

Belize Cogeneration Energy Limited

Belcogen – A project of national importance

***Presentation to
EEP Conference***

***“Cogeneration & Other Renewable
Energies in Central America”***

9 November 2010

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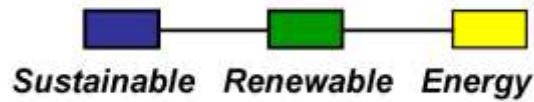


Sustainable Renewable Energy

Belcogen



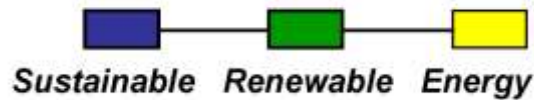
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Objective

- Provide an update of the Belcogen project:
 - Background overview
 - Financing structure
 - Technical aspects of power plant
 - Timetable
 - Operational Issues Resolved
 - Learning to date
 - The Future

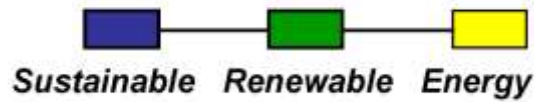


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Background Overview

- Belcogen is an Independent Power Producer (IPP) - supplying power to both Belize Sugar Industries Limited BSI and to Belize Electricity Limited (BEL)
- Total project cost – US\$63 million
 - the largest ever private sector investment in Belize
- A 31.5 MWe renewable energy power plant;
 - Waste to Energy plant
 - Bagasse 420,000 tonnes
 - some Heavy Fuel Oil
 - 92% of energy produced is renewable
 - Contractual first year Generation 106GWh+ for supply to BEL
 - >20% of national energy demand
 - Contractual first year Generation up to 44 GWh for supply to BSI
 - 135 t/h low pressure process steam

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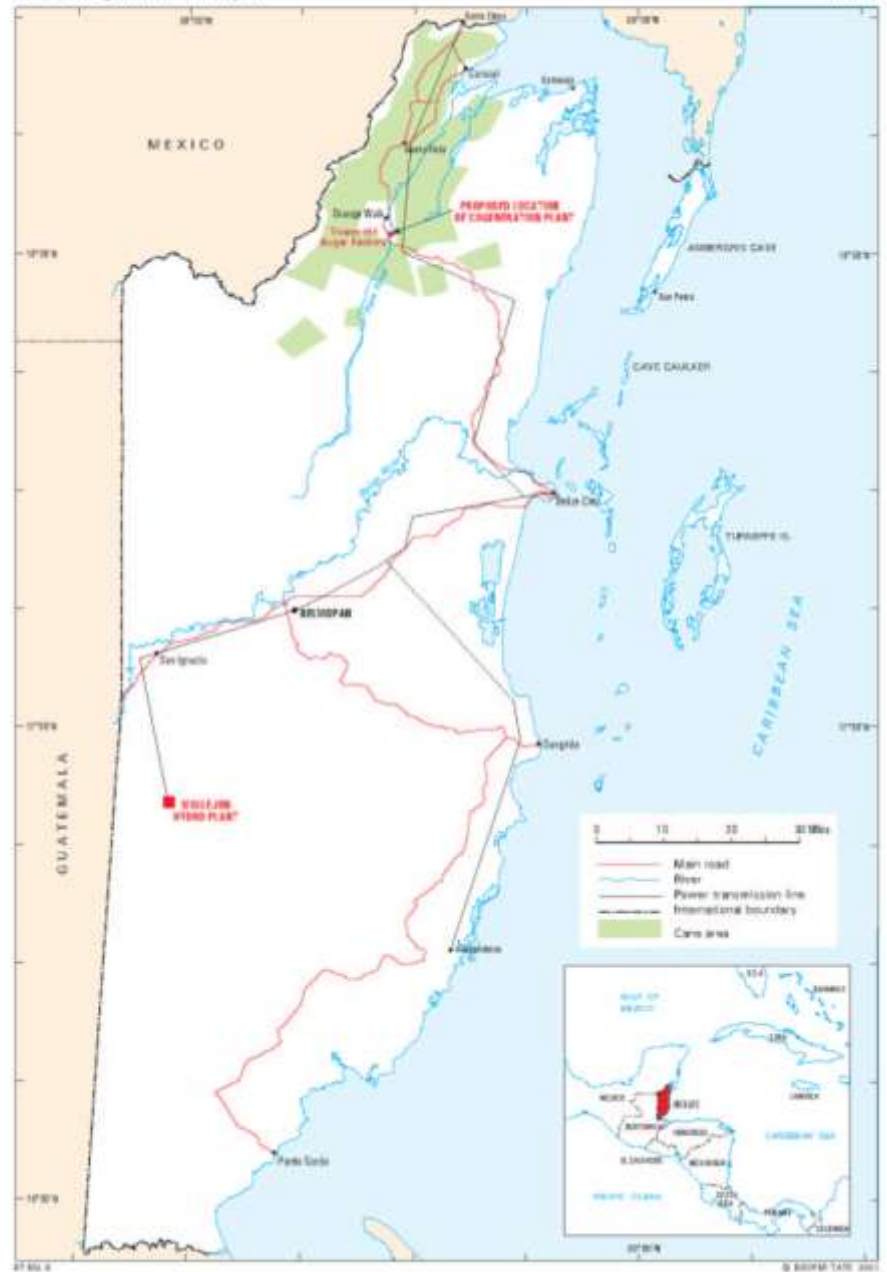


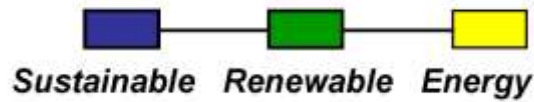
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Background overview (cont)

- Independent Power Producer
 - Not Government owned, subsidized or guaranteed
 - BEL Arms length contractual relationship to supply power
 - Private sector commercial business
 - Subject to regulation of PUC
- Modern facility;
 - New plant & equipment,
 - Built to international standards
 - Efficient, well run & maintained
- Capacity
 - Large by Belize standards
 - Medium sized international biomass facility
 - Small by international fossil fuel station standards

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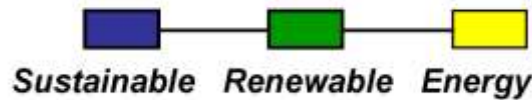




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Additional Project Benefits

- Direct employment
 - construction
 - operation
- Training & Development
- Environment
- Agricultural catalyst
- Economic stimulus
- Foreign exchange
- Environmental leadership in Caricom
- Energy security
- Reduce reliance on fossil fuel
- Use of renewable resource
- Stability of pricing
- Future expansion
- Long term partnership



Belcogen

• Chronology

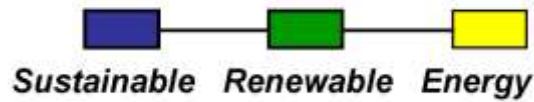
- Sept 2000 – Pre-feasibility study
- June 2001 – BSI Board approve project
- Jan 2002 PUC Implement International RfP process
- August 2002 – Belcogen advised successful in RfP
- October 2002 – Commence PPA negotiations with BEL
- December 2004 – Signed PPA with BEL

History

• Chronology (cont)

- July 2005 to Sept 2006 Engineering contract tender and negotiation
- November 2006 - EPC Contract signed
- February 2007 – Financial Closure
- April 2007 Commencement of Engineering Contract
- Jan 2008 Commence construction
- December 2009 – Commercial Operation

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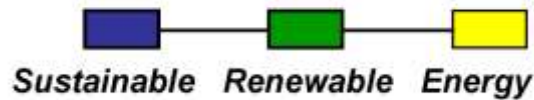


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Belcogen Ownership

- Belize Sugar Industries Limited (BSI)
 - Created Belcogen as a Company in 2001 as a stand alone business
 - 100% of the Belcogen equity (shares) owned by Belize Sugar Industries Limited (BSI)
 - BSI is a major Belize business located at Tower Hill site with Turnover of Bz\$100 million per year from sales of sugar and molasses
 - 65% of BSI's annual sales revenue is paid to private farmers for their cane
 - The BSI factory has a current capacity of 1.3 million tonnes of cane per year
 - Employs approximately 400 people
 - 6,000 private cane farmers supplying 95% of cane to BSI
 - BSI currently growing 5 % of the total cane but expanding

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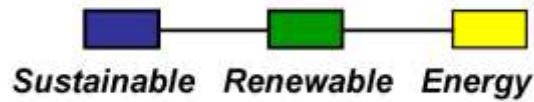


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Financing Structure

- Project cost estimate US\$63 million: comprising
 - BSI Contribution – US\$27.75 Million
 - Debt – US\$35.25 million
 - FMO – US\$ 15 Million (US\$ 10m Senior + 5m Mezzanine)
 - CIFI – US\$ 6 Million
 - IIC – US\$ 6 million
 - CDB – US\$ 8.25 million
 - BSI Corporate Guarantee for US\$35.25 million
 - Compliance with World Bank Environmental Health & Safety Standards
- BEL – Interconnection station and transmission line
 - Estimated cost Bz\$6 million
- Government of Belize – Tax exemptions
- *Carbon Finance – on hold*

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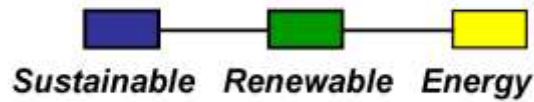


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How do we compete?

- Belcogen business model
 - Significant investment in plant technology in order to be able to utilise a waste product (bagasse) cost effectively, to burn in efficient boilers to generate steam to drive turbines to generate electricity for sale to BEL and to BSI at a commercially competitive tariff
 - Stability of tariff pricing (as reduced fossil fuel impact)
 - Reliable & therefore Available plant generating constant amount of power (baseload energy) 365 days a year
 - Earn a small margin on each kWh sold

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Technical Profile

- Security, Flexibility & Cost
- Boiler
 - Wuxi boiler company
 - Two 90t/h boilers
 - Bagasse and HFO
 - 64 bar
 - 480C
- Turbine sets
 - Hangzhou Steam Turbine Company – Siemens design
 - 15 MW extraction condensing turbine
 - 12.5 MW back pressure turbine
- ESP's
 - World Bank standards -particulate matter , <math><100\text{mg}/\text{NM}^3</math>
- HFO Generator sets
 - 2 x 2MW Ningbo – Major supplier to Chinese Merchant Fleet
 - 2 year Maintenance contract
- Protection, Switchgear Voltage regulation– GE and ABB China
- Distributed Control System – Holsys linked to Siemens

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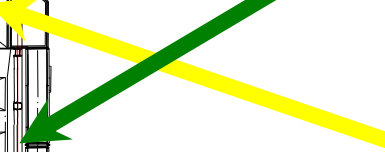
Superheater



Economiser



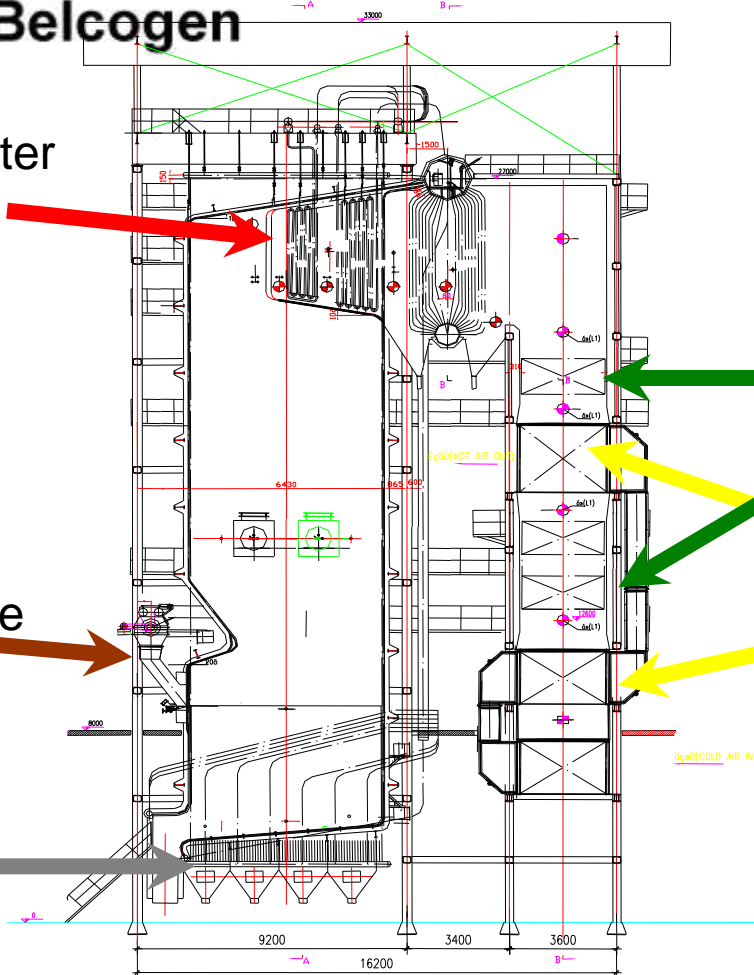
Air Preheater



Bagasse /HFO



Grate




Two bagasse/heavy fuel oil fired boilers

- Rated at ≥ 165 tph, 64bar (928Psi), 485 deg C (905 deg F)
- Watertube boiler complete with bagasse and heavy fuel oil burners
- Control system
- ESP
- Chemical slug dosing and chemical feedwater treatment system
- Pre - boiler plant complete with boiler feed water treatment and storage, feedwater pumps, deaerator and deaerator lift pumps



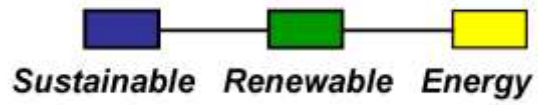
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Power Plant Layout



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General site view



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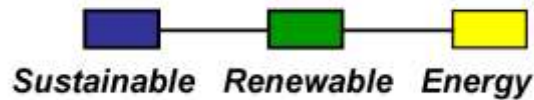

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BEL Interconnection



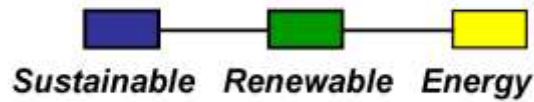
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Contractual Timetable

- BEL Interconnection Facility commercial operation - 30 September 2009
- Engine Generator – test energy to Grid Oct-Dec 2009
- Power Plant Tests on Completion (ToC) December 2009
- BEL Grid Tests December 2009
- Take over of plant from Contractor 24 December 2009
- Scheduled Commercial Operation Date (SCOD) to supply BEL 31 December 2010
- Defect correction period 12 months to 24 December 2010
- Tests after Completion (TaC) November/December 2010

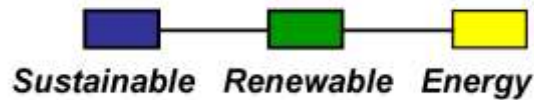


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Technical Issues

- Initial “teething issues” now resolved
 - Belcogen Power Plant
 - Boiler tube leaks
 - Mud & Ash handling system had to be modified and expanded due to excessive mud in cane/bagasse
 - Proportion of Turbine probes recalibrated
 - Contractor modifications required to bagasse conveyor transfer points and chutes
 - Interface with Grid
 - Belcogen protection settings relaxed to meet Grid variations
 - Load swings resulting from customer technical issues both BSI and BEL

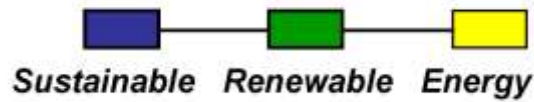
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Learning to date

- **Engineering Contract**
 - Quality of main power plant not an issue
 - Chinese competent at manufacturing, procurement and logistics
 - If doing again would handle on site project management in house but not an option first-time
- **Operational management**
 - Need to ensure high level of cohesive management decision making and understanding throughout the businesses of impact of decisions
 - Learning curve between Grid and Power Plant – not an engine generator plant or hydro plant with same response and ramp time



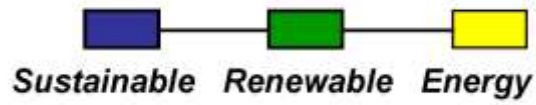
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The Future

- **Goals**

- Improve Profitability through enhanced availability
- Continue to refine operational efficiencies – water/steam/fuel
- Continue to minimise use of fossil fuel
- Continually improve environmental footprint
- Utilise long term stored bagasse
- Increase baseload supply to grid over 5 years up to average of 16.5MW, dependent on:
 - Increased cane to sugar factory up to 1.5 million tonnes
 - BSI to work with cane sector to reduce mud in cane
 - Increase bagasse waste supply to Belcogen
 - Debottlenecking investment – increased condensing capacity
- Continue training and management development

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Thank You & Any Questions

Richard Harris

Director

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