Richard Gill Associates Ltd.

THE BARBADOS LIGHT & POWER COMPANY LIMITED

# Implementing Utility Scale RE Projects– The Local Experience

**Presentation to Barbados Town Planning Society**

**By**

**Johann Greaves – Director Operations, Barbados Light & Power**

**Andy Gill – Planning Consultant, Richard Gill Associates Ltd.**

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# Presentation Overview

- Emera/BLPC Strategy toward Renewables
- Utility Scale Wind Project – Lamberts
- Planning Challenges with Wind Farms
- Utility Scale Solar PV Project – Trents Solar
- Planning Challenges with Utility Scale PV
- Planning Policy for Renewables

# Emera/BLPC's Clean Energy Strategy

- **BLPC has been involved in RE from 2000 – installation of first solar PV system**

- **BLPC has developed a clean energy strategy which will**
  - See the reduction of fossil fuel over the next four decades
  - Increase use of firm and non-firm renewable energy
  - Transform the transport sector to use electric vehicles
  - Use next generation smart grid technologies to help manage the demand side, to increase renewable energy penetration

# Lamberts Windfarm

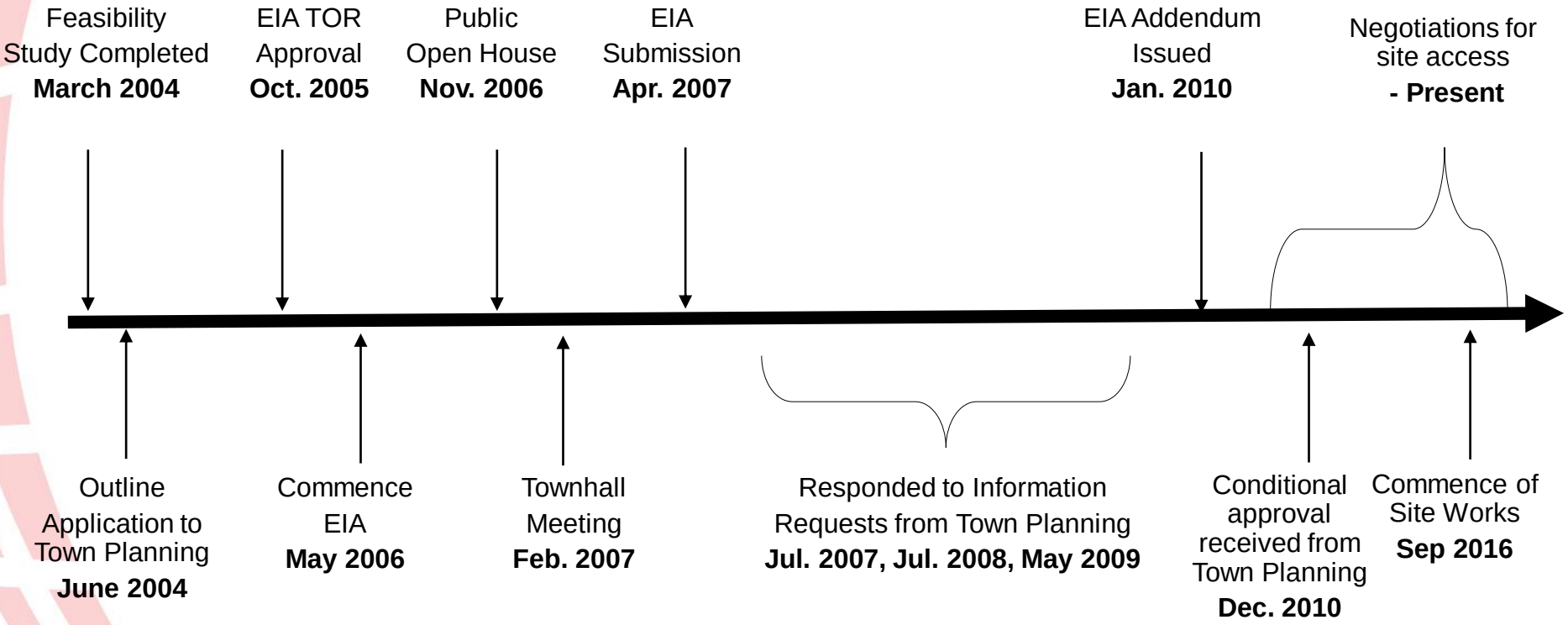
# Lamberts – Project Overview

- **Lamberts is one of four sites designated by Government in the National Physical Development Plan for wind energy development.**

- **Construction of a 10MW utility-scale Wind Farm at Lamberts, St. Lucy**
  - Proposed location is part of the Lamberts plantation lands.
  - Originally proposal for eleven wind turbines rated at around 850kW each.
  - Site Preparation works to facilitate wind farm(Access roads, fencing around base of each turbine)

- **Interconnection of facility to existing St. Lucy Energy Gateway Substation via 24kV overhead line.**

# Lamberts Project Timeline



# Environmental Impact Assessment

- **Aesthetics** – Visual Impact of turbines on landscape
- **Ecological Effects** – Focus on impact on birds and bats
- **Air Quality** – Impact on air quality during construction and operation
- **Noise** – Impact on noise at surrounding receptors
- **Traffic** – Impact on traffic flow during construction
- **Groundwater** – Impact on water resources
- **Electromagnetic Interference** - Impact on radio and telecommunications communications and radar
- **Shadow Flicker** – Impact of movement of turbine blades between sun causing shadows to be formed.
- **Waste Disposal** – Disposal methods during construction and operation

**No significant adverse environmental effects given implementation of recommended mitigation measures.**

# Current Status

- Negotiations continuing with land owner to access land.
- Turbines options being reviewed. Original turbine selected no longer available. May result in fewer but larger turbines.
- Pre-construction noise monitoring on-going. Ambient noise being recorded higher than that specified in permission document. Matter raised with Planning agencies.
- Transportation Survey Completed
- Environmental Impact Assessment to be reviewed based on final turbine selected.

# Planning Challenges with Wind Farms - Lamberts

- First utility-scale wind farm application (11 turbines) in Barbados.
- Extensive research required by BLPC and Planning Agencies before permission was given (6-year planning process, high cost).
- Residents in surrounding areas of the Lamberts Site had memories of old "Howden" turbine that experienced a number of issues.
- Concerns were repeatedly raised at Public Meeting by residents including a local association. BL&P's consultants addressed these issues.
- Only a limited number of sites in Barbados that satisfy both setbacks and suitable wind regimes.
- Available sites are further restricted due to interference with airport radar and flight paths.

# 10 MW Solar PV - Trents

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# Trents Solar Project Overview

- **Site selected was part of a 72 acre site owned by BLPC and previously approved for power generation.**

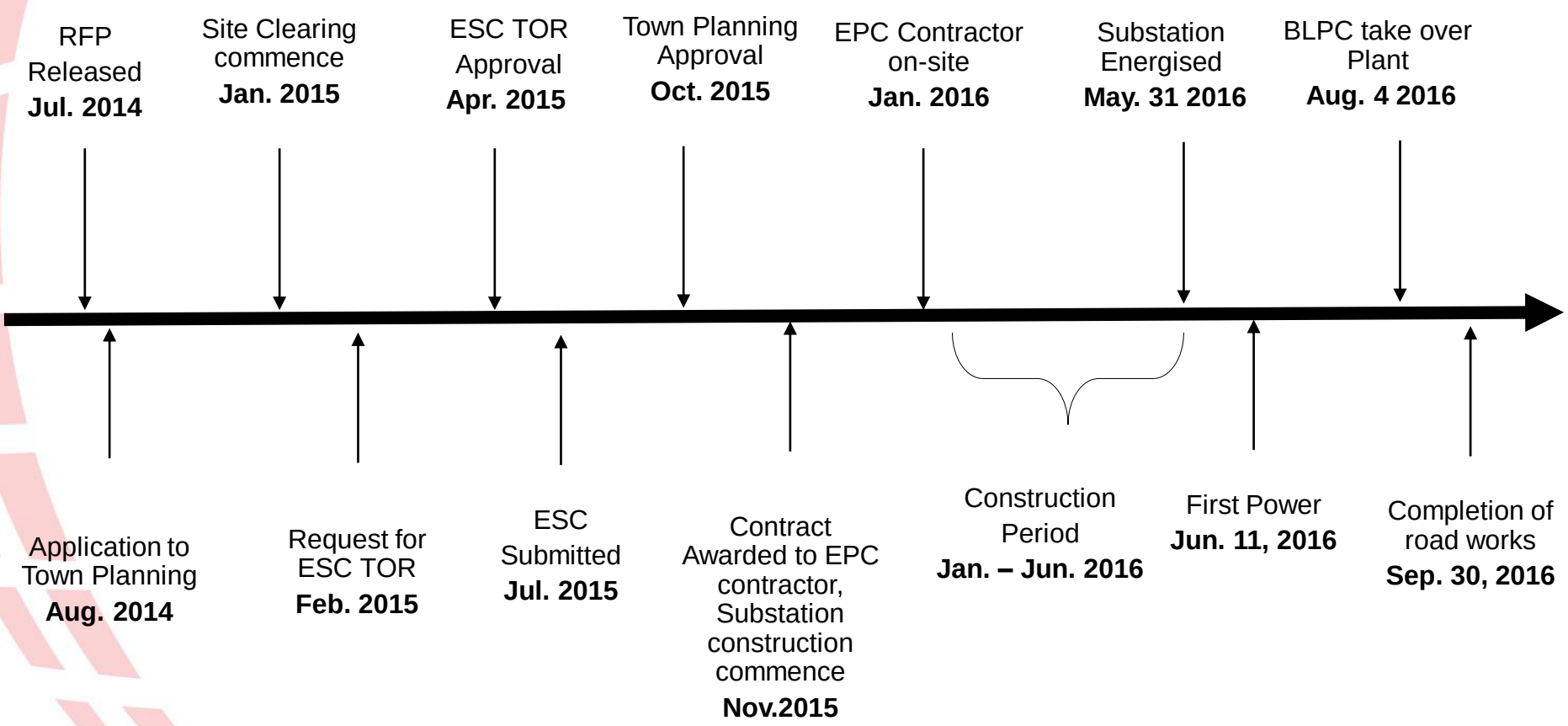
- **Construction of a 10MW utility-scale solar photovoltaic farm at our Trents Site (West of the St. Lucy's Parish Church)**
  - Site Preparation works to facilitate solar plant (leveling site, access roads, fencing site)
  - Installation of Solar PV panels on 42 acres of land.

- **New Substation to facilitate interconnection of Solar Project and other projects planned for St. Lucy.**
  - Interconnection of facility to existing grid via underground HV cables.

# Facts and Figures

| Facts | Figures |
|---|---|
| Number of PV panels | 44,496 |
| Panel Size | ~ 1.6 x 1 Meter |
| Size of Site | 42 Acres |
| Annual Generation | 20.2 GWh |
| Base Load Supported | 2.2% |
| Homes Supported by Plant | 7,700 Average |
| Fuel Cost Reduction | BBD$ 10M Annually |
| $CO_2$ Reduction | 21,000 Tons |
| Life Span of Plant | 25 Years |
| Project Cost | BBD$ 43M |

# Solar PV Project Timeline

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# Will there be any Environmental Impacts?

- **Environmental Scoping Study completed and submitted as part of Town and Country Planning application**
  - Visual Impact
  - Glare & Glint
  - Storm Water Drainage
  - Noise
  - Land Use
  - Security & Safety
  - Construction & End of Life Waste Disposal

- **No significant impacts identified. Minimal glare being addressed with installation of vegetation screen on north and western boundaries.**

TRENTS SOLAR PV FARM

# OUR JOURNEY

# Site Safety

- **Safety was one of major focuses during project.**
  - Risk Assessments
  - Appropriate PPE by all on-site
  - Emergency Drills
  - Incident Reporting

- **No Injuries reported during construction**

- **Safety requirements enforced during operation of plant**

# Clearing & Leveling of Site

**January 26, 2015**

**May 29, 2015**

# Site Security

**Site fencing erected to control access to site**

- **High Voltage on Site**


**Security Cameras monitor site**

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# Road Access

- **Perimeter road around site**
  - To access site
  - Act as fire break with surrounding lands
- **Main Access road on site is artery through site to allow for access to field**

# Site Drainage

- **Drainage study conducted across site.**
- **Regrading of site permitted drainage of site to low areas.**
- **Wells installed in drainage reserve areas.**

# Structure

- Category 3 Hurricane Design.
- Over 15,000 piles driven into ground.
- Oriented at 15 degrees to the horizontal in southern direction.
- Lower end 0.5 m off the ground. Higher end 1.5 m

# Installation of HV Cables

- **Cables between electrical equipment in field are buried.**
- **Underground  Cables between solar field and substation**

# St. Lucy Energy Gateway


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# Time Lapse Video of Construction

Time Lapse Video

# May 2015

# June 2016

# Vegetation Maintenance

- Sheep Grazing  between solar panels
- Sheep Grazing on Solar farms is fairly common around the world.

# Benefits & Disadvantages of PV from Planning Perspective

## Benefits of PV

- Free and abundant energy source – meets National Goals for Green Energy
- Efficiencies are improving, prices dropping, reliable and mature
- Minimal environmental impacts – mostly visual, very eco-friendly
- Roof-top systems use no extra land
- Roof-top systems can be up to 16" above roof without requiring planning permission
- Compatible with BWA Zone 1, possible exception of unprotected batteries
- Dual use (sheep farming and power generation) can mitigate removal of agricultural land

## Disadvantages of PV are minimal

- Ground-mount systems require large areas of land (4 acres per MW)
- Intermittent power (day-time, good weather) = unreliable source

# Requirements for Utility Scale PV

- **Land Requirements for Ground-mount PV**
  - Large contiguous area of relatively flat land
  - Suitable grid connection nearby
  - Suitable soils that allow for affordable foundations
  - Suitable lease or purchase arrangement in place
  - Planning permission for PV-based electricity generation (permanent land use or 20 yr temp use minimum)
- **Scoping Study required**
- **Public Meeting for Scoping Study required**
- **Generation License (renewable every 10 years)**

# Planning Policy

- **2003 Physical Development Plan (PDP)**
  - Heavily focused on protecting agricultural lands from development
  - Wind energy guidance was included and specific sites identified
  - Protect existing & potential wind sites from sensitive uses
  - Required EIA and Wind Energy Assessments for new sites
  - However, PV and other green energies were not included
- **New PDP is currently being worked on**
  - Renewable energy to be comprehensively addressed
  - Renewable energy likely to be promoted across the island to allow greater flexibility
  - Consideration of dual uses likely, where RE is combined with Agri. E.g. Wind and Sugar, PV and Sheep

# Your Time to Share …….


**For further information:**
**Johann Greaves**
Via e-mail: johann.greaves@blpc.com.bb
Via telephone phone: 626-3200/4500

**For further information:**
**Andy Gill**
Via e-mail:agill@richardgillassociates.com
Via telephone phone: 425-1488

Richard Gill Associates Ltd.