



Caribbean Renewable Energy Development Programme (CREDP - GTZ)



Experiences with Investments in Renewable Energy Projects in the Caribbean Region

Thomas M. Scheutzlich
Principal Advisor CREDP/GTZ

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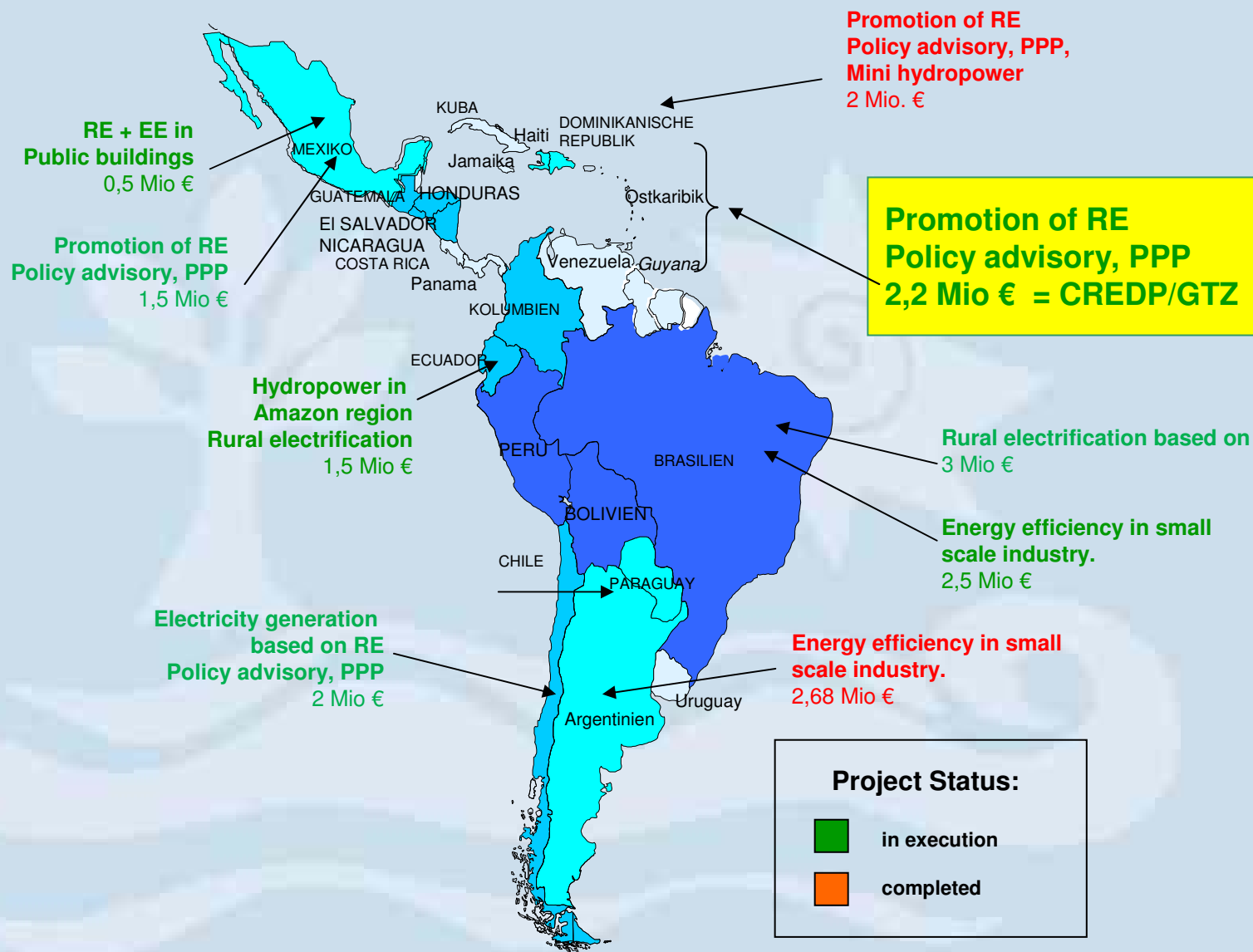
Presentation

- **CREDP: Context – Objective – Activities**
- **Energy Situation in the Caribbean Region**
- **RE and EE potential**
- **Barriers and Challenges for Investment in RE**
- **Lessons learnt**
- **Outlook**

The German Contribution to the Caribbean Renewable Energy Development Programme (CREDP/GTZ) is

- **a joint Programme between the German Development Cooperation and CARICOM and part of the energy portfolio of GTZ in the LAC Region**
- **financed by the German Federal Ministry of Economic Cooperation and Development (BMZ)**
- **implemented by the German Agency for Technical Cooperation (GTZ)**
- **executed by the consortium of Projekt-Consult GmbH, Germany and ENTEC AG, Switzerland.**

Energy Portfolio LAC of the German Technical Cooperation



Caribbean Renewable Energy Development Programme (CREDP - GTZ)

- ➔ **Development Goal: Reduction of the Caribbean Region's dependency on fossil fuels and contribution to reducing GHG-emissions.**
- ➔ **Project Purpose: Creation of favourable framework conditions for RE-investments in selected countries.**
- ➔ **Counterpart: CARICOM Secretariat**
- ➔ **Duration: 02/2003-03/2008 (First Phase),
Volume: 2,2 Mio €**

**Project Region:
15 CARICOM States and States with Observer Status (DomRep, Cuba)**



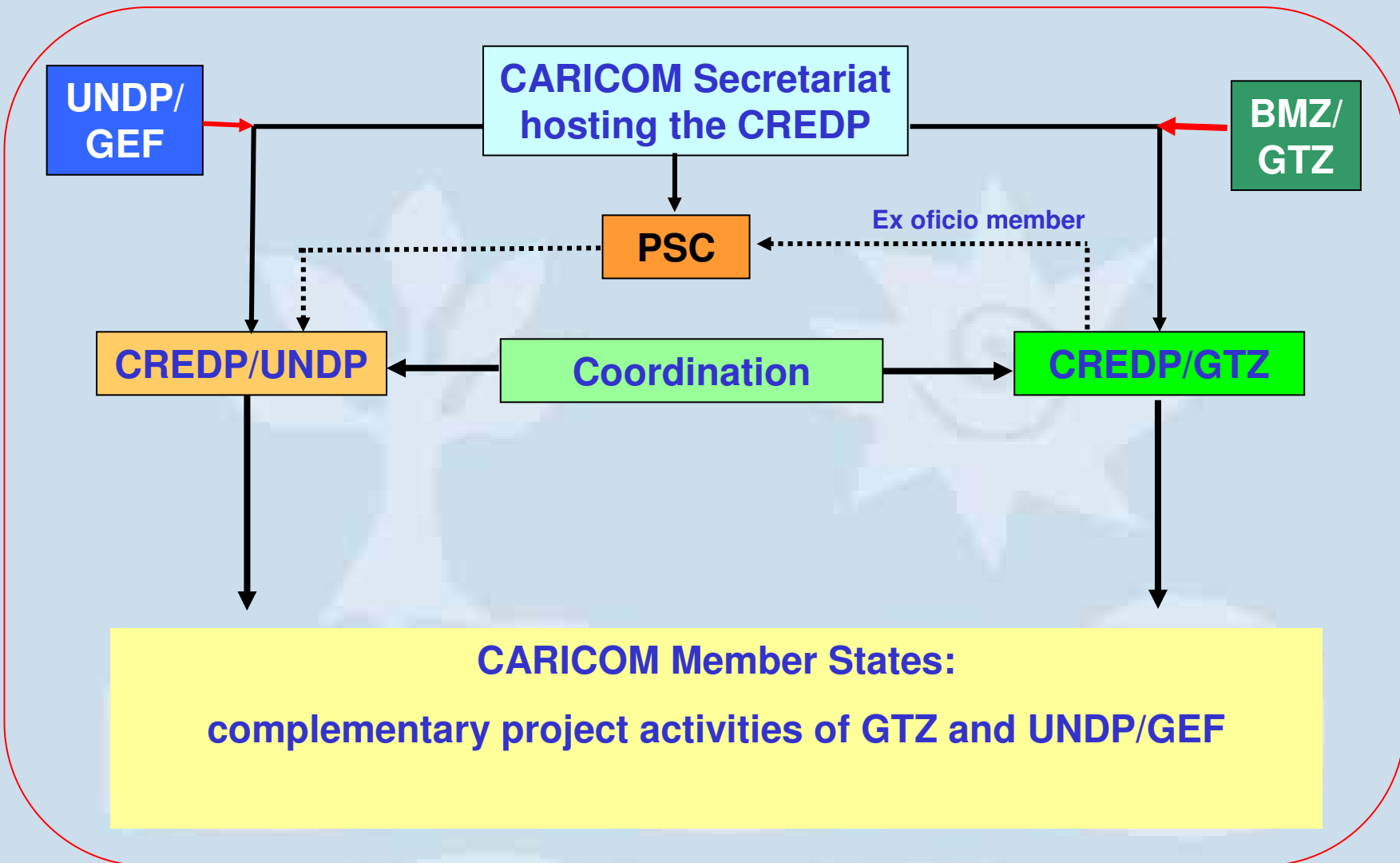
**CREDP/GTZ -
countries of
first phase:**

- (Barbados)
- **Jamaica**
- **Dominica**
- **Grenada**
- **St. Lucia**
- (St. Kitts & Nevis)
- **St. Vincent & the Grenadines**

Main Activities to achieve project purpose:

- Support Governments of selected countries in renewable energy policy formulation and support amendment of energy legislation.
- Identify RE projects and investors and support project preparation.
- Provide capacity building for RE key stakeholders
- Improve information and awareness of RE through access to international experience and „best praxis”

Institutional set up



Energy Situation in the Caribbean Region

(i) Main Characteristic of electricity markets

- High dependency on imported fossil fuels (93% of electricity production)
- Only 3 % of electricity produced from RE sources, Remaining sources: own fossil fuels (e.g. TT, Barbados)
- Electricity coverage on Islands > 98% (except Guyana, Suriname, Belize)
- Monopoly situation for utilities
- Small markets: installed capacities < 150 MW on Islands
- Electricity costs from 0,24 to 0,37 USD/kWh (at 70 USD/barrel on average)
- Main electricity consumers:

- (i) hospitality sector
- (ii) domestic households
- (iii) commercial sector
- (iv) industrial sector

(ii) Energy Policy Issues

- **Most Caribbean countries have no established National Energy Policy, no long term Energy Strategy and no Energy Actions Plans.**
- **In the 70 - 80ties: utilities were privatized without setting the rules of the game for the buyers (5 out of 8 GTZ partner utilities are private companies).**
- **Energy forecasting, planning and energy policy were left in the hands of utilities.**
- **Inefficient policy decision procedures due to split energy portfolio in Ministries for alternative energies and public utilities.**
- **Lack of RE energy expertise in Ministries with responsibilities for energy.**
- **Electricity Supply Acts in many Caribbean states guarantee a rate of return on investment of 15% for electric utilities.**
- **No incentives nor sanctions for utilities to use RE and to foster EE**

(iii) Status of RE utilization and EE

- **All Caribbean countries have medium to large resources of RE:**
 - Solar Energy (all)
 - Wind power (all)
 - Hydropower (most)
 - Biomass (most)
 - geothermal energy (some)
- **Presently, 3% use of RE in the (CARICOM) Region refer to:**
 - Solar Water Heaters in all countries (mainly Barbados)
 - Wind Power in Jamaica (20 MW)
 - Hydropower in Jamaica, Belize, SVG, Dominica and Suriname
- **Large untapped resources of:**
 - Solar thermal in all countries (mainly for hospitality sector)
 - PV for decentralized rural electrification (Guyana, Suriname, Cuba, Bahamas, Haiti)
 - Wind power on all Islands
 - Hydropower (Guyana, Suriname, Cuba, Jamaica, Haiti, SVG, Dominica)
 - Biomass in Guyana, Suriname, Cuba, Jamaica, Grenada)
 - Geothermal energy (St. Kitts & Nevis, Dominica, St. Lucia, SVG)
- **Largely untapped resources in EE at all levels (supply and demand side)**

RE Potential in selected countries

RET Country	Wind	Hydro	Solar-thermal (& PV)	Geo-thermal	Land-fill gas	Co-generation	Potential for RES coverage
Dominica	✓ 20-30	✓ 10+?	✓	✓	?	?	Up to 100%
Grenada	✓ 20+ ?	< 1 ?	✓	?	?	✓	? (10-20%)
Jamaica	✓ 90	✓ 60	✓	n.a.	✓ 20	✓ 35	10-20 %
St. Lucia	✓ 20-30	< 0,5 ?	✓	✓	✓ 2+	?	20-30 %
SVG	✓ 20+ ?	✓ 5+?	✓	✓	?	?	30-40 %

Project Pipeline of RE projects

Project No.	Country	Project Name	Project Status				
			Site Selection Study	Pre-Feasibility Study	Feasibility Study	Final Design Study	Ready for tendering
1	Barbados					X	90%
2	Dominica	Padu Hydro Power Project			X		
3	Dominica	Old Trafalgar Hydro Power Project			X		
4	Dominica	New Town Hydro Power Project		X			
5	Dominica	New Hydro Power Project (NN)	X				
6	Dominica	RE Project Resort Six Senses, Crompton Point	X				
7	Dominica	NN	X				
8	Grenada	NN	X				
9	Jamaica	(GLR)				X	80%
10	St. Kitts	NN	X				
11		NN	X				
12		John Compton Dam Hydro Power Project		X			
13		NHT RE Project (NN)	X				
14					X		90%
15	SVG	Hydropower Plant			X		90%
16	SVG	Hydro Power Plant			X		90%
17	SVG	Owia Hydro Power Station			X		
18	SVG	Ribishi Point Wind Park			X		90%

Wind power projects – Caribbean Wind Power Initiative (CAWEI)

Country	Project	Level of preparation	Potential developer	Status of financing/ observations
St. Lucia	12,6 MW Windpark at Sugar Mill	Pre-Feasibility, site selection, wind data analysed	LUCELEC	KfW is preparing financing offer (expected in Dec 2007)
St. Vincent	7,2 MW Windpark at Ribishi Point	Pre-Feasibility, site selection, wind data analysed	VINLEC	KfW is preparing financing offer (expected in Dec 2007) for windpark and hydropower
Barbados	10 MW Windpar at Lamberts	Feasibility study, EIA, financing secured thorough EIB	Barbados Light and Power (BLP)	EIB has committed financing
Grenada	Ca. 10 MW in SE part of Grenada	Land negotiations ongoing, wind measurements starting soon	GRENLEC	GRENLEC expressed interest in June 2007 to join CAWEI

Next candidates to join CAWEI:

- St. Kitts and Nevis (approx. 3 MW)
- Aruba (approx. 5-8 MW)
- Jamaica (extension of existing wind park for another 15- 20 MW)
- Cuba (up to 100 MW)

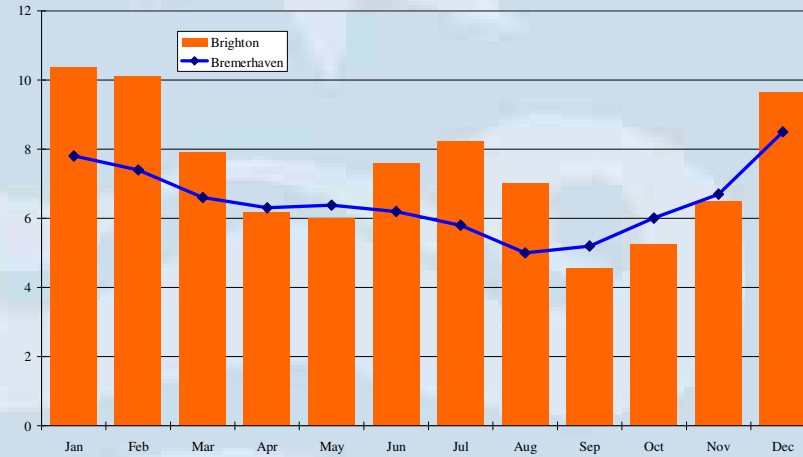
Hydropower projects under development

Country	Project	Level of preparation	Potential developer	Remarks
Jamaica	Great Laughland River Hydropower Project (new project 2 MW)	Feasibility, financial and economic analysis,	PCJ (Petrol Corporation), WWF Ltd.	PCJ is interested to invest, EIA and business plan required, land issue is pending
St. Vincent	Richmond Hydropower Station upgrading and extension project (1,2 to 1,5 MW)	Feasibility, some construction work started	VINLEC	Decision of VINLEC's Board of Directors taken in 2006 to proceed with implementation, Call for interest published in 2007, KfW is preparing financing offer
St. Vincent	South River Hydropower Station upgrading and extension project (1,1 to 1,3 MW)	Feasibility, some construction work started	VINLEC	Decision of VINLEC's Board of Directors taken in 2006 to proceed with implementation Call for interest published in 2007, KfW is preparing financing offer

Action example 1: Wind Park Ribishi Point: 7.2 MW



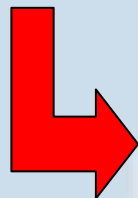
Monthly Average Wind Speeds in



Type of Project:	Wind Park in grid-parallel operation
Location:	Ribishi Point, Brighton (Southern tip of Saint Vincent)
Developer:	Saint Vincent Electricity Services Ltd. – VINLEC
Consulting:	Caribbean Renewable Energy Development Programme
Capacity:	5.4 MW (six units of 900 kW each) (updated planning 2007: 7.2 MW, 8 units of 900 kW each)
Average Annual Wind Speed:	7.44 m/s in 10 m above ground, ~ 8.4 m/s at hub height of 55 m
Expected Annual Production:	12,410 MWh (from 5.4 MW, 16,546 MWh from 7.2 MW Wind Park)
Specific Production:	1,360 kWh/m ² of rotor area
Capacity Factor:	26.2 %
Contribution to Vinlec' grid:	~ 12 % (penetration rate)
Estimated Investment Cost:	5.71 million € (~ 7.14 million US\$)
Est. Specific Generation Cost:	5.851 €cents/kWh (~ 7.314 US\$cents/kWh)
Annual Fuel Savings:	5.4 MW: ~ 2.3 million litre diesel fuel (14.465 barrels @ 60 USD = 868.000 USD)
Start of Operation:	2009
Life Time:	20 years

Action example 2: Rehabilitation and Extension of South River HPP, Option 1

Plant Name	South Rivers
Installed Capacity (Plant Rating)	870 kW
Available Capacity	700 kW
Average Annual Energy Production	3,950 MWh
Average Current Plant Load Factor	0.52
Number and Size of Units	2 x 275; 1 x 320 kW
Design Flow	≈ 1.1 m ³ /s
Gross Pressure Head	115 m



Project Name	South Rivers Option 1
Installed Capacity (Plant Rating)	1,140 kW
Number and Size of Units	2 x 570 kW
Design Flow	1.3 m ³ /s
Net Pressure Head	106 m

Annual energy production is 6,180 MWh, which constitutes an increase of 2,180 MWh or 55%, compared to the currently available average annual output of around 4,000 MWh.

Summary of projects in SVG

	Current generation (MWh, average)	Additional generated (MWh)	Additional generated (%)
HPP South River	4,000	2,180	+ 55
HPP Richmond	6,000	2,360	+ 39
Windpark Ribishi P.	none	16,500	+ 100
Total additional generation		21,040	

21,040 MWh @ 0.08 USD/kWh fuel cost (Lowman's Bay):

- **1,683,200 USD/a savings in expenditure for fossil fuel (avoided fuel cost only).**
- **Approx. 16,000 t/a CO₂ savings**
- **Generation cost (USD/kWh) for wind and hydro < avoided cost of fossil fuel (@ > 60 USD approx.)**

General challenges for investments in RE and EE projects

- Lack of consistent energy policies hampers private sector participation (legislation does not allow IPPs)
- Universal monopolies of utilities
- Lack of international (Bank) rating of benefiting country
- High debt burden of benefiting country (debt-to-GDP ratio) makes Government guarantees difficult
- High debt service of potential borrower/developer (e.g. utilities)
- Lack of knowledge of and confidence in RE/EE Technologies at the level of banks and financing institutions
- Lack of in-house capacities (in banks) for due diligence of RE and EE projects

Specific challenges for investments in RE and EE projects

- Land issues (St. Lucia, Jamaica, Grenada)
- Acceptance of wind power (Barbados)
- High dept burden (SVG)
- Low bank rating of borrowers
- Hesitance of bank to take higher risks for RE/EE projects

Need for actions (i)

- **Governments need to:**
 - **regain control over the energy sector**
 - **formulate and implement sustainable energy policies and action plans**
 - **reform and liberalize the energy sector**
- **Electric Utilities need to:**
 - **open up for new energy policies and accept change of energy paradigm (move towards RE, EE, energy conservation)**
 - **face competition from IPPs**
 - **learn about new energy technologies and their applications**

Need for actions (ii)

- **Electricity consumers need to:**
 - **learn about and apply energy saving methods**
 - **appreciate the value of electricity and its usage**
 - **accept the consequences of use of RE (e.g. impacts of wind, hydro, solar thermal, geothermal)**
- **Banks need to:**
 - **recognize their crucial role for RE/ EE development**
 - **accept the challenges that are inherent for RE and EE investments**
 - **develop and offer innovative financing products addressing the special need for RE/EE investment**

Outlook

(i) Second Phase of four years from 2008 recommend by Project Evaluation Team (03/2007)

(ii) Main recommendations for second phase of CREDP/GTZ:

- Ensuring sustainability of the project by strengthening of new Energy Department of the Caricom Secretariat**
- Extension of regional activities to further Caribbean countries (taking over assistance of former CREDP/UNDP countries, additional Dom. Rep. and possibly Cuba)**
- Extension of project portfolio to include Energy Efficiency**
- Stronger cooperation with potential financing institutions like IDB, KfW, EIB, CDB from the beginning.**



Thank you.