).

RETURN ON INVESTMENT (ROI)

REVENUE ASSUMPTIONS:

- **Tariff:** $0.14/kWh.
- **Annual output:** 1,600 GWh (as above).
- **Annual revenue:** $224 million.

PAYBACK PERIOD:

- **Net annual profit:** $224 million - $41 million = $183 million.
- **Payback:** $458.4 million ÷ $183 million ≈ 2.5 years.

ROI OVER 20 YEARS:

- **Total revenue:** $4.48 billion.
- **Total costs:** $458.4 million (CapEx) + ($41 million × 20) = $1.278 billion.
- **Net profit:** $4.48 billion - $1.278 billion = $3.202 billion.
- **ROI:** ($3.202 billion ÷ $458.4 million) × 100 ≈ 699%.

COST COMPARISON

METRIC	LAND-BASED LNG PLANT	LNG POWER BARGE
Total CapEx (with 20% contingency)	$384 million	$458.4 million
Annual Operating Cost	$34 million	$41 million
LCOE	$47/MWh	$55/MWh
Payback Period	2.0 years	2.5 years
20-Year ROI	889%	699%
Key Advantage	Lower costs, higher efficiency	Rapid deployment, no land use
Key Drawback	Land requirements, longer build time	Higher fuel costs, marine risks

LAND-BASED LNG PLANT

CONSTRUCTION PHASE (2 YEARS):

- 800 temporary jobs, including 600 local hires for civil works, piping, and logistics.
- 200 skilled jobs (engineers, technicians), with 50% trained locally via Geodyn-partner programs.

OPERATIONAL PHASE (20 YEARS):

- 50 permanent jobs (operators, maintenance, management).
- 70 indirect jobs (LNG supply chain, local services).

TRAINING:

Partnership with Universidad Autónoma de Santo Domingo for gas turbine and GeoSmart-AI training, leveraging partner expertise.

LNG POWER BARGE

CONSTRUCTION PHASE (1.5 YEARS)

- 1,000 temporary jobs, including 700 local hires for port upgrades and cable installation.
- 300 skilled jobs, with 50% trained locally through Geodyn-partner programs.

OPERATIONAL PHASE (20 YEARS):

- 60 permanent jobs (operators, marine crew, maintenance).
- 80 indirect jobs (port services, LNG transport).

TRAINING:

Collaboration with INTEC for marine and turbine engineering, supported by partner knowledge.

LAND-BASED LNG PLANT

GREENHOUSE GAS EMISSIONS:
~395 g CO_2e/kWh (64% efficiency), 60% lower than coal (1,001 g CO_2e/kWh). GeoCapture retrofit could reduce emissions by 90%.
LAND USE: 10 hectares, potentially impacting local ecosystems.
WATER CONSUMPTION:
Closed-loop cooling towers use 0.5 m^3/MWh, minimizing water impact.
AIR EMISSIONS:
<12 ppm NOx, <10 ppm CO, compliant with EPA standards via GeoSCR and GeoFlame.
MITIGATION:
Site selection avoids protected areas (e.g., Los Haitises). Reforestation offsets land use.

LNG POWER BARGE

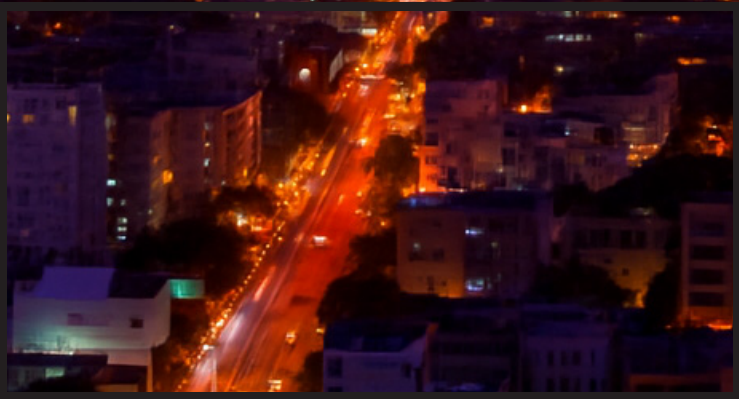
GREENHOUSE GAS EMISSIONS:
~445 g CO2e/kWh (43% efficiency), slightly higher due to lower efficiency.
LAND USE: Zero land footprint; offshore mooring preserves ecosystems.
WATER CONSUMPTION: GeoAir cooling eliminates marine water use.
AIR EMISSIONS: <20 ppm NOx, compliant with IMO and EPA standards via GeoDLE.
MARINE IMPACT: Mooring and cables avoid coral reefs. Co-developed spill prevention systems minimize LNG risks.
MITIGATION: Marine environmental monitoring ensures IUCN compliance.

LAND-BASED LNG PLANT

PHASE	TIMELINE
YEAR 1 (2026)	Site selection, environmental studies, permitting, community engagement.
YEAR 2-3 (2027-2028)	Construction, turbine installation, grid integration.
YEAR 4 (2029)	Commissioning, commercial operation.
REGULATORY COMPLIANCE	Adheres to Dominican Republic's Law 63-17 and EPA-equivalent standards.

LNG POWER BARGE

PHASE	TIMELINE
YEAR 1 (2026)	Mooring site selection, marine studies, permitting, community engagement.
YEAR 2 (2027)	Barge construction, cable installation, grid integration.
YEAR 3 (2028)	Delivery, mooring, commissioning, operation.
REGULATORY COMPLIANCE	Adheres to Law 63-17, IMO, and EPA-equivalent standards.



RISK MITIGATION

- **TECHNICAL RISKS:** Co-developed GeoCycle systems undergo joint testing for reliability. GeoSmart-AI/B reduces downtime.
- **FINANCIAL RISKS:** 20% contingency covers overruns. PPAs secure revenue.
- **SOCIAL RISKS:** Community campaigns highlight low emissions and jobs, supported by partner credibility.
- **ENVIRONMENTAL RISKS:** Independent audits ensure compliance. Co-developed spill and fire prevention systems enhance LNG safety.

Geodyn Solutions, with its strategic partner, offers two LNG-based solutions using proprietary technologies: a land-based CCGT plant with superior efficiency and lower costs, and a power barge with rapid deployment and zero land use. The land-based plant delivers a 2.0-year payback and 889% ROI, while the barge offers a 2.5-year payback and 699% ROI, both at $0.14/kWh. The choice depends on priorities: cost and efficiency (land-based) or speed and land preservation (barge). Both support the Dominican Republic's sustainable energy goals, deployable by 2028-2029.

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