

CARIBBEAN INTEGRATED POWER SYSTEM AND GUYANA HYDRO POWER PROJECT

*Caribbean's best opportunity for Renewable Energy,
Sustainable Infrastructure and new Economic Development.*

Background

- The Trinidad Generation Unlimited (TGU) power plant being constructed at La Brea, Trinidad will have approx. 400MW of surplus capacity which was previously intended for an aluminium smelter
- There are Take or Pay gas supply and Power Purchase contracts totaling **more than TT\$800M annually** associated with this power plant, added to the capital repayment arrangements
- The concessionary gas price for national power generation will expire in 2018. The opportunity cost for this gas is more than **TT\$1 Bn annually** when compared with other available uses for gas
- Trinidad and Tobago's Gas Reserves to Production Ratio has fallen, making it difficult to enter into new long term gas contracts for industrial plants
- TT produces a significant amount of greenhouse gas, Carbon Dioxide, from its energy sector
- There is liquidity in the TT financial system, and a business sector that is eager for new opportunity
- Government policies support establishment of linkages between the Manufacturing and Energy Sectors, export of locally developed energy services, reduction of carbon footprints, increased usage of renewable energy, and CARICOM economic integration
- Trinidad & Tobago is at risk of losing its leadership role in the Caribbean energy sector as renewable energy initiatives gain prominence e.g. Nevis Geothermal power plant and cable to Puerto Rico
- Guyana presents the opportunity to address many of the TT current and future needs - food security, raw materials for sustainable manufacturing, energy security, land space, workforce
- Guyana's hydropower potential is 7000MW. The country uses 100MW of mostly diesel power
- ENMAN Services Ltd, a Trinidadian engineering service company has developed the concept of utilising renewable hydroelectric power from Guyana as part of a regional integrated power system, interconnecting islands with a submarine power & telecommunications cable

Project concept

Design, finance and construct a submarine power cable from Trinidad to Guyana to initially take surplus power from the TGU plant in La Brea to Guyana

Develop a new Industrial Park and Port facility in Guyana's under-developed North West.

Encourage TT and Caribbean manufacturers and service companies to partner with Guyanese counterparts in building new industries, while hiring and training locals and persons from the region

Supply the ever growing industrial site with hydropower when it becomes available six years hence

Bring hydropower in the reverse direction on the submarine cable to Trinidad and to the rest of the Caribbean. The Port of Spain power station can be taken off-line at that point. Three trillion cubic feet (**3TCF**) of gas will be freed up for other, higher value usage

The entire project (cable, industrial park, port, hydropower plant) value exceeds US\$3B



Guyana Hydropower Project

The Guyana Hydropower Project site is located at the Turtruba Rapids on the Mazaruni River in Guyana. In 2001, ENMAN Services Ltd, a Caribbean engineering company, conducted a review of the regional power situation and concluded that hydroelectric power from Guyana presented the best option for new energy for the region. They also recognised the need for cross-border power transmission and energy integration.

ENMAN entered into an agreement with the Government of Guyana to develop the project and partnered with Canadian ex-Ontario Hydro consultants, Hardy Stevenson and Associates.

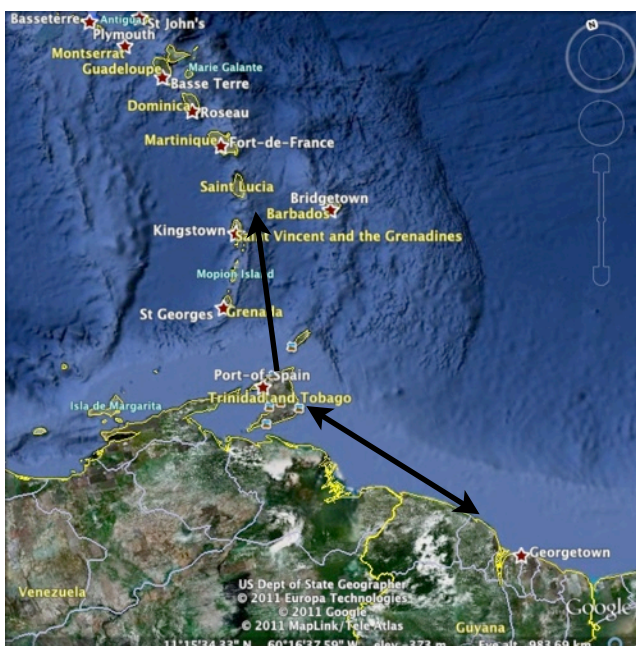
The developers have studied a 1976 UN Report on Hydropower in Guyana along with all available information and have contracted specialist engineering firms in Canada and Brazil. Studies on the Dam, Power Plant and Power line have concluded that the development is technically and economically feasible.

Phase 1 target is 800MW, with a power cost as low as five US cents per kWh, compared with 16-40 cents paid in parts of the region. The construction period is six years. Guyana and the entire region will benefit by way of major new economic activity, skills development, taxes and availability of low cost power for new industrial projects. Guyana will become a net exporter of energy.

Caribbean Integrated Power System

The TGU power plant and the Guyana Hydropower Project individually are sufficiently large to justify the construction of the much-discussed power cable. An interconnection is a necessary part of the regional infrastructure as recognised by the Energy and Climate Partnership of the Americas (ECPA) and OAS.

Gas generated power will reduce the need for diesel fuel. Hence all recipients will reduce their carbon footprints from the outset. The hydropower and will create other benefits - sustainable, reliable, power that is low cost and independent of the oil price. Territories can create world scale renewable energy generation (wind, solar, geothermal) and sell power into the Caribbean Integrated Power System.



The developers propose to employ high voltage direct current (HVDC) technology to reduce power losses and stabilise the connected grids. Trinidad and Guyana are approximately 150 miles at the closest points. The water depth is around 400 feet. There are several power cables around the world carrying more power for further distances in deeper water.

Considering the ever increasing demand for communications capacity, the power cable will feature a fibre optic component, which will get an almost “free ride” through the region. Sale of bandwidth will enhance the economic viability of the project.

The developers are committed to a **model project** for Corporate Social Responsibility and delivery of benefits to the people of the region.



Presentation of PFS Report



Guyana Energy Park

Vision for new Sustainable Centre for Caribbean Innovation and Enterprise

A modern Energy based Park on the coast of Guyana with Port and Logistic facilities and shared services

Plants engaging in Sustainable Manufacturing, utilising raw material available in Guyana. Knowledge based industries using the Telecoms bandwidth. Training facilities. Technical/Financial support services

Powered initially via a submarine power cable from Trinidad's gas generated power and later by Hydroelectric Power and other renewable energy (Solar and Wind) to be developed in Guyana

Guyanese and CARICOM companies partnering with each other, and with external organisations

Sustainable infrastructure, green energy, new economic space...

The Players

ENMAN Services, Trinidad & Tobago - The ENMAN (Engineering Management) Group is based in Trinidad and operates in the Caribbean. ENMAN's activities include Consultancy, Engineering Design and Implementation, Instrumentation & Controls, Environmental, IT and Solar/Wind solutions

Hardy Stevenson & Associates, Canada - Consultants. Infrastructure, Energy, Environmental/Social Impact Assessments, Public Consultation, Project Management and Finance. Associates include former senior executives of Ontario Hydro and former Chief Hydrologist of Guyana.

A F F I L I A T E S

Manitoba Hydro International, Canada - Provincial Power Utility.

MOBEC Engineering, Canada - Hydropower Engineers

Shelton & Carey Law, USA - Washington D.C. law firm

Key Personnel

Donald Baldeosingh BSc MSc Eng. - ENMAN Group CEO. Electrical Engineer with a broad base of industry experience in energy and management. Served as Chairman of Petroleum Company of Trinidad & Tobago, several other government appointed positions, and member ASME Industry Advisory Board.

David R. Hardy, BA Hon., M.E.S., RPP, MCIP - President, Hardy Stevenson and Associates, Social entrepreneur. Worked on major energy infrastructure and community projects across Canada. Served in senior positions in Ontario Hydro, and as President of the Conservation Council of Ontario.

Eur Ing Aldwyn Lequay HBM BSc CEng FIET FIMechE FASME FAPETT - Consulting Engineer. Former Power Station Manager and Deputy Chairman of T&TEC (Power Utility) and Port Authority, member of National Training Board and President of APETT.

Ian London BEng, MBA - Former President, Ontario Hydro International, Director – Ontario Hydro Technologies, Director – Asia Power Group, Vice-Chair & Director – Luz del Sur (Peru)

Darryl Mohan, MBA - Seasoned executive and consultant with extensive experience in strategic and business planning, project financing, government relations, and training & development programs

Yuri Huminilowycz BAA - Former senior executive at Ontario Hydro companies. Worked as urban planner, environmental assessment specialist, real estate asset manager, business development specialist, finance analyst and corporate strategic planner. Most recently in mediation and conflict resolution.



Project Brief

- 800 MW (optimised plant size) Hydropower Plant at Turtruba Rapids on Mazaruni River, Guyana
- High Voltage Power Transmission with Fibre Optic cable Guyana - Trinidad & Tobago - Caribbean
- Industrial Park and Port in Guyana utilising low cost power, and telecoms
- Infrastructure development - industrial parks, roads, ports, schools, living accommodation
- Total Project Value estimated at more than \$3 Bn

COMPLEMENTARY ACTIVITIES

- Downstream manufacturing in Trinidad & Tobago
- Fisheries enterprises at impounded waters
- Eco Tourism and Water Transport on lake
- Forestry products e.g. pulp plant
- Support services for the above
- Carbon Credits from displacement of hydrocarbon fuel
- Institute for Sustainable Renewable Energy Development - for Training and Capacity building



Hydropower Plant Site at Turtruba Rapids

Benefits to Trinidad & Tobago, Guyana and Region

- Utilisation of TT surplus power capacity and contracted gas
- Royalties and taxes, Access to Carbon Credits
- Hydropower is clean, renewable, lowest price, independent of world oil/gas prices
- Rapid development of Guyana's immense natural resources
- New economic space for regional entrepreneurs, Economic Diversification
- Capacity development and Job creation - skills, training institutes, financial, legal, contracting
- Sustainability: Hydropower plants have a life of 50+ years with a fixed predictable power price
- Shared capacity: System stability and Reliability - hydropower plant will be away from hurricane zones
- Promotion of Energy Integration as a vital part of Economic Integration

Status & Next Steps

- Scope and budget for study of power cable TT-Guyana completed
- Pre Feasibility Study and Business Plan completed for hydropower portion
- Three alternative Dam configurations produced
- Bankable report to be produced
- Some technical studies and EIA/SIA to be completed
- Power Purchase Agreements needed, leading to Structuring of Finance
- Engineering Design and Start of Construction

For further information, contact

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