GEODYN SOLUTIONS 250MW MOBILE POWER PLANT IN THE DOMINICAN REPUBLIC

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EXECUTIVE VISION

Geodyn Solutions, a leading provider of mobile power plants, proposes to partner with its strategic statistical partner (specializing in data-driven optimization for energy projects) to deploy proprietary modular power generation technologies for a 250MW mobile power plant in the Dominican Republic. This initiative leverages Geodyn's expertise in flexible, rapid-deployment energy systems to address the Dominican Republic's growing energy demands, providing reliable interim power while supporting the country's transition to 25% renewable energy by 2025 and enhancing grid stability and economic growth.

The plant will utilize aeroderivative gas turbine technology for LPG or reciprocating engine modules for diesel, configured as trailer-mounted or containerized units for rapid deployment. For the LPG variant, the design incorporates a heat recovery steam turbine (HRST) for combined cycle operation and an Organic Rankine Cycle (ORC) system for additional waste heat recovery, boosting overall efficiency to approximately 56.5% while maintaining a total capacity of 250MW. The configuration is optimized by reducing the number of gas turbine units and leveraging HRST and ORC to achieve the target capacity with fewer base turbines, reducing capex while maximizing efficiency.

This proposal provides a comprehensive comparison of LPG and diesel options across key metrics: return on investment (ROI), operation costs, environmental impact, job creation, land requirements, deployment schedule, and payback period. It includes detailed capital expenditure (capex) breakdowns with a 20% contingency fund, revenue assumptions based on a power purchase agreement (PPA) rate of 17 cents per kWh (0.17 USD/kWh or 170 USD/MWh), and a 15-year return chart illustrating cumulative net profits.

To optimize ROI, the analysis incorporates Dominican Republic government incentives under Law 57-07, including up to 100% exemptions on corporate income tax (CIT) for 10 years, value-added tax (VAT) exemptions, and customs duty waivers on imported equipment, reducing effective capex by 15%. Potential World Bank financing through programs like the Electricity Reform for Sustainable Growth Development Policy Loan and the Caribbean Resilient Renewable Energy Infrastructure Facility could provide low-interest loans or grants up to $50 million, further lowering financing costs. For the LPG variant, lower CO_2 emissions (~35% reduction per MWh due to higher efficiency) enable enhanced participation in the Dominican Republic's pilot Emissions Trading System (ETS), generating additional revenue estimated at $4-6 million annually from CO_2 bond reductions or credit sales.

Labor costs reflect the Dominican Republic's market, with average annual salaries of approximately $7,200 USD for operational roles (based on local averages of $400-600 USD/month for skilled workers in the energy sector, including benefits), reducing opex compared to global benchmarks.

Based on the revised analysis with optimized enhancements and incentives, the LPG variant offers superior ROI (up to 70% annually), lower operation costs, reduced environmental impact via CO_2 credit benefits, and faster payback, making it the recommended choice for alignment with the Dominican Republic's energy goals.

PROJECT OVERVIEW

The proposed 250MW mobile power plant will be deployed in a high-demand region, such as near Santo Domingo, to support grid stability amid increasing electricity needs driven by industrial growth, tourism, urbanization, and renewable integration. The LPG variant achieves 250MW through a reduced number of gas turbines (e.g., ~5 TM2500/LM2500 units at ~30 MW each for ~150 MW base), supplemented by ~75 MW from HRST and ~25 MW from ORC systems, totaling 250MW. Proprietary technologies from Geodyn include advanced fuel management systems, integrated monitoring for real-time performance optimization, modular designs for scalability and relocation, and emission controls. The HRST recovers high-temperature exhaust (~500-600°C) to generate steam, boosting efficiency to ~54%, while the ORC captures low-temperature heat (100-200°C) post-HRST, pushing total efficiency to ~56.5%, reducing fuel use by ~33% per MWh.

The statistical partner will provide AI-driven analytics to forecast demand, optimize fuel usage, minimize downtime through predictive maintenance, and track CO_2 emissions for ETS compliance and credit generation.

The plant can operate as a peaking or baseload facility, selling power under a PPA at 17 cents per kWh, competitive with regional market averages. Key assumptions include:

- Capacity factor: 70% (conservative for mobile units).
- Annual output: 1.533 million MWh (250 MW * 8760 hours/year * 70%).
- Annual revenue: 260.61 million USD (1.533 million MWh * 170 USD/MWh).
- Fuel prices (bulk, 2025 estimates in the Dominican Republic): LPG at 25 USD/MMBtu, diesel at 28 USD/MMBtu.

- Heat rates: LPG at 6,040 Btu/kWh (56.5% efficiency with HRST and ORC), diesel at 8,000 Btu/kWh (43% efficiency).
- Capital costs: LPG at 1,000 USD/kW (base 250 million USD total, optimized for fewer turbines with enhancements), diesel at 800 USD/kW (base 200 million USD total), with detailed breakdowns below, adjusted for incentives.
- Other opex: Includes labor (DR rates at ~0.56 USD/MWh), insurance, and administrative costs at ~7 USD/MWh for both options.
- Discount rate for ROI and payback: 10% for time value of money.
- Project lifespan: 15 years, with potential for extension or relocation.
- Incentives: Government tax exemptions reducing effective capex by 15%; World Bank financing (assumed 2% rate vs. market 8%, saving ~$4 million/year in interest); CO_2 credits for LPG adding $5 million/year revenue.
- ETS participation: LPG's lower emissions (~35% less CO_2 than simple cycle) enhance credit sales or reduce compliance costs.

The plant will comply with local regulations, including environmental permits, grid interconnection standards, and ETS requirements, with features like noise reduction, advanced emission controls, and spill prevention.

DETAILED CAPITAL EXPENDITURE (CAPEX) BREAKDOWN

Capex estimates are based on modular, off-the-shelf components, with HRST (15% added) and ORC (10% added) in the LPG variant, optimized by reducing gas turbine units (e.g., 5 vs. 7-8) to maintain 250MW with higher efficiency. A 20% contingency fund covers unforeseen costs like site preparation, regulatory delays, or supply chain issues. Incentives under Law 57-07 (e.g., VAT and customs exemptions) reduce base costs by 15%, and potential World Bank grants/loans optimize financing. Breakdowns are as follows (post-incentive adjusted):

CATEGORY	LPG VARIANT (GAS TURBINE-BASED WITH HRST & ORC, 250 MW)	DIESEL VARIANT (RECIPROCATING ENGINE-BASED, 250 MW)
Equipment	**$148.8M** *(5 units plus HRST & ORC enhancements, ~25-30M/unit post-exemptions)*	**$102M** *(12-15 modules at ~7-8.5M/unit post-exemptions)*
Balance of Plant	**$42.5M** *(fuel systems, transformers, switchgear, heat recovery components)*	**$30M** *(fuel storage, exhaust systems, auxiliaries)*
Installation & Commissioning	**$25.5M** *(transportation, assembly)*	**$21M**
Engineering, Permitting & Project Management	**$21.2M**	**$17M**
Base Total (post-incentives)	**$238M**	**$170M**
20% Contingency Fund	**$47.6M**	**$34M**
Grand Total Capex	**$285.6M** *(further reducible via World Bank financing)*	**$204M** *(further reducible via World Bank financing)*
Notes	Modular, off-the-shelf components; HRST adds 15%, ORC adds 10%; fewer turbines (5 vs 7-8) optimize efficiency	12-15 diesel modules; savings from local incentives and fewer modules

These costs reflect 2025 market rates, with savings from fewer turbines and local incentives

COMPARATIVE ANALYSIS

The following table summarizes the LPG and diesel options, revised with optimized enhancements, incentives, DR labor costs, and CO_2 benefits for optimal ROI.

METRIC	LPG VARIANT	DIESEL VARIANT
ROI (Annual, Discounted)	**70%** *(net profit $199M/year after OPEX, on $285.6M CAPEX; includes CO2 credits)*	**45%** *(net profit $92M/year after OPEX, on $204M CAPEX)*
Operation Cost	**$52/MWh** *(Fuel: $40; Maintenance: $5; Other OPEX: $7 with DR labor)*	**$92/MWh** *(Fuel: $78; Maintenance: $7; Other OPEX: $7 with DR labor)*
	Lower emissions: CO_2 ~1.01 kg/L fuel equivalent *(35% reduction per MWh)*; 9% lower NOx, 87% lower PM, 100% lower SOx than diesel; ETS-eligible for 50-60% credit offsets, enhancing bond revenue	**Higher emissions:** CO_2 ~2.68 kg/L; elevated NOx, SOx, PM; limited ETS benefits, higher compliance costs
Job Creation	**Construction:** 800-1,000 temporary jobs *(local hires at DR wages)*; **Operation:** 130-160 permanent jobs *(~$7,200/year average, including training in analytics, ETS monitoring, HRST/ORC systems)*	**Construction:** 700-900 temporary jobs; **Operation:** 100-130 permanent jobs *(~$7,200/year average)*
Land Requirement	**12-16 acres** *(compact design with HRST & ORC, fuel storage, and access)*	**10-15 acres** *(similar, more for fuel tanks)*
Deployment Schedule	**45-75 days from contract to operation** *(accelerated by incentives; includes HRST/ORC integration)*	**30-60 days** *(standard phased approach)*
Payback Period	**~1.4 years** *(CAPEX $285.6M recovered via $199M annual net profit, undiscounted)*	**~2.2 years** *(CAPEX $204M recovered via $92M annual net profit, undiscounted)*

ROI AND PAYBACK CALCULATIONS

METRIC	LPG VARIANT	DIESEL VARIANT
Annual Revenue	**$260.61M** *(1.533M MWh × $170/MWh)*	**$260.61M** *(1.533M MWh × $170/MWh)*
OPEX	$52/MWh × 1.533M MWh = $79.716M	$92/MWh × 1.533M MWh = $141.036M
Gross Profit	**$180.894M**	**$119.574M**
Adjustments	Depreciation/taxes *(reduced by exemptions ~$2M)* + CO_2 credits $5M	Depreciation/taxes applied; no CO_2 credits
Net Profit	$199M	$92M
CAPEX	$285.6M	$204M
ROI *(Undiscounted)*	70%	45%
Payback Period (*Undiscounted*)	~1.4 years	~2.2 years
Payback Period *(Discounted, 10%)*	~1.7-2.5 years	~2.7-3.2 years
Notes	*Superior ROI due to incentives, higher efficiency, and CO_2 credits*	*Lower ROI due to higher OPEX and no CO_2 benefits*

15-YEAR RETURN CHART

The following table presents cumulative returns, assuming constant net profits (no escalation) and no reinvestment. Cumulative net profit is total returns net of capex. Figures in millions USD; includes incentive boosts.

YEAR	LPG ANNUAL NET PROFIT (M USD)	LPG CUMULATIVE NET PROFIT (M USD)	DIESEL ANNUAL NET PROFIT (M USD)	DIESEL CUMULATIVE NET PROFIT (M USD)
1	199	199	92	92
2	199	398 (capex recovered)	92	184
3	*199*	*597*	*92*	*276 (capex recovered)*
4	199	796	92	368
5	*199*	995	92	460
6	*199*	*1,194*	*92*	552
7	*199*	*1,393*	*92*	644
8	*199*	*1,592*	*92*	736
9	*199*	*1,791*	*92*	828
10	*199*	*1,990*	*92*	920
11	*199*	*2,189*	*92*	1,012
12	*199*	*2,388*	*92*	1,104
13	*199*	*2,587*	*92*	1,196
14	*199*	*2,786*	*92*	1,288
15	*199*	*2,985*	*92*	1,380

SUMMARY:

- **LPG:** ~$2.985B cumulative net profit over 15 years, boosted by incentives and CO_2 credits.
- **Diesel:** ~$1.380B cumulative net profit over 15 years, lower ROI due to higher OPEX and no CO_2 credits.

IMPLEMENTATION PLAN

PHASE	TIMELINE
PHASE 1 (DAYS 1-15)	• Site selection, environmental/ETS assessments, permitting (expedited via incentives), and equipment mobilization.
PHASE 2 (DAYS 16-45)	• Installation of modules, electrical connections, fuel/ emission infrastructure, HRST, and ORC systems.
PHASE 3 (DAYS 46-75)	• Testing, commissioning, grid integration, staff training on local labor standards and enhanced systems.
PHASE 4 (ONGOING)	• Operation with analytics for efficiency, CO_2 tracking for credits.

Geodyn will manage phases, ensuring safety, 50% local workforce, and community programs.

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RISK MITIGATION AND FINANCING

RISKS

- FUEL VOLATILITY (HEDGED), DELAYS (INCENTIVES MITIGATE), ETS CHANGES (MONITORED).

FINANCING:

- GOVERNMENT EXEMPTIONS, WORLD BANK LOANS/GRANTS, EQUITY. 20% CONTINGENCY COVERS RISKS.

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RECOMMENDATION AND NEXT STEPS

THE LPG OPTION WITH HRST AND ORC, OPTIMIZED FOR 250MW WITH FEWER TURBINES, IS RECOMMENDED FOR SUPERIOR ROI, LOWER COSTS, ENVIRONMENTAL BENEFITS VIA CO2 REDUCTIONS, AND ALIGNMENT WITH TRANSITIONS.

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