

OLADE Workshop

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(CHENACT)  
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CARIBBEAN  
HOTEL & TOURISM  
ASSOCIATION



**CAST**

Caribbean Alliance for Sustainable Tourism



# Presentation topics

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- What is CHENACT
- Main Findings – Energy Audits
- ODS Audits
- Main Issues in Hotels
- Energy
- Water
- Linkages
- CHENACT AP
- PoA

# What is CHENACT?

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- CHENACT is a CHTA project financed by :
- IDB, GTZ, CDE, UNEP, BL&P, Government of Barbados, BHTA
- It is implemented via CTO by CHTA/CAST.



Inter-American Development Bank



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# Who is CHENACT?

- CHTA : Umbrella Organization of the National Hotel Associations ( Private sector)



- CAST: Green Arm of CHTA (Private sector)



- CTO: Umbrella Organisation of the Ministries of Tourism (Public Sector)



# Objective of CHENACT

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To improve the competitiveness of small and medium sized hotels (<400 rooms) in the Caribbean Region through improved use of energy with the emphasis on Renewable Energy and Micro-Generation

The Pilot project is in Barbados, and the Region

The beneficiaries are CHTA member hotels

# CHENACT Assistance to Hotels

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- Detailed energy audits in 32 hotels in Barbados
- Walk Throughs assessments in 30 hotels in Barbados
- Detailed audits in 12 hotels in the OECS
- Detailed audits in 5 hotels in the Greater Caribbean Region
- ODS audits in Barbados \*

# Detailed Audit Reports

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- Energy Audit & Accounting
  - Energy Consumption and Cost
  - Electrical Bill Analysis
  - Organizational Analysis
  - Maintenance Effectiveness
- Carbon Dioxide Emission Analysis
- Solar Energy Performance Analysis
- Natural Gas Analysis
- Energy Saving Opportunities
- Discussion and Recommendations
- **Appendices:**
  - Data logger & Energy Meter Readings
  - Heat Load Results
  - Energy Management Matrix
  - Single Line Utility Diagrams (Electrical)
  - Energy Accounting Exercise & Savings Calculations

# Detailed Audit Reports

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## – DISCUSSION AND RECOMMENDATIONS

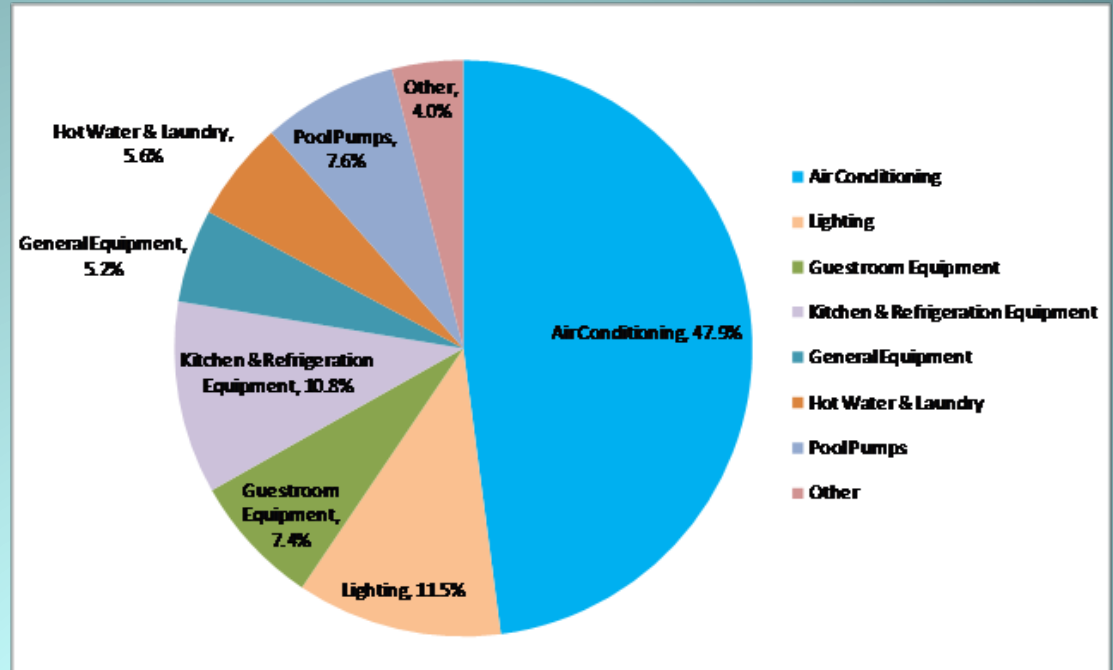
- This is the final portion of the report which indicates the most feasible projects for the hotel to undertake.
- It calculates:
  - Total Project cost
  - Total Annual savings
  - Simple Payback period
  - Total kWh & Carbon Dioxide Savings
  - Internal Rate of Return (IRR)
  - Net Present Value (NPV)
    - Making this a bankable document



# Energy Audit Findings

## ENERGY

- Air conditioning is the largest consumer in hotels; it accounted for over 50% of the total energy consumed
- Some hotels are paying more than one electrical bill per month. This results in a higher unit cost of energy and in turn a higher electricity cost
- Having 3 bills under the Secondary Voltage Rate when the hotel can be using the Large Voltage Rate
- By switching to a larger rate some of the unnecessary charges can be removed.



# Electricity Consumption and CO<sub>2</sub> Emissions for the Barbados Hotel Sector

<b># of Rooms</b>	<b># of Hotels</b>	<b>Annual electricity Consumption (MWh)</b>	<b>CO<sub>2</sub> Emissions (Tons)</b>
<=50	60	20,711	14,606
51-100	18	18,450	13,012
101-200	14	26,102	18,408
>200	4	16,536	11,662
Total	96	81,799	57,688

# Energy Usage per Guest night by Hotel Size

	Hotel Size (# of Guestrooms)			
	<=50	51-100	101-200	>200
High (kWh/Guest Night)	70	87	43	50
Average (kWh/Guest Night)	38	44	32	34
Low (kWh/Guest Night)	12	18	25	22
# of Hotels	10	8	5	4
GN/RN Ratio	1.73	1.79	1.79	1.90

# Audit reports indicate significant opportunities for energy efficient savings in the hotel sector

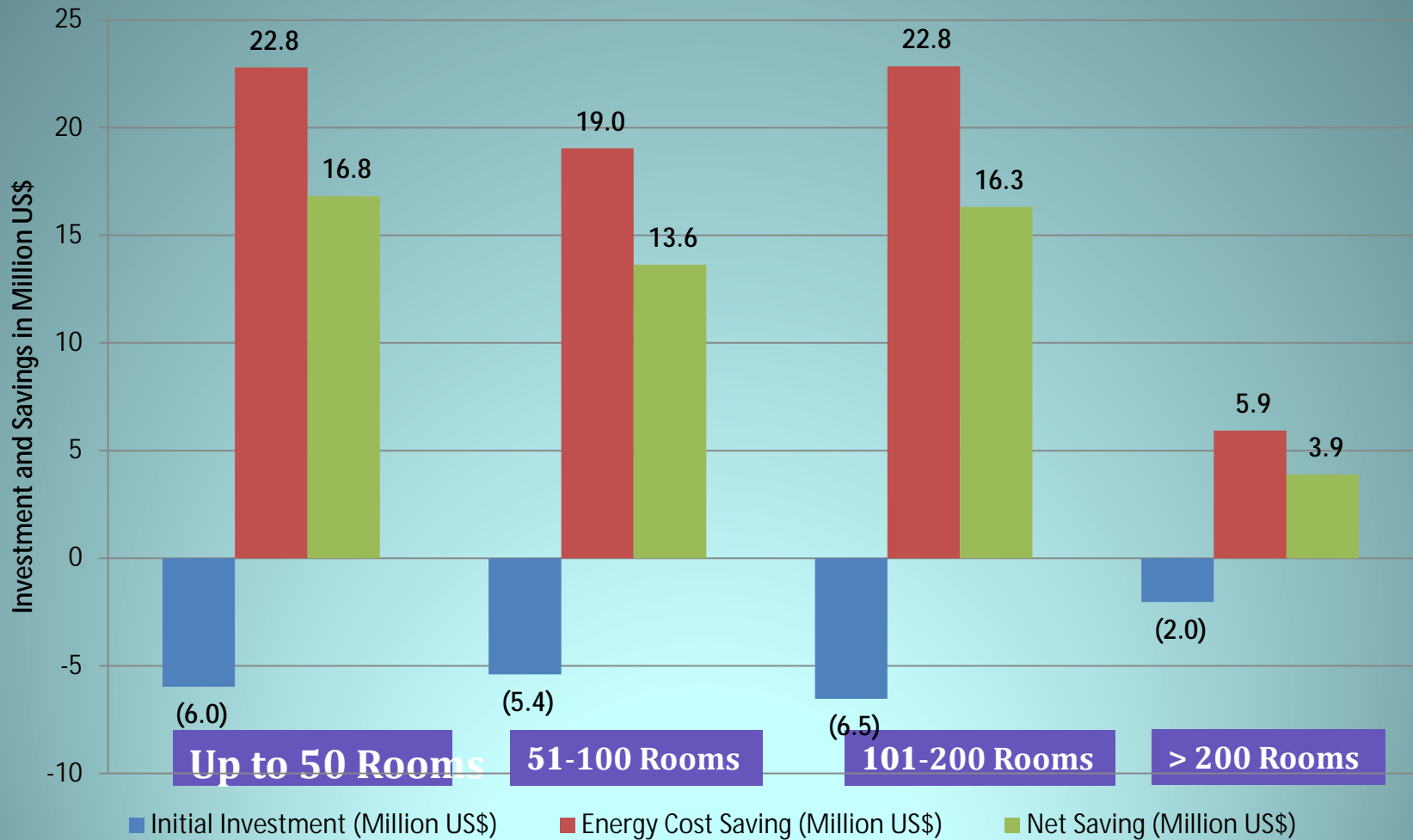
- Average potential electricity savings near 40% of total hotel's consumption
- Most savings are related to:
  - 1) Retrofit of present mini split unit systems to high efficient AC systems (such as inverter type variable refrigerant volume (VRV) system ) with heat recovery for supplying hot water also.
  - 2) Installation of high efficient lighting systems.
- Average total paid back period around 2.5 years
- Total investment costs between US\$200,000 and US\$550,000 depending on property size

Hotel size	# of Rooms	Potential Annual Electricity Savings	Investment Cost per hotel [US\$k]	Payback period [months]
Small	0-50	38%	200	37
Medium	51-100	39%	320	28
Large	101-200	40%	410	33
Very Large	200<	39%	550	27

# 111 room hotel in Barbados

	Energy Saving Opportunities (ESO's)	Initial Cost BBD\$	Annual Savings BBD\$	Payback (Years)	Tons of CO2 savings	kWh Savings per Year
1	Retrofit of 40W and 60W Incandescent Bulbs with 13W and 10W Compact Fluorescent Lamps.	\$7,050.00	\$11,037.27	0.64	13.4	22,843
2	Retrofit of T12 40W Tubes with 18W LED replacement	\$16,940.00	\$3,213.44	5.27	3.9	6,651
3	Installation of Guest Room Controls to setback A/C Temperature when room is Unoccupied	\$111,000.00	\$19,002.82	5.84	24.7	42,020
4	Installation of new Solar Water Heaters to replace existing Solar Water Heaters	\$226,800.00	\$76,442.03	2.97	93.1	158,208
5	Solar Photovoltaic System for Outdoor Lights	\$68,000.00	\$9,288.80	7.32	12.1	20,540
6	Natural Gas Absorption cooling system to replace electrical DX System	\$623,066.00	\$205,223.00	3.04	155.0	448,877
	TOTAL	\$1,052,856.00	\$324,207.37	3.25	302.3	699,140

# US\$ 20 million investment in Barbados hotel clean energy will yield US\$ 50 million in savings



*Assumptions:* Analysis period – 7 years, Discount rate – 12%, Average electricity tariff – 0.40 US\$/kWh, Electricity annual price escalation rate – 4.5% for Barbados.

# ODS Audits

51 hotels audited, 3821 Rooms

	A/C Split Systems
R22 units	3193
R407C units	98
R410a units	39
	Chillers
R410a units	5
R134a units	5
Absorption Units	4
R22	4
	Refrigerators
R134a units	2118
NH3 units	88
R12 units	9



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# So What are the Issues??



- SINGLE LINE UTILITY DIAGRAMS (ELECTRICAL)
- There were some cases however where the Electrical Rooms & Panels were not maintained to a safe level; they were rooms which were dangerous and as a result:
  - Was too dangerous for the team to enter
  - Can cause the hotel to be shut down if inspected.



# Energy Audit Findings

**Dirty Freezer Coils**



**Main Electrical Room**



# Energy Audit Findings

**Lime Scale collection on  
SWH**

**Dirty Freezer Coils**



# Energy Audit Findings

**Kitchen Fresh Air Supply**

**Poor Split Unit Maintenance**



# Energy Audit Findings:

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## – EQUIPMENT

- Boilers
- Some hotels used boiler systems for the production of hot water.
- A case seen in the photograph where a lack of proper maintenance resulted in a constant leak. This results in additional natural gas and water costs for the production of hot water.
- This equipment was found to be feasible for larger hotels that have a constant demand for hot water in comparison to smaller ones that can be supplied by a solar water heating system.



# Energy Audit Findings

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- The Set point in this walk in freezer is too low, which causes increased energy consumption by compressors.

# Energy Audit Findings

**Water condensing on the ceiling of a walk-in in chiller**



**Walk in chiller doors not properly closed**



This was an instance where the switches were left on for the entire duration of the audit.





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# Typical hotel room issue TnT



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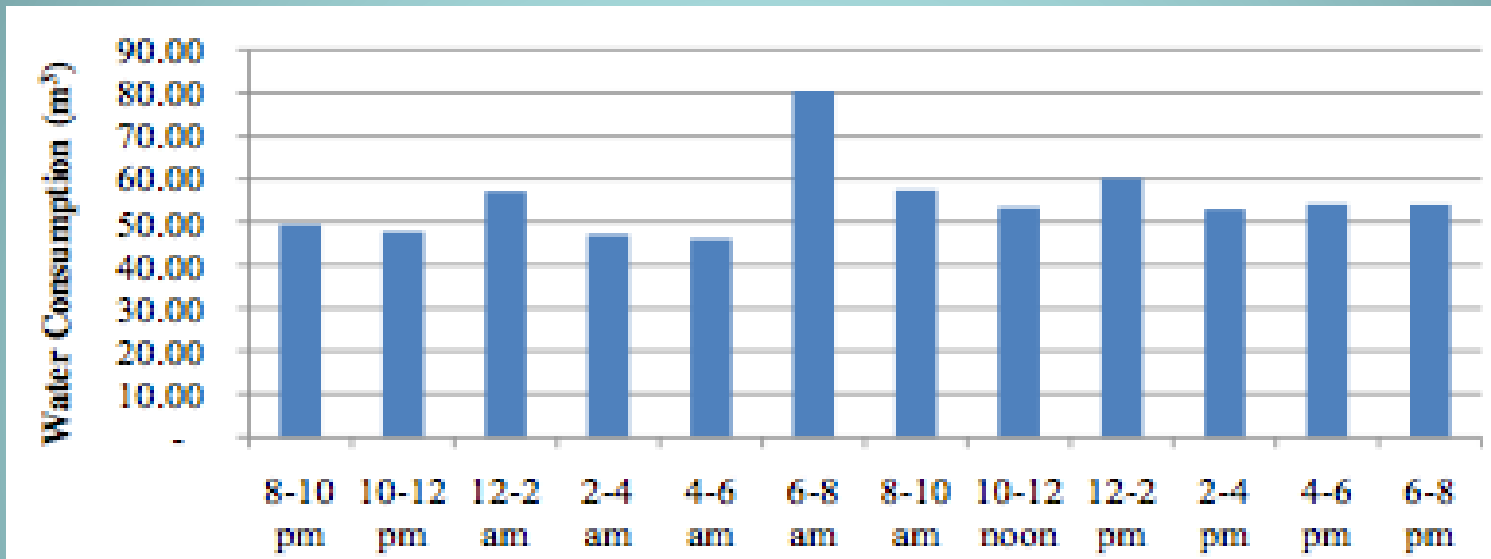
## – WATER

- The majority of hotels sustained water leaks which was costing them between 20-50% of their water bills.
- This was due to: leaking toilets, faucets, underground pipes, cooling towers and pools.
- The audit team found a leak at a large hotel which was costing them approximately **\$620,153.70/yr.**
- In a number of cases proper water consumption analysis could not be done due to water meters that were not functional.



# Water Audit Findings

- 24 hour water audit results:



# LINKAGES

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- Montreal Protocol : ODS audits, HCMP phase out commenced in Barbados
- Kyoto Protocol : Calculated the Co2 emissions and potential savings
- NAMA – replacement of the Inefficient A/c units
- PoA for the Caribbean Hotel Sector : EE, Lighting, A/C's  
PV systems =Reducing the footprint of the hotels in terms of energy , water usage - Marketing

# CHENACT AP

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- 30 detailed audits in Barbados, Jamaica, Bahamas and other interested countries: DR, Belize and the OECS
- ODS audits in all in conjunction with UNEP and the Ozone units
- Implementation of the recommendations from Phase 1
- Replication of Clean Energy Policy for the Hotel Sector
- Replication of the Smart Fund
- Development of the PoA
- Demonstration models, EE, PV, Wind etc

# Recommended technologies and services be included in the Hotel CDM PoA:

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- Air conditioning retrofit - VRV EE mini-splits
- Guestroom energy controls – occupancy sensors, programmable thermostats
- Public area lighting controls – occupancy sensors
- Individual lamp replacement CFLs LEDs
- Fluorescent tube lamps – T8 tube lamps with electronic ballasts and LEDs
- Solar hot water heating systems
- Energy efficient freezers, refrigerators, cool rooms
- Guest room energy efficient mini-fridges, televisions
- Office and guestroom equipment – televisions, computer monitors
- Timers on pumps and motors
- Photo-sensors and timers for outdoor lighting
- Energy Management Systems
- PV Systems

# Contact details for CHENACT

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