



**UWI Mona Climate-Energy Nexus Series**  
UWI Mona, Department of Physics




***“Greening the Energy Sector: Benefits for the Job Market”***

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Kingston, Jamaica



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## “Greening the Energy Sector”

- **Reference to reducing emissions (and other pollutants).**
- **Improved energy use (EE & EC).**
- Sustainable use of **natural** energy resources.
- Improving aesthetic values.
- Jamaica's current focus on the electricity sector and **proactive environmental strategies. Less focused on compliance.**

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## ENABLING ENVIRONMENT

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## Game Changer Enabling Environment



- Policy.
- Legislation.
- Cost and funding (economic/financial).
- Technology.
- Training and competence.
- Market (demand/supply/competition).
- Intrinsic/social.







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## Game Changer – Global Investments



- Total investment in renewable energy **exceeded US\$270 billion** (including large hydro and SWH).
- Asset finance of new **utility-scale renewable** energy projects (wind farms, solar parks, biofuel and solar thermal plants), was the largest investment asset class (**US\$128 billion in 2010, or almost 60% of the total**).
- **Sources** - asset finance, venture capital, private equity investment, public markets (stock purchases), and corporate and government research and development.

*REN21, 2011 Global Status Report.*

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**Policy**



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<b>National RE Policies - Quotas</b>			
Country	RE Target/Quota	Sector / Subsector	Deadline
<b>St. Vincent &amp; the Grenadines</b>	30 %	Electricity	2015
	60%	Electricity	2020
<b>St. Lucia</b>	"At least" 5%	Electricity	2013
	"At least" 15%	Electricity	2015
	"At least" 30%	Electricity	2020
<b>Jamaica</b>	11%	Overall Energy Sector	2012
	12.5%	Overall Energy Sector	2015
	20%	Overall Energy Sector	2030
<b>Guyana</b>	32% Hydro Power 11% Bagasse 57 % Diesel	Electricity - Installed Capacity	2015
	80% Hydro Power 10% Bagasse 10% Petroleum	Electricity – Generation Mix	2015
<b>St. Kitts &amp; Nevis</b>	100%	Electricity (Phase 1 - of Geothermal Project)	2011

## National RE Policies - Quotas

Country	RE Target/Quota	Sector / Subsector	Deadline
Barbados	40%	Overall Energy Sector	2010
Dominica	25%	(22% Hydro Electric Power in 2007)	2010
Fiji	90% of grid connected 55% of off-grid supply	Electricity	2011
Tonga (Energy Road Map)	50%	Electricity	2012
Marshall Islands	20%	Electricity	2020
Samoa	20%	Electricity	2030
Tuvalu	100%	Electricity	2020
Palau	20%	Electricity	2020
Federated States of Micronesia	30%	Overall Energy Sector	2020

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## Game Changer – Global Investments

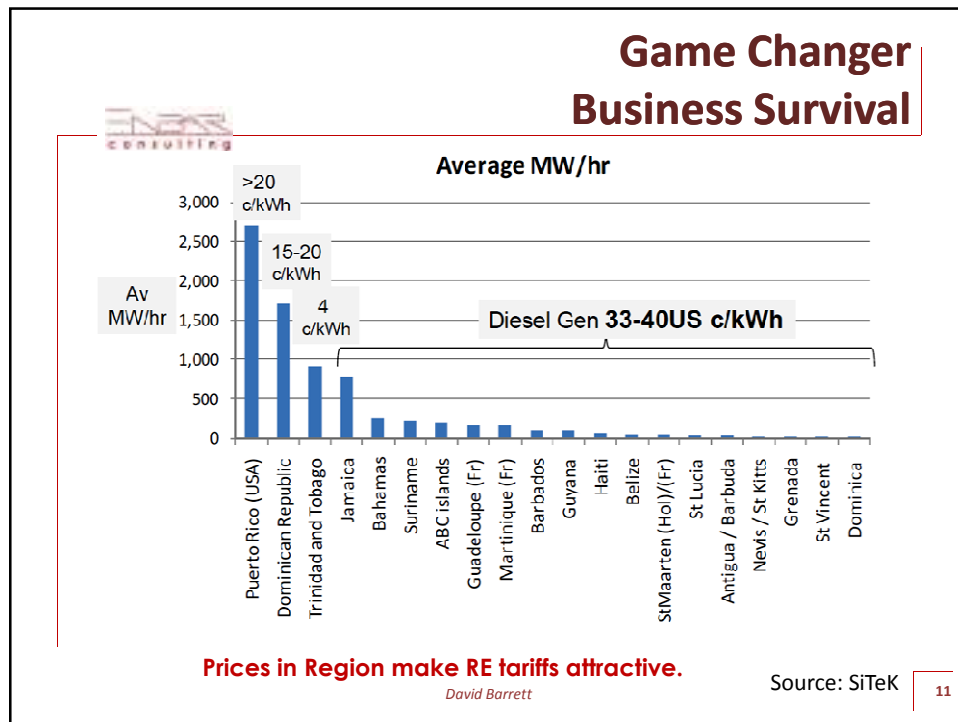


- 13 development banks worldwide provided **\$13.5 billion of finance for RE** (2010) mostly as loans.
- GEF funding for 25 RE projects **direct financing = \$40.4 million; co-financing = \$382.1 million.**

(REN21 -2011)

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## Game Changer Business Survival


- A 2011 MSME Survey - high cost of electricity was a leading factor in business failure for MSMEs.
- Energy consumption by the private sector is estimated to account for **40%** of the country's total consumption.
- Jamaican businesses can save as much as **J\$15.4 billion** on their light bills.

Source: SiTeK

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# ENERGY EFFICIENCY

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## Energy Efficiency

- GoJ facilitating EE/EC:
  - Stimulate and sustain RE market demand/supply dynamics and industries.
  - Sensitize and generate public/corporate appetite for RE.
  - **Suppliers, practitioners, energy managers/consultants, contractors, trainers/educators needed.**

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## ESCO Industry (Jamaica)



### **MLSS-JPC ACP-EU ESCO Project:**

- Specific Objective: "To develop a sustainable ESCO industry in Jamaica by raising the level of awareness and understanding of the business of energy efficiency (EE) and renewable energy (RE); introducing new business models to enable increased levels of investment in and implementation of EE and RE projects; and increasing dialogue, trust and confidence in the industry among its stakeholder groups".
- **DBJ Survey Demand Survey on EE & EC and RE (opportunities):**
  - **73%** of SMEs which responded to Demand Survey On EE & EC and RE considered investment in energy programmes.
  - For those who implemented projects **>70 %** of related equipment accessed locally.

## ESCO Industry (Jamaica)



### **Beneficiaries & Potential Job Opportunities:**

- Awareness building delivered to **500,000 consumers/persons**.
- **20 institutions** exposed to energy efficiency through ESCOs (meetings/ workshops).
- **400 public sector organizations** exposed to energy efficiency through ESCOs (meetings/ workshops).
- **250 Engineers, administrators and bankers** exposed to ESCO specific introductory training.
- **10 certified trainers**.
- **400 educators, financiers, SMEs, engineers et. al.** exposed to energy efficiency through ESCOs (meetings / workshops).
- **100 youth** exposed to public meetings/ workshops.



## ESCO Industry (Jamaica)



### Professional Competences & Opportunities in EE & EC:

- **DBJ** – 27 EE & EC equipment providers.
- **DBJ/PCJ** – 26 registered energy auditors DBJ - PetroCaribe SME Energy Fund.
- **JSEA** - (EE & EC, RE, project managers, other) – 44 members.
- **JIE** – electrical and mechanical engineers (135) (total = 326).
- **JSEE – UTECH** > 15 (?) Certified Energy Managers.

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## Energy Efficiency



Appliance Standards



Small Industry  
(employment)




Public Education



Energy Audits

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# GRID TRANSFORMATION (T&D LIBERALIZATION)


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## Grid Transformation

- Modern grid/network:
  - Distributed generation (DG) including renewables to reduce losses ~ **1 kWh RE generation can avoid 1.3 kWh of production from conventional sources @ 22.3 % losses** (World Watch Institute).
  - Advanced Metering Infrastructure (AMI) (measure, collect and analyze energy usage remotely) and Energy Management Systems.
  - Potential reduction of jobs in conventional generation but increase RE jobs opportunity.




**Analog Meter**



**Bidirectional Digital Meter**

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# Grid Transformation

- Wheeling of electrical power.
- Opportunity for RE generation.
- Engineers.

**OUR**

OFFICE OF UTILITY REGULATION  
Michigan Energy Service Corporation

**REQUEST FOR CONSIDERATION OF BIDDING  
(CONSULTING SERVICES)**

The Office of Utility Regulation (OUR), hereby engages the services of an experienced and competent Third Party to provide analysis and support for the development of an appropriate framework for electricity wheeling.

Bidding for the Consulting Services will be conducted through the International Consulting Bidding process and is open to all bidders. Qualification requirements are provided in the Bidding Documents.

**SCOPE OF WORK**

The Consulting Firm will be required to:

- Conduct a comparative analysis of electricity wheeling mechanisms;
- Determine the implications of grid congestion and the role of storage in electricity wheeling;
- Prepare a summary of electricity wheeling mechanisms appropriate for the Michigan electricity market;
- Identify all cost and benefit data points required for the consideration of electricity wheeling;
- Develop a brief model to compare actual wheeling charges; and
- Provide training in relation to electricity wheeling charges methodologies and the bid wheeling model.

**ELIGIBILITY**

- Interested third firms must submit a valid Tax Compliance Certificate (TCC) with their Technical Proposals.
- Foreign firms, unless accompanied by a commission officer TCC will be in line of submission, must provide a valid TCC of the firm's country of origin.

The OUR may require eligible consultants to submit information in providing for services. Interested consultants must provide information substantiating that they are qualified to perform the services, including:

- Business/Company profile
- Description of similar equipment
- Availability of appropriate staff and qualifications among staff, etc.

Consultants may negotiate with other suitable firms to enhance their qualifications.

Consultants will be selected in accordance with the procedures set out in the Government of Michigan Procurement Guidelines as stated in the Instructions for Public Tender Procurement (Guidelines 2010) and a copy of all eligible consultants as defined in the guidelines.

The Instructions can be found at [www.michigan.gov](http://www.michigan.gov)

Interested consultants may obtain further information at the address below during the hours of 9:00 a.m. to 3:00 p.m. Eastern Standard Time (EST).

**DATE OF BIDDING**


Expressions of interest must be delivered in sealed and unopened (self-addressed) envelopes to the address indicated below by 10:00 a.m. EST on Thursday, May 24, 2012.

THE OFFICE OF UTILITY REGULATION  
Department of Natural Resources, Electricity Wheeling Program  
Attention: Mr. Jason Wilson - Project Manager  
140 First Street, Room 3000, Lansing, MI 48906-0001 (Michigan) |  
Tel: 517.487.3000 & Fax: 517.487.3000  
Website: [www.michigan.gov](http://www.michigan.gov) & Email: [our@mic.gov](mailto:our@mic.gov)  
Based on the Michigan Energy Service Corporation May 13, 2012.

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# REGULATORY MECHANISMS

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## Regulatory Mechanisms

**Feed-In Tariff (FIT).**


- “An energy supply policy focused on **supporting the development of new renewable energy projects** by offering long-term purchase agreements for the sale of RE electricity” (NREL 2011).
- Guaranteed **grid access**.
- Stable **long term-contracts** (electricity or heat) (10 – 20 yrs).
- **Accepted tariff level** based on cost for RE generation or avoided FF generation cost, plus a reasonable Rate of Return (RoR).

- **Feed in Tariffs\*\*.**
- **Net Metering\*.**
- **Quota-Obligations (Renewable Portfolio Standard)\*.**
- **Biofuels Obligation Mandate.**
- **Heat Obligation Mandate.**
- **Tradable Renewable Energy Certificate.**

**\* Successful policy mechanisms.**

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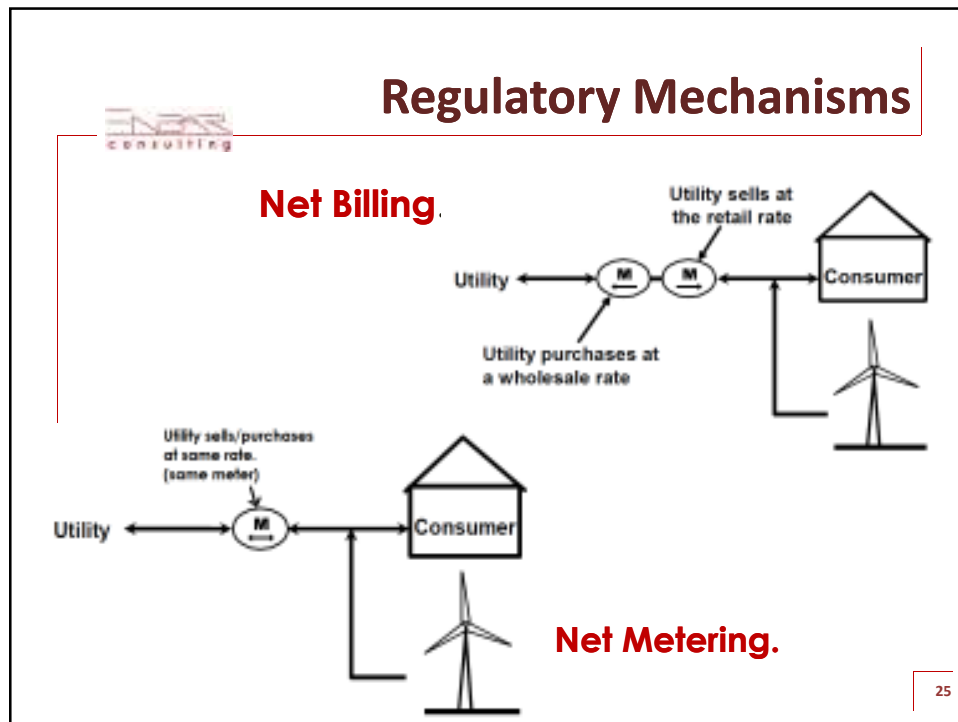


## Regulatory Mechanisms

- **Feed-In Tariffs (FITs)** - most widely used policy for accelerating RE deployment. (REN 21)
- By 2011 > 61 countries and 26 states/provinces had FITs.
- FITs were responsible for ~ **75% of global PV and 45% of global wind deployment** (Deutsche Bank 2010).
- EU - FIT policies led to **>15,000 MW of PV; > 55,000 MW of wind** power (2000 and 2009).

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**JPS**

**Jamaica (SOC)**


**NET BILLING** Standard Offer Contract (SOC) with a **5-year** renewable term.

- Residential **≤10kW** and commercial **≤100 kW**. **All renewables.**
- Net Billing program capped at **3%** of highest system peak for the “pilot period” (12) months. to be revised (18 MW).
- Short run “**Avoided Cost Rate**” + **15% premium** (~US\$0.21 – 0.23/kWh) for net energy export.
- 2-year pilot (commencing November 30, 2011).

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### Interconnection Programmes



COUNTRY	NET BILLING	NET METERING	NUMBER OF LICENSEES
Barbados	✓.	-	200 (1.6 MW)
Bermuda	-	✓.	200
Cayman	✓.	-	2 MW
Costa Rica	-	✓.	5 MW
Dominican Rep.	-	✓.	1 MW
Grenada	✓.	✓.	0.8 MW
St Lucia	-	✓.	
Jamaica	✓.	-	18 MW


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### RE Estimated Employment per MW (Lifetime)



ENERGY TECHNOLOGY	CONSTRUCTION, INSTALLATION & MANUFACTURING JOBS/MW	OPERATIONS, MAINTENANCE & FUEL PROCESSING JOBS/MW	TOTAL JOBS/MW
Solar PV	0.29 – 1.48	0.12 – 1.00	0.41 – 2.48
Geothermal	0.10 – 0.44	1.67 – 1.79	1.77 – 2.23
Biomass	0.11 – 0.21	1.21 – 1.53	1.32 – 1.74
Solar Thermal	0.18 – 0.41	0.22 – 1.00	0.40 – 1.41
Small Hydro	0.14	1.14	1.28
Nuclear	0.38	0.70	1.08
Wind	0.10 – 0.44	0.14 – 0.40	0.24 – 0.84
Coal	0.21	0.59	0.80
Natural Gas	0.03	0.77	0.80


*David Barrett* World Watch Institute 2012. 28



# TAX/FISCAL OPTIONS.

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## Tax Exemption

- **Jamaica** – list of >100 RE equipment and components exempted from GCT.
- Various duty reductions/exemptions.
- **Caribbean** – Common External Tariff (customs duty) suspension for agreed list of RE equipment and components.
- **INCREASE IN RE, EE& EC PRODUCT SALES (distributors, dealers, installers etc)**

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# MARKET MECHANISMS

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## Market Mechanisms

- **Carbon trading experts – CDM.**
- Wigton Wind Farm competences as seller of certified ERU. (other sellers reported).
- The targeting of CO<sub>2</sub> emissions reduction to meet GHG reduction strategies, environmental and other commitments, can lead to the development of a tradable commodity.
- C-trading markets are developed in EU, North America, Australia and Asia.
- **Renewables** are at the forefront of such efforts.

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# SPECIAL FINANCING

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## Special Purpose State Loans

- **Jamaica - Petrocaribe Small and Medium Enterprise (SME) Energy Fund**-J\$ 1 billion line of credit to SMEs for energy retrofitting and conversion to alternative energy sources.
- Managed by the Development Bank of Jamaica through its AFIs.
- Capped at J\$15 million per borrower, @ 9.5 % interest (from 12% since May 2010).

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## Special Purpose State Loans

- DBJ direct lending to companies - **J\$50 - J\$500M** (or US\$ equivalent) for any one project, company or group.
- DBJ will lend directly up to **70%** of the overall project cost or for Co-financed projects, a maximum of 65% of the project cost which is not financed by other financial institutions.
- Stakeholder's equity  $\geq$  30% of the total project cost.
- **< 15 years for repayment with 3 – 5 yr moratoria on interest and/or principal payments @ 9.5% interest rate + commitment fees between 1/2 - 2% (terms and conditions apply).**


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## Special Purpose Local Private Sector Loans

- Jamaican Commercial and Merchant banks offering new **“green/RE” loans @ 9.5 – 14% interest (JA\$); ~ 5 - 7 yrs repayment.**
- Commercial Banks are still challenged by smaller RE projects:
  - Long repayment period desired (10 – 20 yrs).
  - Lack of clarity on value and risks (e.g. hurricanes).
  - Don't understand the “business”.
  - Absence of resale market.
  - Required collateral from small investors.

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## DFI Special Investment Financing

- **Climate Technology Institute - Private Financing Advisory Network (CTI PFAN).**
- Multilateral public-private partnership which matches experienced investors and resources, with innovative clean and renewable energy projects. CTI PFAN provides guidance on feasibility, project structure, investment, financing and other support.
- Funds projects USD1 – 50 Million.
- **Canadian** \$250 million as loan funds for Climate Change initiatives managed by the IADB.

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## CAPACITY BUILDING

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 **Research, Education & Training**

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 **Thank you**

**Any Questions**





**END**



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