

WORLD BANK ESMAP SIDS

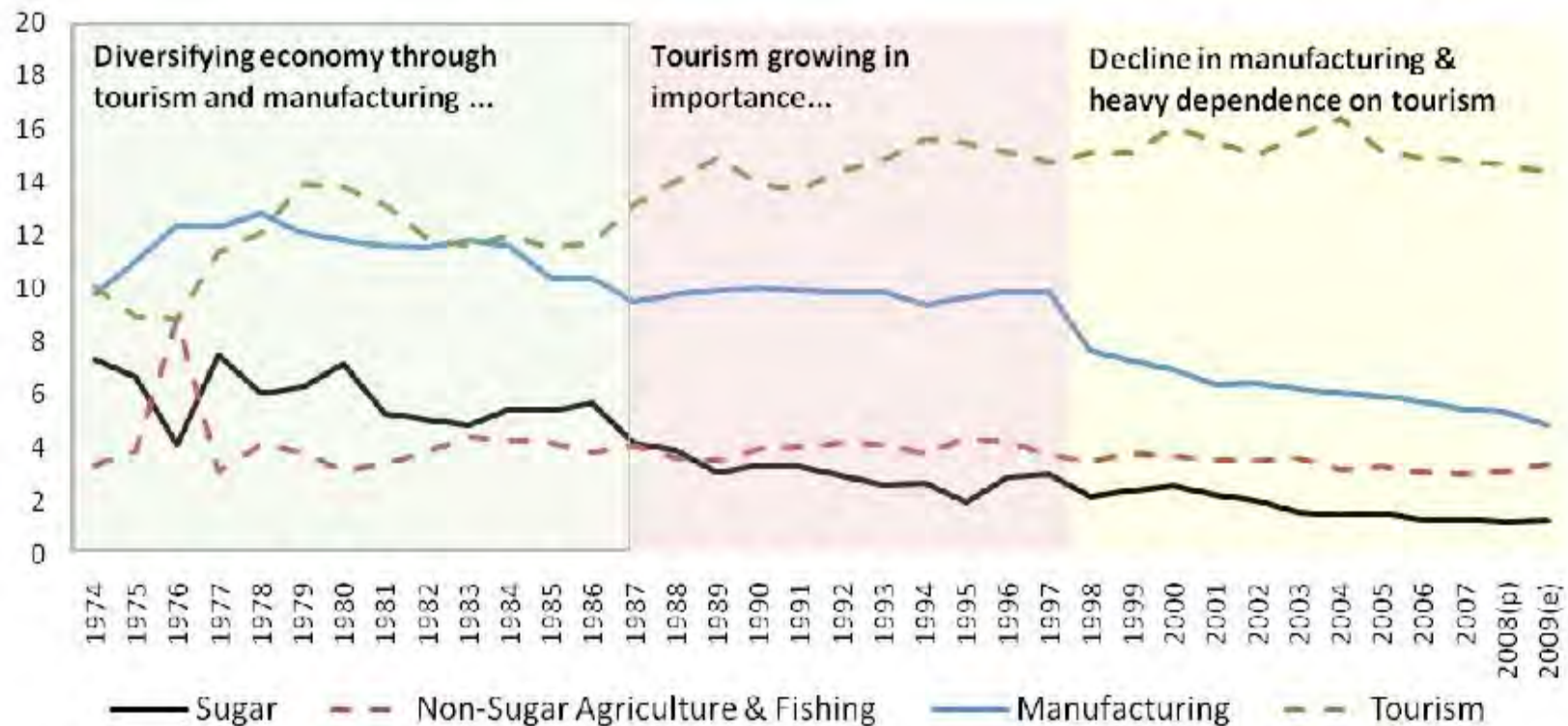
Lessons from the Reform of the Barbados Energy Sector

June 17 2015 VEF

Barbados

- Barbados is 166 square miles/432 square kilometres.
- Population is 270,000.
- There are 120,000 households (over 119,000 connected).
- # of government and commercial connections unknown
- National GDP is \$3.5b and per capita income is \$12,500
- The three main foreign exchange earners are Tourism \$3 billion per annum (40% of foreign earnings), International Business/Capital Inflows \$1.3 Billion (17.5% of foreign earnings) and Merchandise Exports with rum outperforming sugar \$35m to \$23m
- Sugar was the primary revenue earner from 1637 to the 1980s at which time windmills were used as a significant source of power for grinding cane and producing sugar.

Sector Contributions to Real GDP as a Percentage

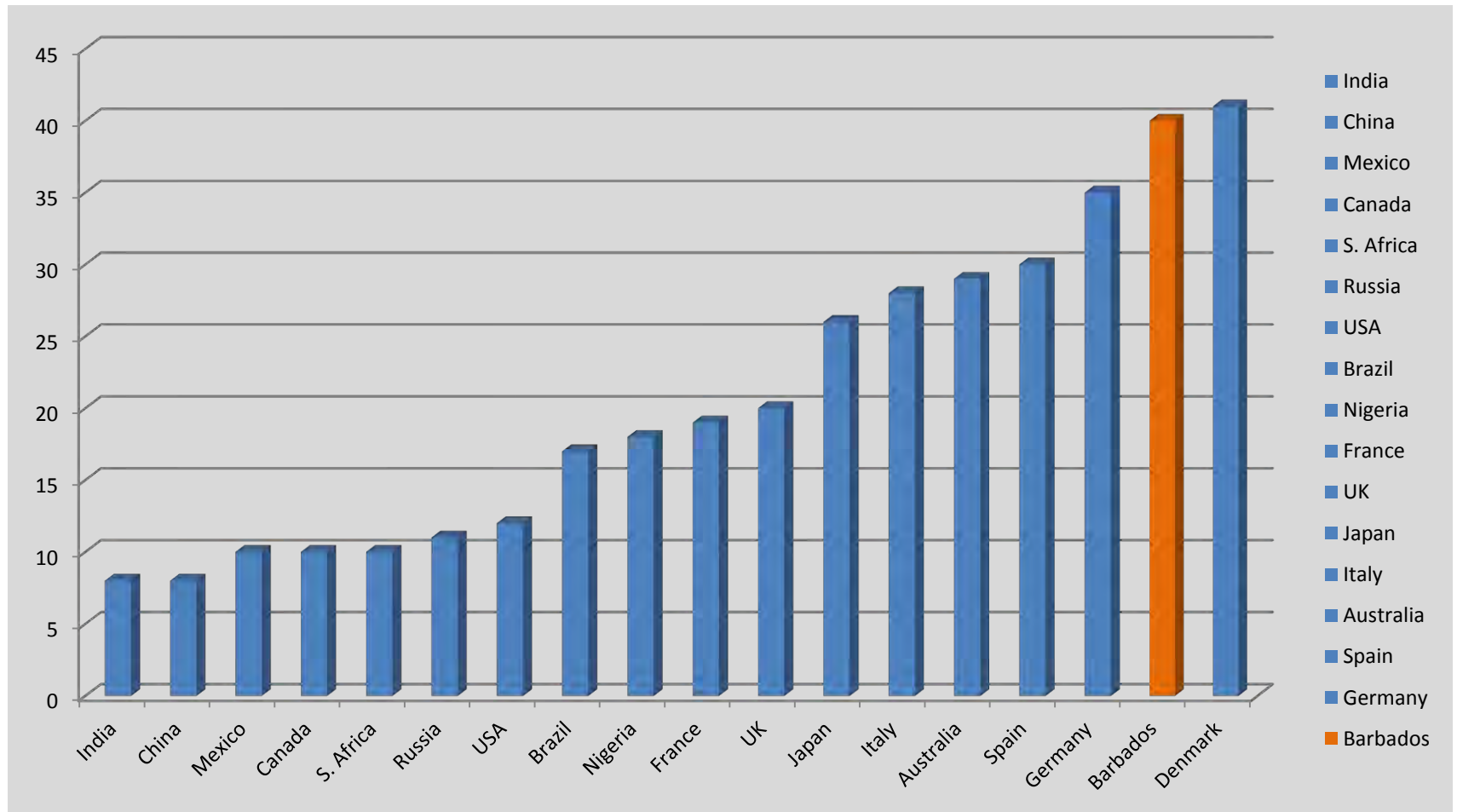


Electricity History and Consumption In Barbados

- Electricity was first introduced in 1911
- In 1899 House of Assembly passed the Electric Light and Power Act. Enacted in 1907.
- Barbados Electric Supply Corporation began its operation in 1909. Built the grid from the city outwards.
- By 1930s the utility had extended the grid over 90% of the island
- **Barbados Light and Power boasts penetration of almost 100% of the island and a total installed capacity of 239MW (see slide 2)**

Electricity Costs in Barbados

(USD cents per Kwh. \$US1 = BDS \$2)

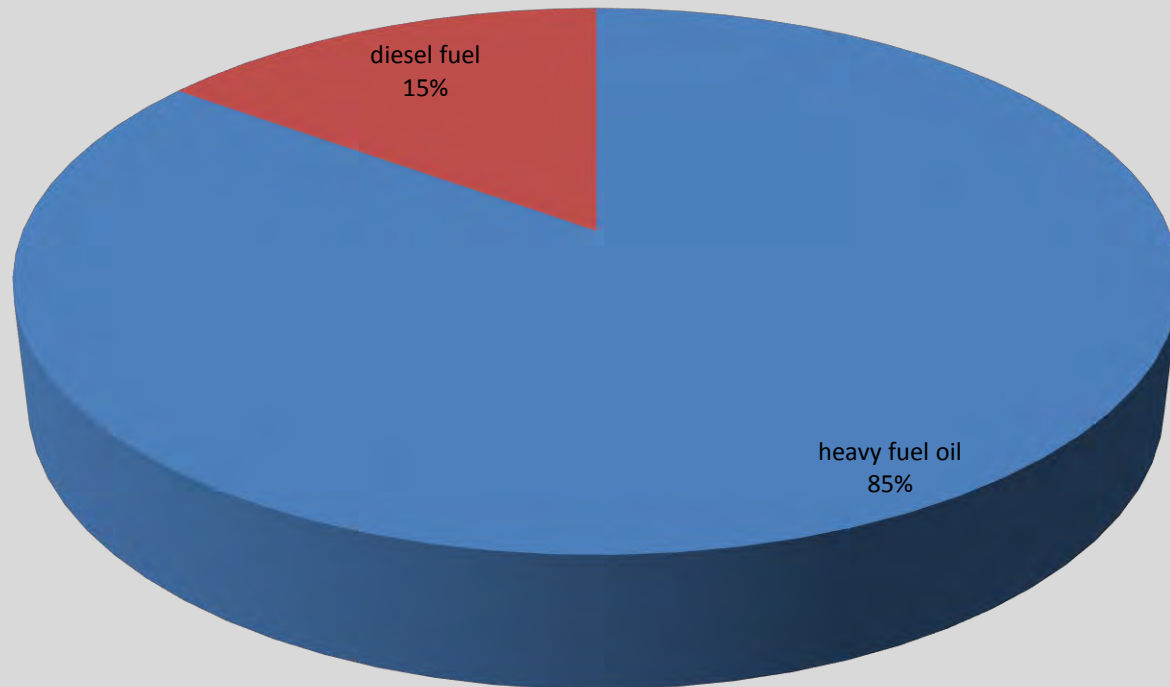


Electricity Consumption Data

- 97.4 % of all Barbados' energy requirements are met from fuel
- Total consumption is 10,000 bbls per day, 9000 bbls are imported (Barbados produces about 400bbl per day)
- Fuel Imports represents 11% of GDP
- Fuel import costs rose from 7% of total imports in 2007 to over 20% in 2009, the highest of any category
- Natural gas contributes 2.5% of energy requirements
- Natural gas is used only sufficient to supply 25% of housing population
- Natural gas is supplied to 20,000 domestic and commercial customers

Electricity Generation by Fuel Source

Fuel for Electricity Generation



Energy Consumption (kWh)

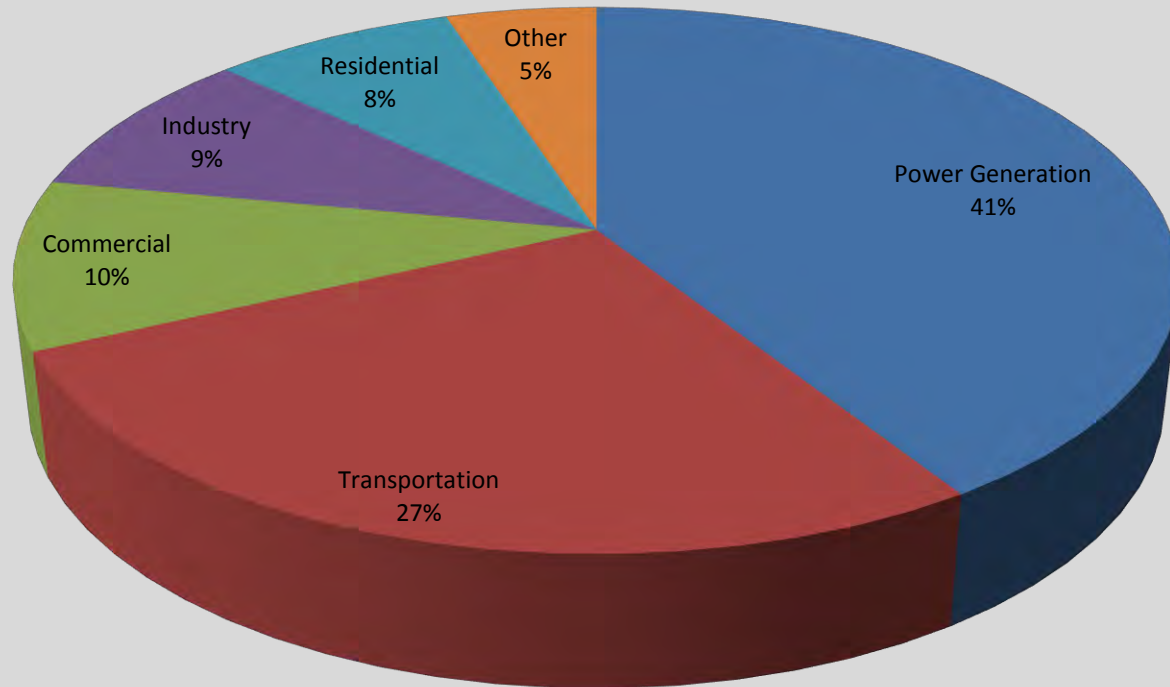
Industry / category	2000 Avg. for year	2013 Avg. for year	% increase
Residential	19,994,311	26,575,163	33%
Commercial	6,972,590	14,804,579	112%
Street Lighting	669,297	894,059	34%
Tourism	5,119,968	7,461,289	46%

Industry / category	% of total National consumption
Power Generation	41%
Transportation	27%
Commercial	10%
Industry	9%
Residential	8%
Other	5%

Two largest single consumers of electricity are government entities: Barbados Water Authority and Queen Elizabeth Hospital

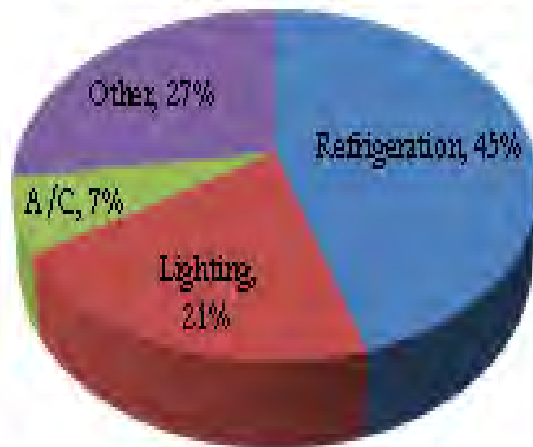
Energy Consumption By Sector

Consumption by Industry

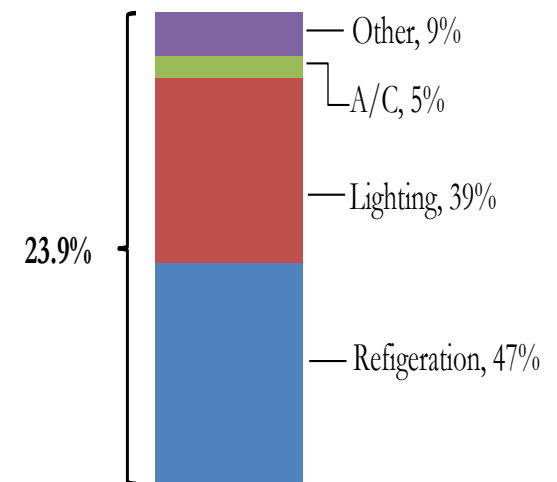


Residential Energy Consumption

Electricity end-use, residential



Estimated savings potential, %



Solar Water Heating in Barbados

Indigenous SWH Manufacturing in Barbados since 1973 brought about:

- Stimulation of the supply and demand sides of the market
- Tax exemptions on parts imported for manufacturing
- Income tax rebate to home owners who installed solar hot water systems
- Increased the duties on gas and electric water heaters
- SWHs now installed in both residential and commercial sector
- Central Bank estimates foreign exchange savings between 1974 and 2009 at US \$410m
- Over 80% of the SWHs in the Caribbean were manufactured in Barbados .
- Over 60% of the Caribbean's installations are in Barbados

Solar Water Heater Installations



Renewable Energy Policy in Barbados

2007 National Green Economy Policy – first in Americas

The first National Sustainable Energy Policy – target transition all sectors to 30% renewables by 2020

Electric Light and Power Act (ELPA) 2015 – Revised the law related to the supply and use of Electricity to allow IPPs to generate and sell from RE sources. Act established Advisor Committee

Recent policy statements express 50% of electricity generation will come from RE.

Under the new energy mix the stated plan for intermittent RE is to introduce 20MW of domestic PV, 20MW of commercial PV and 15MW of wind.

- At present there is 9MW PV on the GRID and no wind but excellent resource potential
- Every dollar invested in the RE industry will yield \$2.50 in savings to the economy based on the avoidance of spending foreign exchange and local stimulation (economic analysis)

Policy Targets

Government intends to reduce energy consumption by 22% by 2029 via:

- 12% savings in public sector
- 24% savings in residential sector
- 22% in commercial sector
- 12% in industry
- 22% in tourism
- 48% in street lighting

Sustainable Energy Initiatives

Global Environmental Facility

In 2011 the Global Environmental Facility (GEF) - \$1M Grant to the Government of Barbados to execute pilot projects in RE and EE. Project Launched in 2011 with objective of:

- Installing 15,000 energy efficient lights and 3000 energy monitors in households across the island
- Installing 28 solar photovoltaic systems in households and government locations across the island.
- Executing a Public awareness campaign
- The project was completed in February 2015. In total:
- 60kW was installed in households and 36kW in Government locations
- 15,000 incandescent lights were replaced with energy efficient lights and 2000 power monitors were installed
- Public Awareness Campaign was conducted

The Grant was administered by the Inter-American Development Bank

Sustainable Energy Initiatives

Global Environmental Facility

12kW Solar system installed
For the physics department
Of the University of the
West Indies



Sustainable Energy Initiatives

Global Environmental Facility

2kW solar system
Installed at a family
Residence



Sustainable Energy Initiatives

Public Sector Smart Energy

The PSSEP is a 5 year project signed in November 2013. The project budget is \$20million comprised of a combination of Grant funding from the EU and a low-interest loan from the IDB

Project estimated to generate \$45 million in electricity costs savings over the next 20 years and will avoid the production of more than 132,000 tCO₂e emissions

Sustainable Energy Initiatives

Public Sector Smart Energy

Component 1: Retrofits – (i) retrofit of 85% public lights (ii) retrofit of at least 12 buildings (iii) installation of 1.14 MW of solar PV

Component 2: Pilot Projects - (i) procure a fleet of government electric vehicles (ii) ocean power studies

Component 3: Capacity Building – (i) capacity building and institutional strengthening in the public sector

Sustainable Energy Initiatives

Energy Smart Fund

The Smart Fund – Established by the Government to facilitate private sector investment in RE & EE by accessing grants and low-interest loans. The project budget is \$10 million. Comprised of 6 facilities

Technical Assistance (TA) Facility (\$500k)— provides grants to businesses for funding pre-investment studies of RE and EE projects, to assess their technical and financial viability and support implementation.

EE Retrofit and RE Finance Facility (\$6 million)— provides subsidized loans to businesses for financing the implementation of viable RE and EE projects.

Sustainable Energy Initiatives

Energy Smart Fund

Pilot Consumer Finance Facility (\$500k)— rebates (subsidies) to selected retailers for customer purchases of RE and EE equipment.

LED Distribution Facility (\$500k)— provides free LED Lamps to a limited number of residential customers of Barbados Light and Power ('BL&P'), through the issuance of vouchers

A/C Rebate Trade-In Facility (\$1.5 million)— provides a 50 percent instant rebate for households and businesses to replace older air-conditioning models with more energy efficient and ozone- depleting-substance (ODS) free systems.

Discretionary Grant Facility (\$1 million)— provides funds for institutional support to execute the Energy Smart Fund.

Sustainable Energy Initiatives

Energy Smart Fund

LED bulbs being manufactured locally for distribution.



Lessons Learned

- Barbados has deep history and experience in exploiting wind energy
- Barbados has a globally recognised SWH industry due to a combination of government support, private sector investment and consumer buy-in which can be applied today.
- Potential savings from RE are tangible and invaluable

Challenges

- Shortages in trained energy specialists and a dedicated team to advance the reform process
- No clear approach for dealing with RE regulation and not addressed in ELPA
- Role of Fair Trading Commission not clearly set out in ELPA
- Capacity building needed for Ministry and for FTC
- Absence of a clear, structured, policy and strategic roadmap
- Finding and funding appropriate technologies at scale

Weaknesses

- **The exclusion of Wheeling** from the ELPA denies the opportunity for IPPs to compete to provide electricity to very large consumers sustainably
- **An unstable investment environment** means potential IPPs and investors complain about a proposed payment to them per kW which is based on the price of imported fuel
- **Absence of clear strategic plan** to transition all major sectors of economy to RE
- **No consideration of policy, or distribution harmonisation** to effect economies of scale under the Revised Treaty of Chauguramas

Weaknesses

- **A monopoly for transmission and distribution** remains due to economies of scale. Current utility has 12 years left on their license and this is likely to be extended under the new legislation.
- **Absence of independent grid studies**, all studies being done by the utility
- **No clear policy for RE/EE for transportation.** Fuels efficient & electric vehicles are subject to high import duties.
- **Policy does not address sectoral transitions**

Way Forward

Caribbean and SIDS governments have indicated their commitment to SE4ALL (Bridgetown Consensus April/May 2012)

What is now needed is:

- Clear vision
- Independent analyses and assessments
- Technical, human and financial resources to take the countries toward the broad goals
- Enabling fiscal, policy, regulatory, legislative, incentive frameworks and environment
- Structured strategic Roadmaps
- Regional policy and distribution harmony
- Consensus on the composition of the future energy mix
- Review of monopoly utility relationships and stimulation of competition and genuine market

Morgan Lewis Windmill



**H. Elizabeth Thompson, Senior Advisor to SE4ALL
Former Minister of Energy and Environment of Barbados**