SMART HEALTH CARE FACILITIES

November 2018

Shalini Jagnarine
M.Sc., CEng, MIstructE, D.I.C.
PAHO SMART HOSPITALS

SAFE
Resiliency

GREEN
Environmentally Sound

MAINTAINED
Sustainability

= SMART

Improve resilience to hazards

Reduce impact of Climate Change & Reduce operational costs

Conservation & Planned Preventative Maintenance
PAHO SMART HOSPITALS

• 5-year Project funded by DFID, UK
• 7 countries: Grenada, St. Lucia, St. Vincent and the Grenadines, Dominica, Guyana, Belize and Jamaica
• Over 400 Health facilities assessed (safe & green)
• Smart App created with database
• “SMARTing” of at least 4 facilities in each country
• Improved Technical material/ Tools
• Develop National & Regional Capacity
Why Smart?

Majority HF’s = HSI B or C

Only 2 HF’s are SMART
Making Healthcare Facilities in the Caribbean SMART

A platform for integrating Disaster Risk Reduction, Climate Change Adaptation, Environmental Management, and Conservation Efforts

**RESILIENCY**

SAFE

- Sound Roof & Foundation
- Improved Security & Signage
- Secured Equipment & Fuel Storage
- Protected & Efficient Doors and Windows
- Good Drainage
- Back-up Power
- Water Reserve
- Disaster Management Plans
- Comprehensive Maintenance Planning
- Disability Access

**SMART HOSPITAL**

Hospital safety Index – Score A
Green checklist – Scores above 70%

**ENVIRONMENTALLY SOUND**

GREEN 70+

- Water Efficiency
- Waste Minimization & Management
- Pollution Reduction
- Rain Water Harvesting
- Alternative Power Using Renewable Energy
- Efficient Lighting & Cooling
- Improved Indoor Air Quality

**SUSTAINABILITY**

SMART

- Reduced Downtime
- Resilient Structure
- Reduced Operating Cost
- Improved Safety
- Satisfied Patients and Staff
- Environmentally Sound Operations
- Improved emergency care and services for the community
Average Electricity Cost (US$ / kWh)

- Brazil: $0.13
- Colombia: $0.18
- Canada: $0.11
- USA: $0.13
- BVI: $0.27
- Aruba: $0.28
- Jamaica: $0.33
- Belize: $0.39
- Guyana: $0.29
- Saint Lucia: $0.34
- SVG: $0.33
- Grenada: $0.33
- Dominica: $0.36
Health Care Facilities

Electrical usage at health care facilities by equipment

IN-PATIENT FACILITY

% of total electricity from Lighting: 20%
% of total electricity from AC: 32%

OUT-PATIENT FACILITY

% of total electricity from Lighting: 22%
% of total electricity from AC: 46%
Health Care Facilities

Estimated Savings from Electrical Retrofit to Lights & AC Only

- **Out-Patient Facility**
  - Average Annual Electricity Usage (KWh): 62,840
  - Average Annual Electricity Saved (KWh): 16,096
  - Average Annual Savings (US$): $5,749.36

- **In-Patient Facility**
  - Average Annual Electricity Usage (KWh): 74,636
  - Average Annual Electricity Saved (KWh): 13,618
  - Average Annual Savings (US$): $4,864.11

Savings:
- 26% for Out-Patient Facility
- 18% for In-Patient Facility
Health Care Facilities

HVAC: Average payback period = 5.6 years

Lighting: Average payback period = 9.2 years
Energy retrofit:

Sounds EASY!
Integrating disaster risk reduction into investment decisions is the most cost-effective way to reduce these risks; investing in disaster risk reduction is therefore a precondition for developing sustainably in a changing climate.

b) Breakdown of recorded economic losses (US$) per disaster type 1998-2017

- Storm: 46% US$ 1,330 billion
- Earthquake: 23% US$ 661 billion
- Flood: 23% US$ 656 billion
- Drought: 4% US$ 124 billion
- Wildfire: 2% US$ 68 billion
- Extreme temperature: 2% US$ 61 billion
- Other: US$ 8 billion

World Health Organization
Regional Office for the Americas
Natural Disaster
Designing for Resilience

PAY ATTENTION TO GEOMETRY AND SITING!

- No risk if facility located in safe location
- Avoid building in flood planes
Geometry

Use simple geometry rather than complex geometry
Favourable Roof Geometry

- Hip Roof with pitch ≥ 20°
- Gable Roof with pitch ≥ 20°
- Hip Roof with parapet, pitch ≥ 15°
- Gable Roof with parapet, pitch ≥ 20°
PV panels, post-Maria

Parapet walls
Smart Energy Retrofit

- Solar shading versus increased lighting
- Include insulation, small capital cost = big operational savings
Smart Energy Retrofit

- Incorporate natural ventilation

Ref. windowmaster.com
Smart HF Retrofit
Comfort Bay Senior Citizens Home, Saint Lucia

Natural Wind flow

Mechanical vent
Smart Energy Retrofit

- Include natural lighting
- Include occupancy sensors for conservation
- Regular maintenance for optimal efficiency
- Use energy efficiency fixtures: lights, AC and appliances
- Supplement with renewable energy

- Safety first!
Smart HF Retrofit

Georgetown Hospital, St Vincent and the Grenadines

BEFORE

AFTER

Natural lighting transoms
Smart Health Care Facilities

- Belize - EU Smart Hospitals retrofit
- Jamaica - WB Health Section Vulnerability Assessment
- BVI – Smart schools & hotels
- Grenada – partial retrofits other donors
Smart Hospitals:
http://www.paho.org/disasters