

Energy Efficiency Options for the Caribbean Region

Panel Session I: Setting the context for Caribbean Energy Initiatives

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**Caribbean Renewable Energy Development Program-
CREDP/GTZ a project implemented by
German Agency for Technical Cooperation, GTZ**

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Beach, Gros-Islet

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1. The Sustainable Path – Requirements for Energy Policy
2. EE policy formulation and planning process – a step approach
3. List of possible Energy Efficiency (EE) policy tools
4. General barriers for EE in the Caribbean
5. EE issues in commercial sector/ tourism sector
6. EE issues in residential sector
7. Existing EE policies: Jamaica, Barbados, St. Lucia
8. Possible options to improve the situation
9. Objective of future EE program supported by GTZ
 - Outputs and Activities and possible Partners

1. The Sustainable Path - Overview

- Each country has to define its own path, there is no one solution for all!
- There is no single technology option to solve the problem!
- Common attributes of a sustainable path are:
 1. Clear long term policy
 2. Curbing demand growth
 3. Reduce material consumption: reduce, reuse, recycle
 4. Increase energy efficiency
 5. Increase renewable energy portion steadily
- **Target:** Example Germany until 2050:
 - Reduce Energy demand by 50% (14000 PJ/a/ 2000 to 7000 PJ/a)
 - Increase RE to 50% (to 3 500 PJ/a from now 825 PJ/a)

1. The Sustainable Path: Energy policy requirements

- Most important: Government must set a policy, that public know:
 - There is no more “cheap” energy” in the future
=> The price signal must be right!
- Energy policy must be long term policy and must have:
 - Targets
 - Plans to achieve targets by using energy planning tools
 - Instruments: taxes, subsidies, adders, incentives, standards and labels
 - Implementation strategies to implement plans including energy agencies who need to constantly monitor, evaluate and adjust instruments
- Adopt targets under changing conditions, like:
 - Changing energy costs; development of technologies
 - Development of energy demand in the different sectors

1. The Sustainable Path:

Step 1: Curbing demand growth options

- Taxes on energy: 1 US\$/lit.(in gasoline); 10 c\$/kWh on elec.
=> **Germany: Transport fuel consumption -15% (1998 – 2005)!**
=> Role of price signal important!
=> 250 000 jobs, slightly pos. impact on GDP; more winner than loser; but especially private households pay
- Change transport system to “integrated transport concepts”, including
 - Entering a Congestion Charging Zone, Charge of £8/day in London
 - Singapore Area License System (ALS) & Electronic Road Pricing (ERP)
 - Integrated concept in Berlin, Germany: Bicycles to/from/in Metro and bus
- Demand Side Management
 - DSM program in Thailand reduced peak demand by 1,300 MW from 1996-2006

1. The Sustainable Path:

Step 2: Reduce material consumption: reduce, reuse, recycle

- Strong waste reduction strategies are required
- Approach: Cleaner production and EMS
- Integration of recycling aspects into the design stage of products e.g. cars
- Return of all consumer goods to shops after their use;
 - manufacturer have to recycle it.. and not to export it to... China..
- Applying “Life Cycle Assessment” to all material and energy processes as standard
- In the long run, we need to reduce it by 80%!

1. The Sustainable Path:

Step 3: Increase energy efficiency

- Challenge with Energy Efficiency (EE) is:
 - It is not visible and no “ribbon cutting ceremony” is possible
 - For each sector and for each technology it needs a well targeted program
 - It is a constant battle: You have to change the mind of the people
 - The children have to challenge the adults!
 - It requires often multi discipline actions:
 - e.g. in industry: cooperation between production and energy department
 - It requires strong implementation agencies

1. The Sustainable Path:

Step 4: Increase renewable energy (RE) portion steadily

- Policy matters more than resources !
 - e.g. Feed-in law (EEG) is the single most important regulation to ensure constant growth of RE
 - PV and Wind in Germany is growing not because of availability of wind and sunshine, but because of a reliable law (EEG)
 - But each country has to set its own priorities for individual RE sources
- Development of technology goes along with the development of the resource
 - but there must be a market for the technologies!
 - E.g. wind power development in Denmark and Germany

.....*We Have a Choice*

Example : Energy Efficiency of Cars



The 3 litre VW Lupo
33 km/l (diesel)



The 3 litre Peugeot 406 Coupé
10 km/l (petrol)

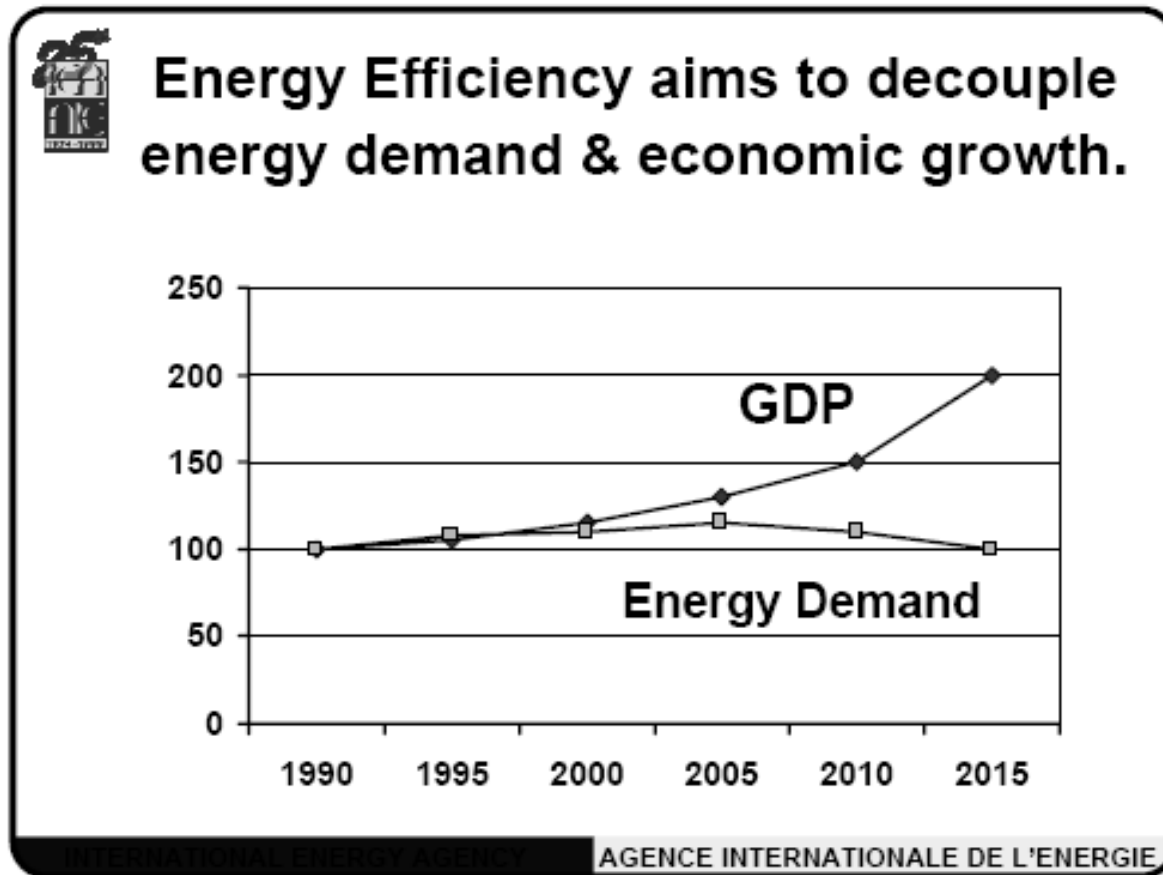


The 3 litre Hummer H1
3 km/l (diesel)

.....Factor 10!

2. EE policy formulation and planning process

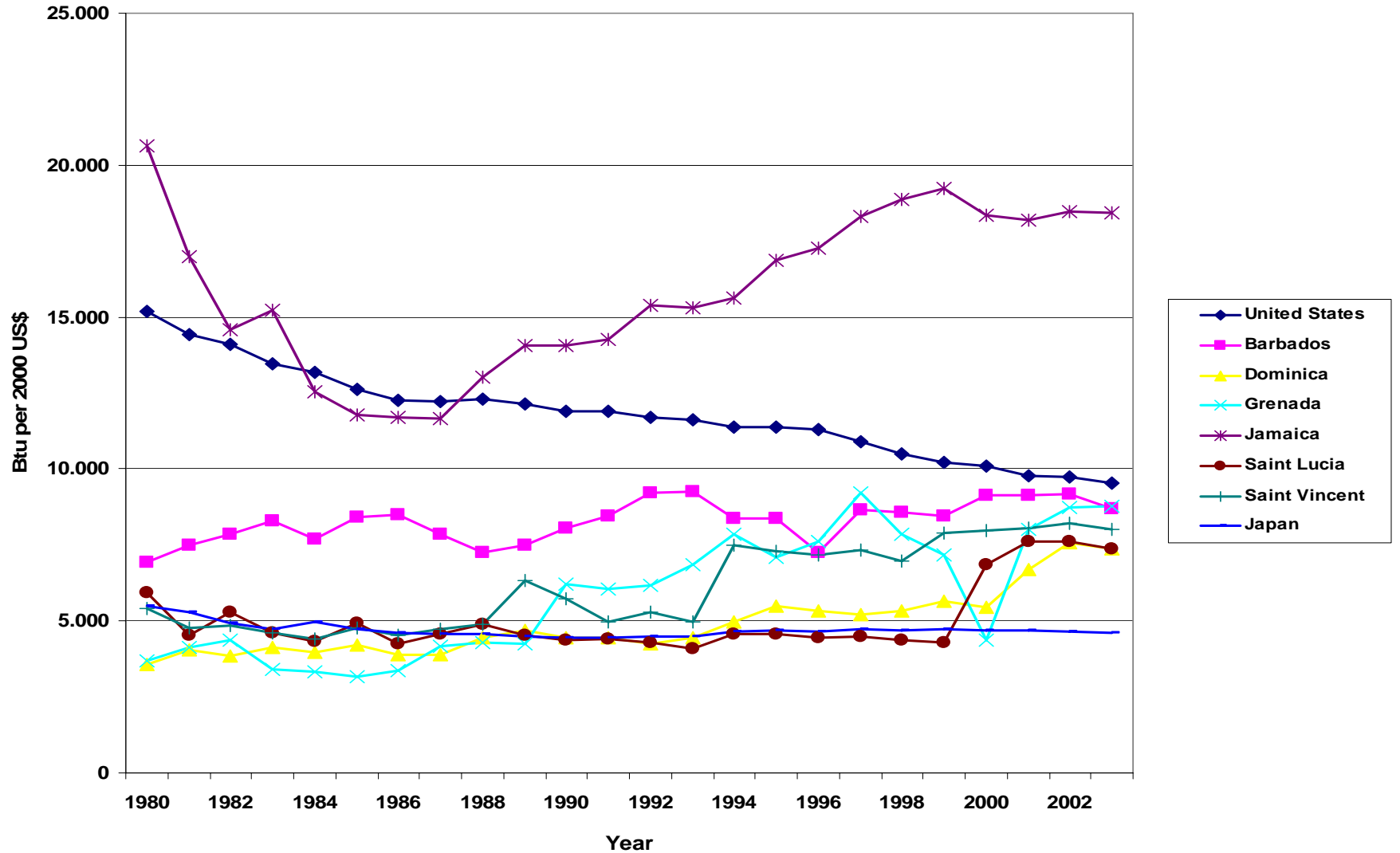
– a step approach:
Objective of EE policies



Energy situation in the Region

Energy Intensity in the Caribbean: Fluctuating/Increasing!

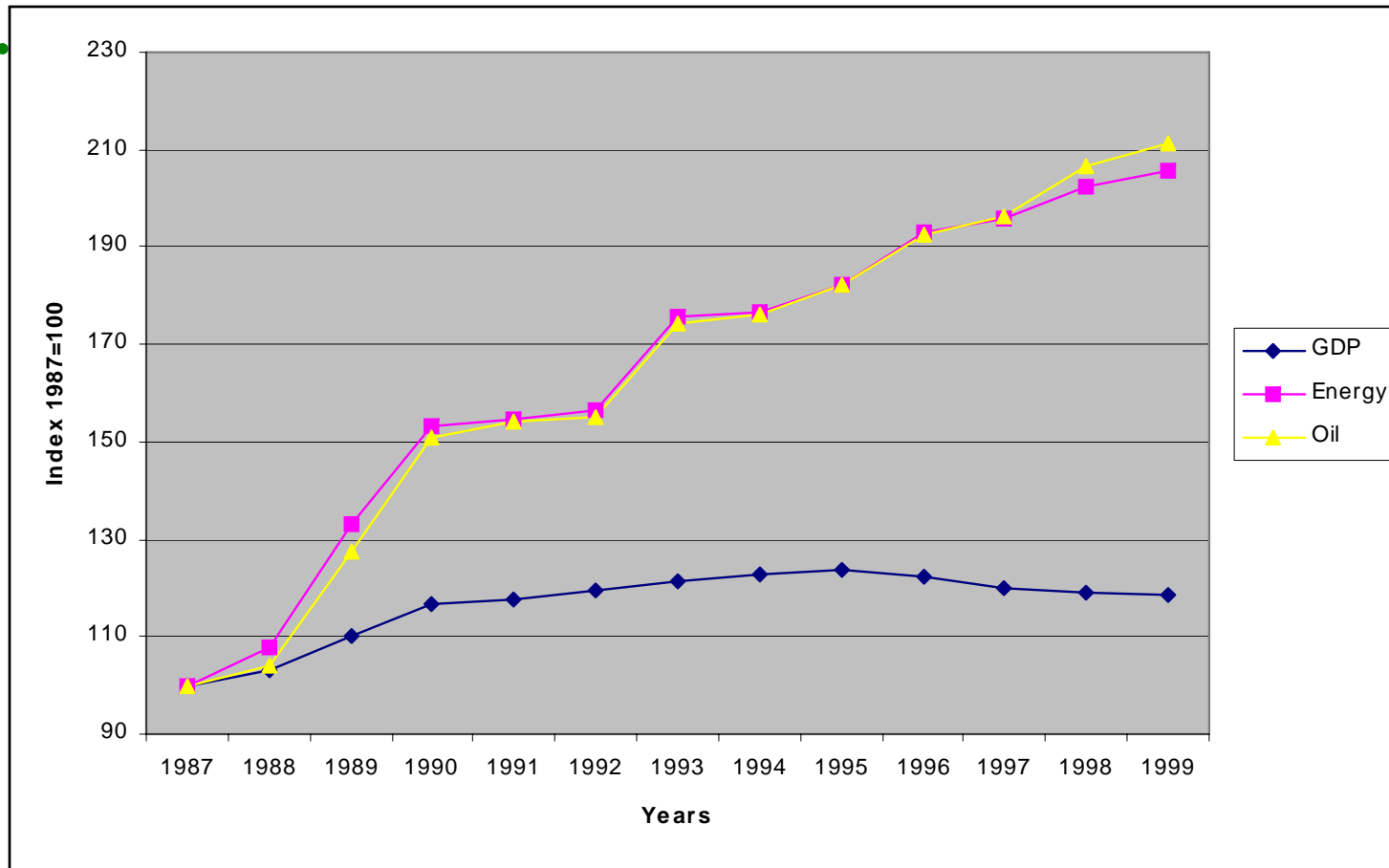
Energy Intensity (1980-2003)



GDP Evolution, Energy and Apparent Oil Consumption

Index Numbers: 1987=100

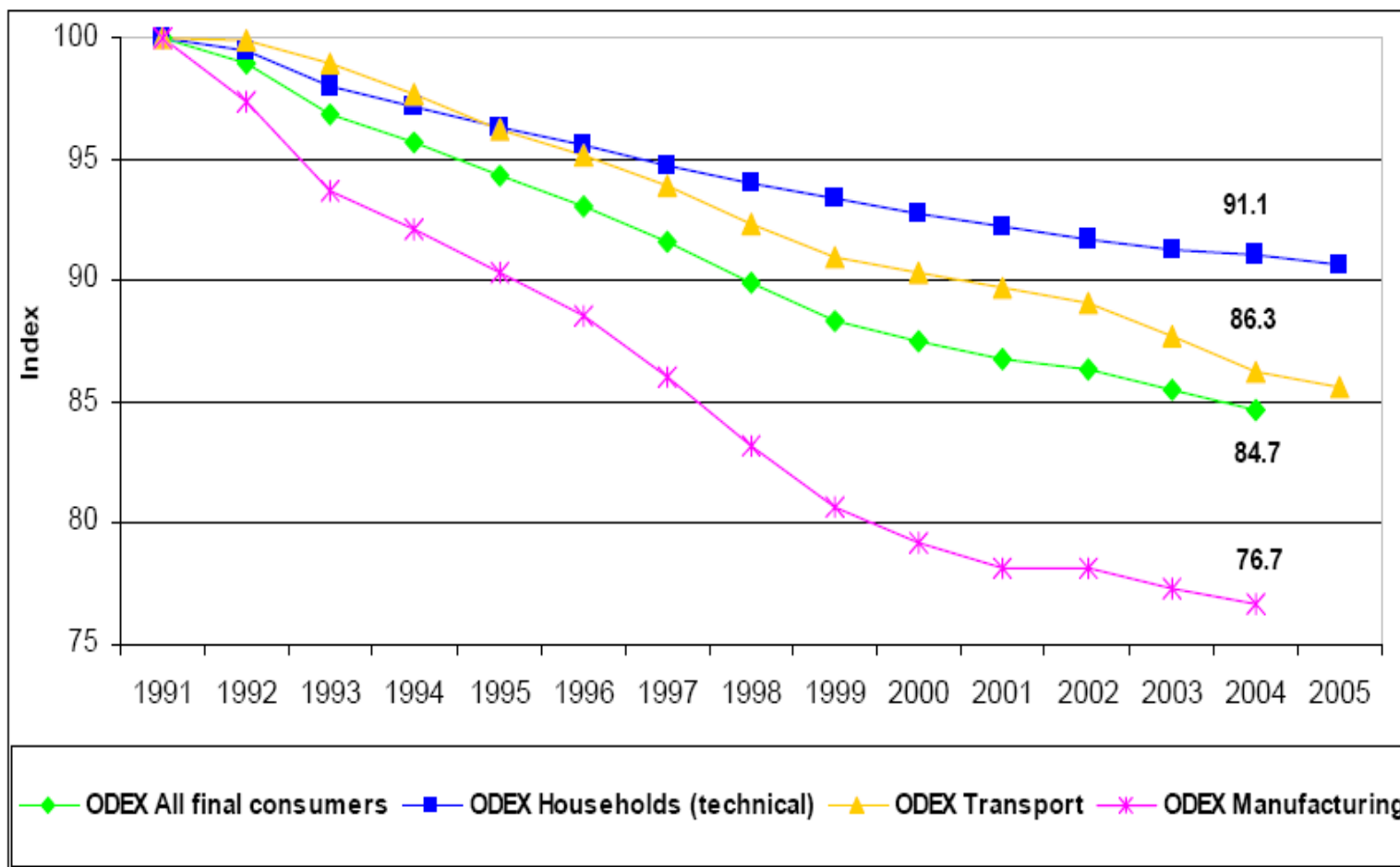
JAMAICA



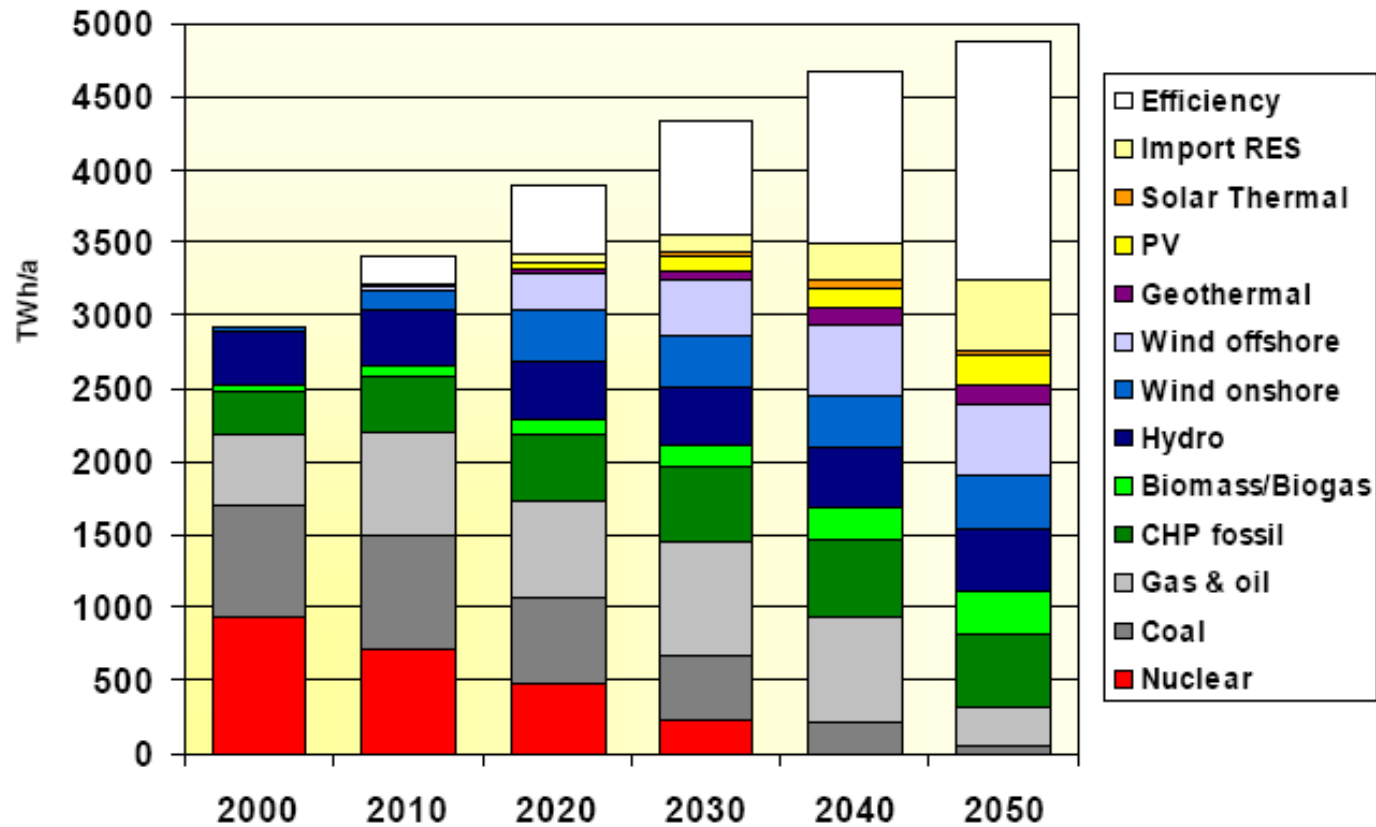
“Considering 1987 as base year, we see that the GDP grows 18.6%, while energy consumption rises 105.7%, a pattern of dubious sustainability in the medium term” (R. Wright, PCJ).

Energy efficiency index of the whole economy and by sector 1991-2004 (2005) for Germany

GDP grew during that period by + 21%



electricity generation under the 'Alternative Scenario' in the EU-25



2. The EE policy formulation and planning process is complex and needs to be well targeted!



Successful Energy Efficiency combine different policies

1. Sound Market Structure
2. Address Consumer needs
3. Focus Market Interest
4. Access to technology
5. Develop Institutions
6. Policy Continuity

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Successful Energy Efficiency combine different policies

1. Sound Market Structure



- Sound Pricing
- Remove Subsidies
- Set Clear Ownership
- Transitional issues
- Non-payment issues
- Include Externalities
- Introduce Taxes,
Levies



Successful Energy Efficiency combine different policies

1. Sound Market Structure
2. Address Consumer needs



Understand
Consumer
Behaviour,

Provide informa-
tion and training

Energy Service
Companies (ESCO),

Certification Sche-
mes

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Successful Energy Efficiency combine different policies

1. Sound Market Structure
2. Address Consumer needs
3. Focus Market Interest



Voluntary Agreement,
Building Codes,
Standards
Procurement Practice
Public Purchasing
Small scale financing
"Clearinghouses"

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Successful Energy Efficiency combine different policies

1. Sound Market Structure
2. Address Consumer needs
3. Focus Market Interest
4. Access to technology



Commercialise R&D,
Adaptation of technology,
Dissemination,
Technology Procurement
District heating &
CHP

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Successful Energy Efficiency combine different policies

1. Sound Market Structure
2. Address Consumer needs
3. Focus Market Interest
4. Access to technology
5. Develop Institutions



Capacity building

Integration in
sectors,

Develop impartial
expertise

Transport sector a
special case

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Successful Energy Efficiency combine different policies

1. Sound Market Structure
2. Address Consumer needs
3. Focus Market Interest
4. Access to technology
5. Develop Institutions
6. Policy Continuity




Leadership

Evaluation and
monitoring


International
collaboration (CTI...)


Emerging financing
mechanisms

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Energy Efficiency Should be Integrated into other Policies


Transport



Industry


Industry



Equipment





Building




Housing


Land Use





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2. Step approach to a successful EE policy

EE program have to be tailor made for each sector!

1. Analyze energy consumption pattern in respective sector:
 - end energy distribution, costs, developments trends, energy framework conditions, tariffs, etc.
2. Design Pilot program for that particular sector
3. Get consent with local utilities and private sector, stakeholders (e.g. AC installers) to join in the implementation
4. Implement pilot program and monitor it carefully!
5. Evaluate cost/benefit and targeted against realized savings
6. Design full EE program and include:
 - Extensive PR
 - Provide financing or ensure access to financing
 - Get credibility by insisting that public institutions, public purchase have a model function!
 - Education – general awareness
 - Institutional development and capacity building
 - Training of technicians, engineers, architects, supplier, etc.

3. List of possible Energy Efficiency (EE) policy tools:

Classification for EE Policies and Programs

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- ✓ Regulations and Standards, Labels
- ✓ Fiscal Policies
- ✓ Agreements (mostly Voluntary)
- ✓ Reporting/Benchmarking
- ✓ Audits/Assessments
- ✓ Information Dissemination and Demonstration
- ✓ Research and Development

4. General barriers for energy efficiency (EE) in the Caribbean

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Barriers, that can be overcome:

- Lack of knowledge about the trends and consumer patterns
- Lack of awareness at political level, executives level
 - Many countries still have no EE policy, no standards for EE
- No lead organisation for EE !
- Lack of utility involvement: No ongoing DSM program !
- Lack of trained personal: at vocational and university level
- Lack of awareness about EE options by general public !
- No pilot projects of EE measures, no monitoring of the savings
- Funding not readily available from banks for EE investments

Barriers, that are not possible to overcome easy:

- Size of the Caribbean market => small markets => higher transaction costs, lack of expertise, number of EE professionals very small

But: A Success story of RE and EE measure in Barbados

- **Barbados: Solar Water Heater (SWH) Program**

- So far 36,000 SWHs in private homes and hotels installed, population is around 250 000.

- SWHs are produced locally!

- Government promoted the expansion of the SWH industry by waiving taxes on raw materials to manufacturers, maintaining high taxes on non-solar water heaters (60%), and allowing a 100% tax rebate on income taxes to householders to purchase a SWH.

- In addition, hotels borrowing from the Barbados National Bank are required to carry out energy audits and these usually suggest the use of SWHs.

- Payback period in Barbados is around 2½ years

⇒ This success story was possible in the Region as the government implemented the right policy and the private sector was responsible for implementing the program!

⇒ Replication in St. Lucia and in Jamaica

5. EE issues in commercial / tourism sector Situation - 1

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According to World Travel and Tourism Council tourism contributed (1999):

- 20.6% of region's GPD
- 15.8% of employment
- 25.7% of capital investment

=> Tourism is the most important single sector in most countries of the Caribbean!

Tourism facilities are moving towards compliances with:

- Global environmental standards
- Caribbean standards for hotels
- Green Globe Certificate

=> The option to get EE introduced into the sector!

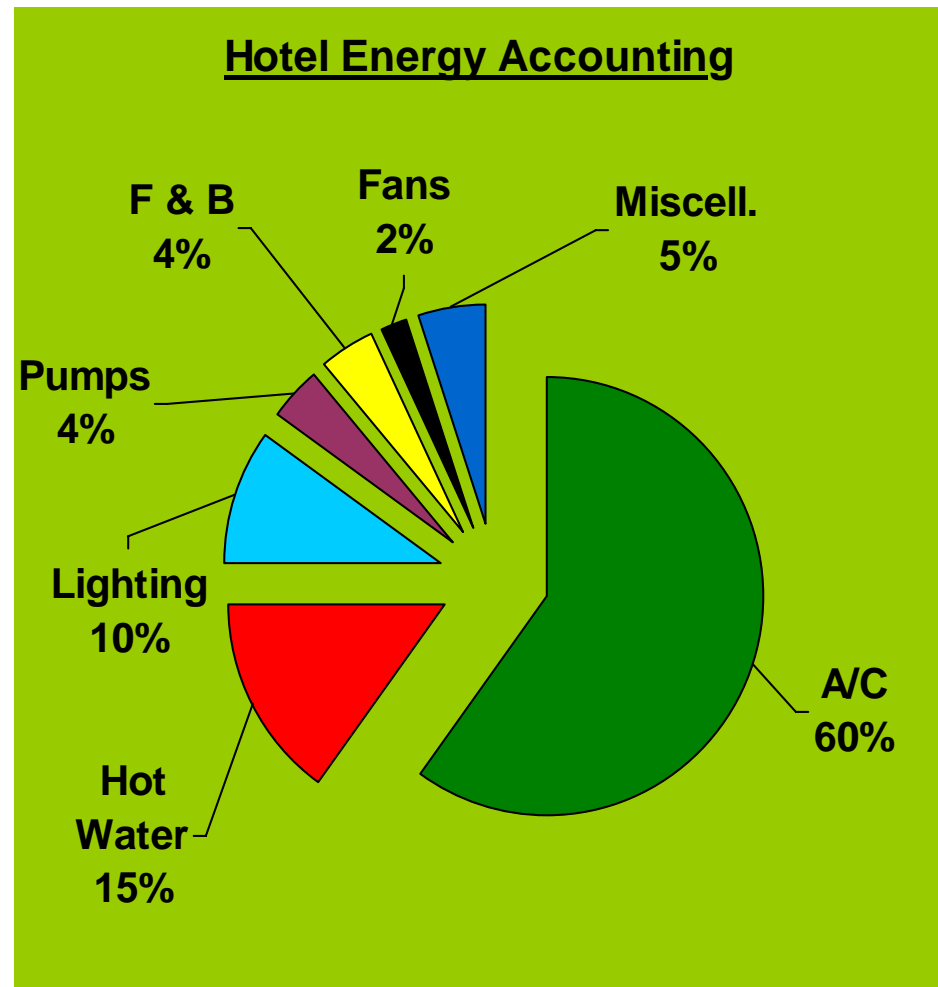
Typical Energy Use in Hotels: Distribution of Energy Demand

- A/C & Refrigeration largest slice – up to 70%
- Hot water 2nd largest – 15%
- Lighting 3rd – up to 10%

Saving possibilities:

- ◆ Highly efficient A/C with controls can save 25% to 35% of total
- ◆ Solar thermal can save up to 15% of total
- ◆ Efficient lighting can save 7% of total
- ◆ Automatic timers can save 3% of total
- ◆ Cogeneration in large hotels

Source: Energy Dynamics Limited



5. EE issues in commercial / tourism sector

Situation - 3

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- Energy costs are second highest cost factor after labour costs for hotels! ...up to 5 – 10 US\$/night/guest
- Break down of utility costs for a typical hotel (2003)
 - Electricity: 56%
 - Water heating (fuel costs): 1%
 - LPG (cooking): 14%
 - Water supply: 29 %
- From a utility perspective: Commercial sector is one of the main consumer (2002) of electricity:
 - 67% in Barbados, with 17% for hotels , 50% for commercial buildings,
 - Dominica 35%, with 4.5 % for hotels,
 - Grenada 53%,
 - St. Lucia 56% and St. Vincent 42%
- The commercial/hotel sector is the only sector we know a bit about its energy consumption pattern!

5. EE issues: Problem statement for commercial/tourism sector

- Building codes do not include EE aspects
- So far: EE standards and procedures are not part of standards and certification programs for facilities
- Energy...meaning electricity supply and costs development - are considered to be the “responsibility” of the utility.
- Lack of access to financing to upgrade facilities
- Lack of awareness by staff in larger hotels about possibilities of EE
- In addition in smaller hotels even by the management of hotel has some kind of helplessness..

6. EE issues in residential sector Situation

- Residential sector is the other large electricity consuming sector in the Region:
 - Barbados: 34%
 - Belize: 46%
 - Dominica: 52%
 - Guyana: 45%
 - Grenada: 41%
 - Jamaica: 38%
 - St. Lucia: 37%
 - St. Vincent: 48%
- Despite the importance of this sector very little is known about it
 - The consumer pattern (trends in appliances purchase and use) are not monitored
 - Load profiles for the sector are not known

6. EE issues in residential sector

Problem statement - 1

- The consumer pattern (trends in appliances purchase and use) and load profiles for the sector are not known neither by the utilities nor by governments
- There are only very limited activities to influence purchase and use of appliances
- No labelling of products!
- Knowledge of consumer about electricity consumption of their appliances is very limited.
- Energy - Electricity supply and costs development - are considered to be the “responsibility” of the utility.
- There has been one DSM program in the 90ties in Jamaica with quite some success, but it was discontinued when JPS was sold to a private investor

6. EE issues in residential sector

Problem statement - 2

- Efficiency standards for appliances are not used widely
- Even supplier/dealer don't know about the standards
- Building codes are partly developed, but implementing is pending, mostly on a volunteer basis
- Most mistakes are done in the design stage of buildings....the absence of incentives and the lack of awareness by all groups involved in the design of an energy efficient building is leading to inbuilt inefficiencies...
- So far the utilities are not pro-active to promote EE through DSM programs
 - Why should they? ... long term concessions with fixed rate on return on their investment

7. EE policies in the Region: Recent developments in Jamaica - 1

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In 2007 Nat. Dev. Plan incl. DSM plan drafted:

- Green Paper of Energy Policy includes EE: EE program, Public education program for EE and equipment standards to encourage EE and EE building codes with SWH passive solar design etc.
- Revolving Energy Fund for EE and RE installed
- Ongoing activities: Residential SWH and CFL exchange program (Cuba) SME's: CFL's , ventilation and SWH, Large commercial: CHP, power factor improvement, Gov. sector: improving HVAC
- Tax reduction for import of EE products
- Building code developed (1994): but it is voluntary

7. EE policies in the Region: Recent development in Barbados - 2

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Draft Energy Policy in 2006 incl. EE:

- Nat. building code for new and sub. renovated buildings, EE Act shall be enacted in 2008 incl. standards EE appliances, Energy audits in homes, Public sector EE program, DSM program, Setting up a EE and RE center in collaboration with Oak Ridge Lab., US
- Ongoing: EE home material incl. CFL's reduced import tax 5% instead of 20%, home energy audits deductible up to 1000 US\$, hotel EE audit and retrofit program up to 5 Mill US\$
- New green tax regime for solar AC's , water saving devices up to 2500 US\$ tax deductible
- Building code development (ASHRAE 90.1) initiated

7. EE policies in the Region: Recent developments in St. Lucia - 3

- St. Lucia: adopted a Sustainable Energy Plan, Funding required for implementation (GEF?) for EE standards in public buildings as part of a green architecture initiative, working on ESCO legislation
- 300 000 CFL's distributed (Cuba), plans of a larger EE program, monitoring of saving done (?)
- CFL's import reduction to 5%,
- SWH tax deductible up to 6500 EC\$
- Energy audits tax deductible
- GHG reduction program for hotels (CIDA) energy audits and training.

7. EE policies in the Region: OECS countries - 4

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OECS framework energy policy drafted, incl. EE:

- A national energy code for buildings.
- Public education with an emphasis on children.
- Institution of DSM programs by utilities.
- Use of least-cost or integrated resource planning by utilities.
- Encourage the development of ESCOs and use of energy performance contracts.
- Labeling and verification of the energy efficiency of consumer products.
- Provision of incentives for CFLs and disincentives for incandescent bulbs

8. Possible options to improve the situation - 1

- Interventions on the policy level
 - Formulate an energy efficiency policy - started
 - Introduce standards and labelling of appliances - started
 - Introduce building codes that include energy efficiency - started
 - Use tax/duty concessions for high EE products – started
 - Plan and execute information and awareness programs – not yet started
 - Include EE issues in formal education, from primary to collage level – not yet started
- Interventions on the utility side:
 - Plan and implement a DSM (demand side management) program including solar water heating – not yet started
 - Improve energy efficiency on the generation, transmission and distribution side - pending
 - Test pre-paid meters as means to promote energy awareness - pending
 - Allow net-metering for PV systems on buildings – in discussion

8. Possible options to improve the situation - 2

- Intervention on target group level: Commercial/Tourism sector
 - Capacity training
 - “Energy Management” (EM) as part of QTC process
 - All staff training as part of orientation program
 - EM included in operator training (licensing program)
 - Energy audits for commercial buildings (not only hotels)
 - Develop and apply energy tool kits for hotels with energy auditing
 - Assist in retrofitting
 - Assist in securing financing for retrofitting
 - Change design pattern for commercial buildings, hotels and private houses
 - Train architects, building constructors, etc.
- Intervention on intermediate level
 - Promote ESCO’s and their service

8. Possible options to improve the situation - 3

- Intervention on target group level: Residential sector
 - Awareness about appliances and energy consumption
 - Information campaigns about options
 - Pre paid meters as means to promote energy awareness

9. Objective of the future program for EE improvement in the Caribbean by GTZ

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The proposed objective for the program may be:

- **The energy efficiency in the commercial and residential sector in selected countries is improved**

Possible outputs: 1. The frame work for energy efficiency is improved

Activities:

- Introduce/Improve/enforce EE standards for AC, lighting, fans, pumps
- Introduce a labelling program for all major appliances
- Change guidelines for EIA to introduce EE in EIA
- Assist in development of building codes including EE aspects and assist implementation in pilot projects prior to its mandatory introduction

Partners:

- CEHI, OECS Sec., CARICOM Sec.
- Governments and respective administrations in selected countries

9. Possible outline of an Energy Efficiency program

Outputs, Activities, Partners - 2

Possible outputs:

2. Energy efficiency services are offered to residential, commercial and industrial sector

Activities:

- Pilot demand side management (DSM) program with selected utilities are planned and implemented
- Offer training workshops on design and implementation of DSM to utilities
- Establish good monitoring program to document cost/benefit of DSM for utilities, consumer and government
- Implement a solar water heating program driven by utilities
- Information and awareness program

Partner:

- CEHI, CARILEC, ESCO's
- Selected utilities in the Region

9. Possible outline of an Energy Efficiency program Outputs, Activities, Partners - 3

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Possible outputs:

3. Energy efficiency in the commercial / hotel sector is improved

Activities:

- Energy Management (EM) as part of the QTC (Quality Tourism in the Caribbean) process
- Plan, test and disseminate “tool kits” for energy audits especially for SME hotels as well in commercial buildings
- Training of staff “on all levels” as part of orientation program
- Integration of EM in formal education of hospitality staff (colleges, schools)
- Including EM in operator training
- Include EM in EIA of hotels/commercial buildings
- Include EM in facility management training

Partners:

- CEHI, CAST, ESCO's

9. Possible outline of an Energy Efficiency program

Outputs, Activities, Partners - 4

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Possible outputs:

4. The knowledge and awareness about EE is improved

Activities:

- Introduce EE issues in formal education in vocational training, like hospitality sector
- Information and awareness program on all levels about standards and labelling for consumers
- General awareness program about EE

Partner:

- CEHI, schools/ colleges / tech. vocational institutions , UNESCO

Thank for your kind attention!

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