

Renewable Energy Development in The Gambia

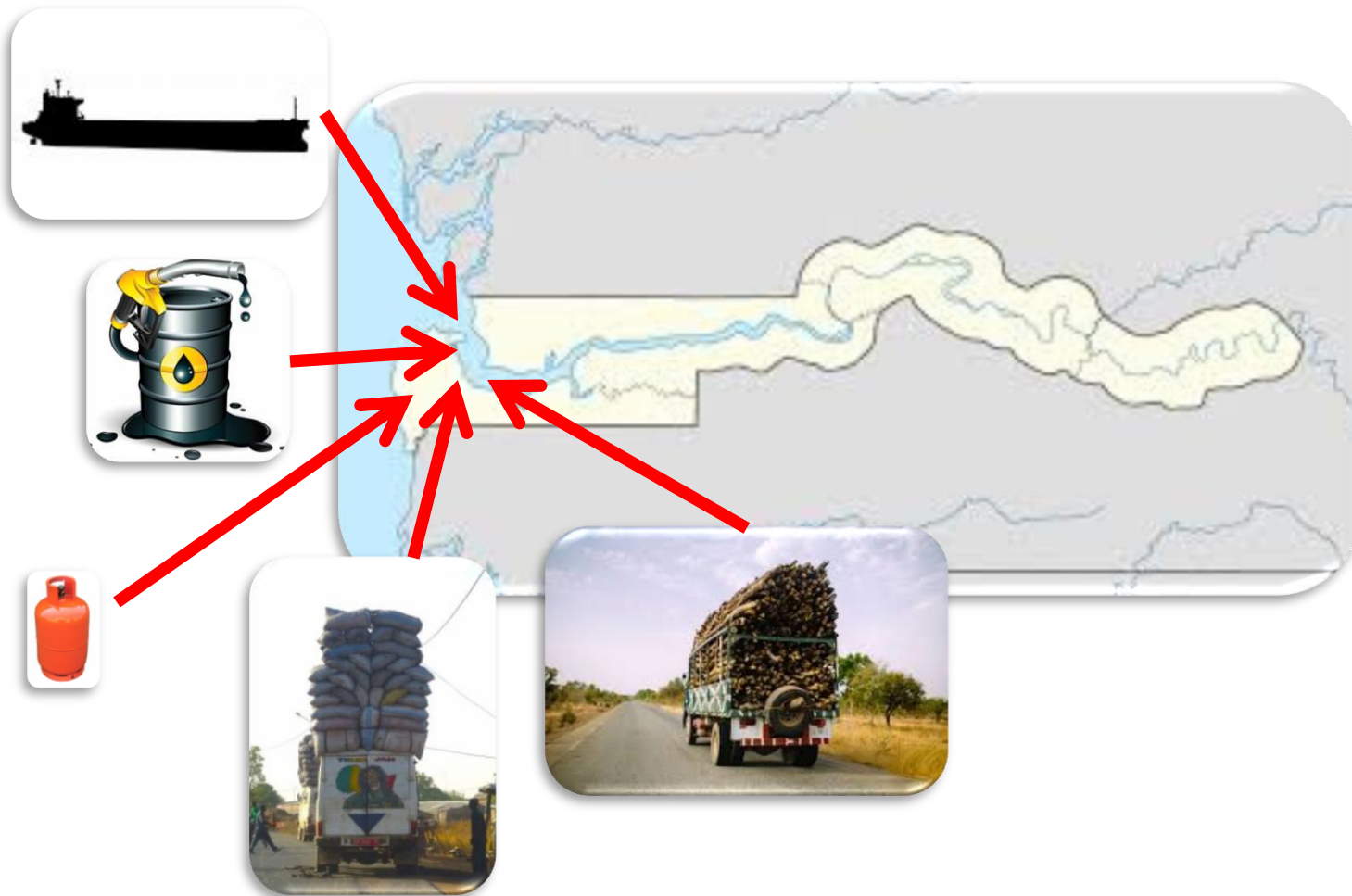
by

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PURA

Presentation

- Historical perspective
- Legal & Regulatory
- Recent Projects by different sectors
- Lessons Learnt

Energy In-dependence?



1980s – 2000s

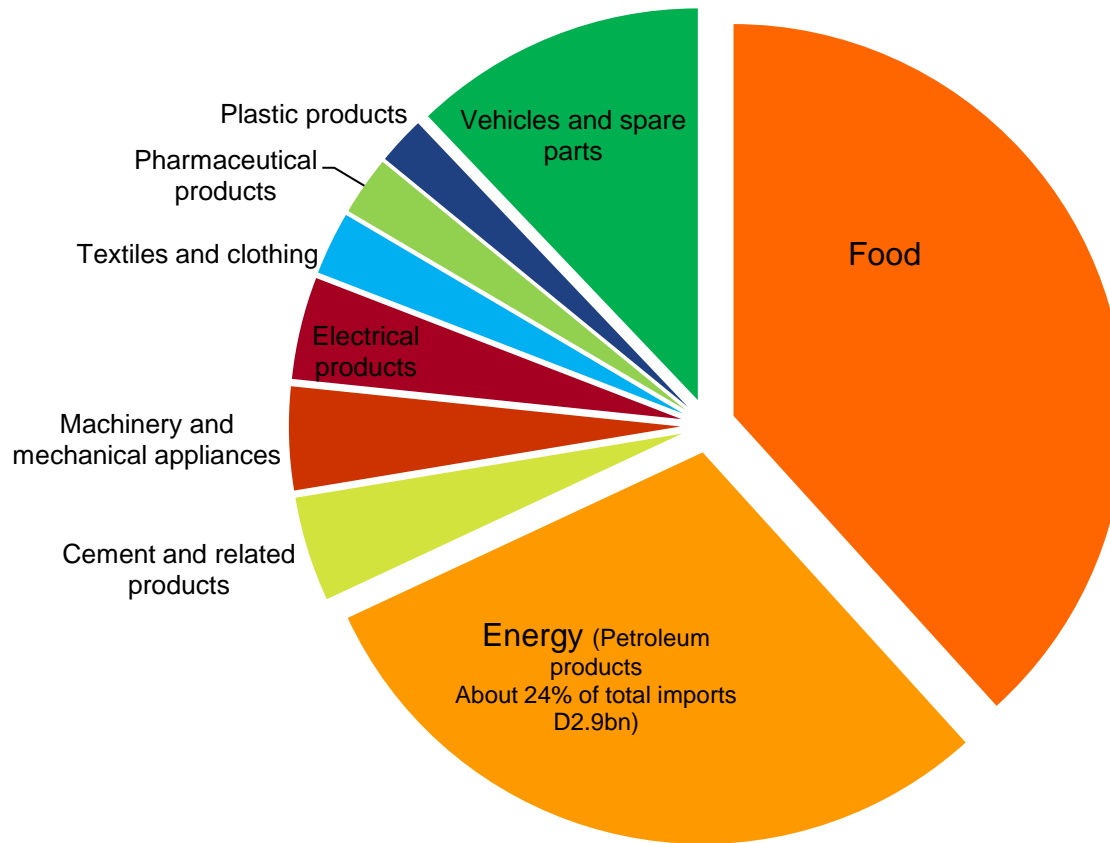
- RE solar used mostly for water pumping
- Rural water supply projects
 - DWR
 - GAMTEL repeater towers
- Very little home use
 - Solar PV was expensive (**\$7-8/Watt**)
 - Solar thermal was expensive and bulky too
 - Wind water pumping for irrigation

Early uses of RE in The Gambia



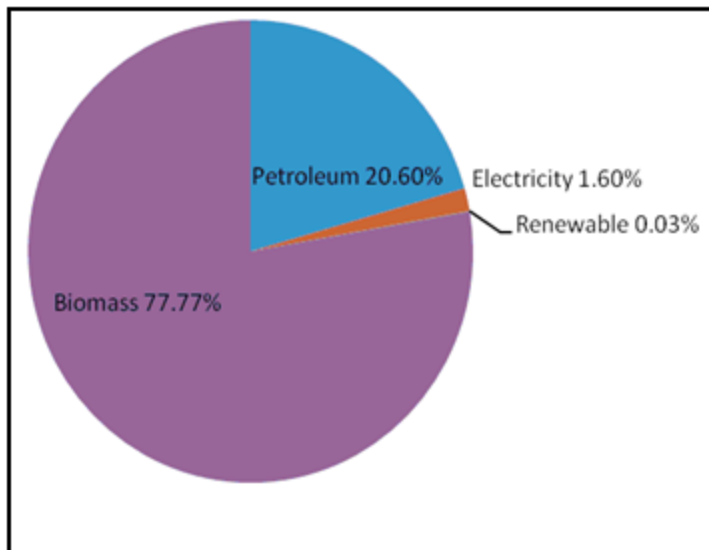
Oil Burden

Main Imports 2013

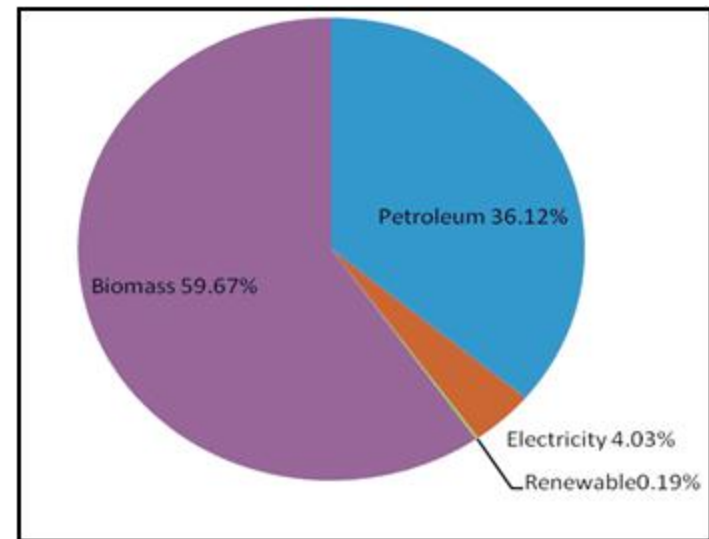


Energy Balance – (2000 – 2010)

2000



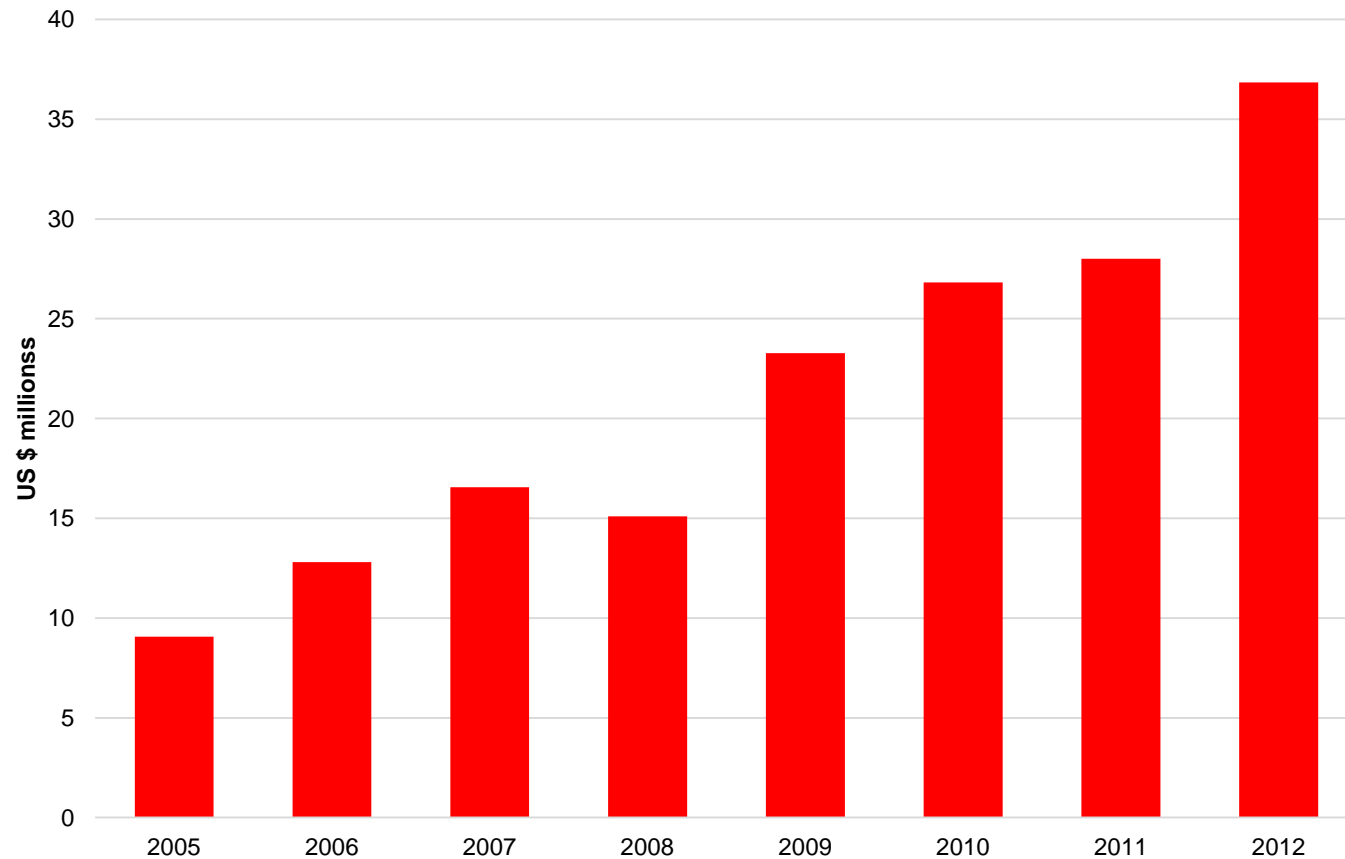
2010



Source : RRA, 2013/ MOE

Cost of Electricity Production

HFO Import Costs



Evolution of Electricity Tariffs

Electricity Services (GBA and Provinces)

	2003 Prices D/kWh	2010 Price D/kWh	PURA Approved Tariff 2011	% Increment	Approved Tariffs 2012 D/kWh	% Increment	Approved Tariffs 2015 D/kWh	2016 Tariffs US ¢/kWh	% Increment
Domestic	2.80	6.18	7.2	16.50%	9.10	26%	10.14	0.25	11
Commercial	3.90	7.20	8.6	19.44%	9.70	13%	10.90	0.27	12
Hotel s/ Clubs / Industries	4.30	7.60	8.9	16.99%	10.40	16%	11.65	0.29	12
Agriculture	3.74	7.20	8.0	11.11%	9.10	14%	10.14	0.25	11
Area Councils	3.75	7.20	8.7	20.83%	9.70	11%	10.90	0.27	12
Central Government	3.75	7.20	8.7	20.83%	9.70	11%	10.90	0.27	12

US \$1 = D40

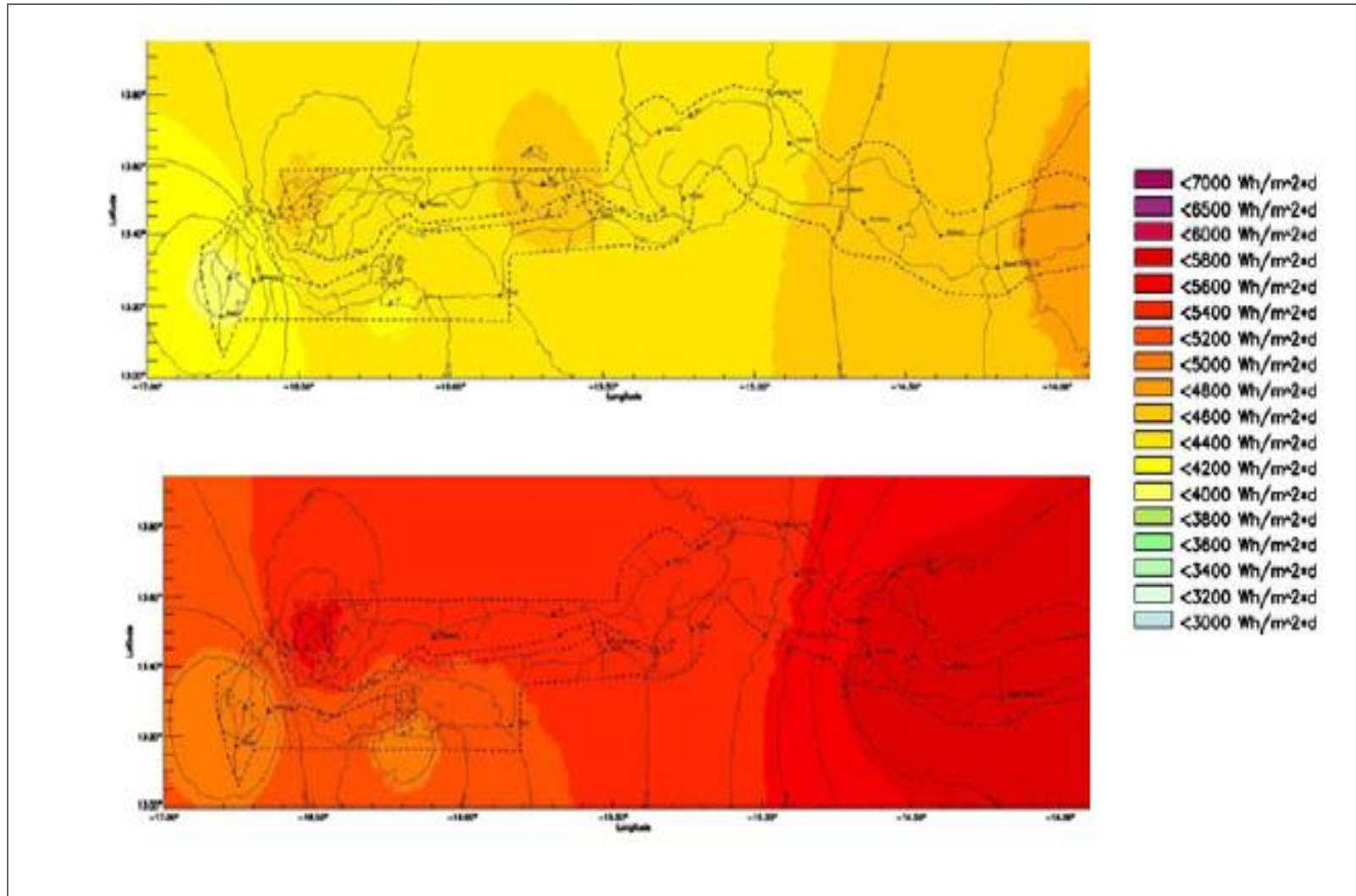
2005 -2010

- Energy Policy shifts
 - More recognition of RE
- Rising cost of electricity
 - High oil prices US\$ 80 – 110 / bbl
 - Reliability issues
- Declining cost of solar PV
- Availability of used turbines
 - More solar companies registered in The Gambia

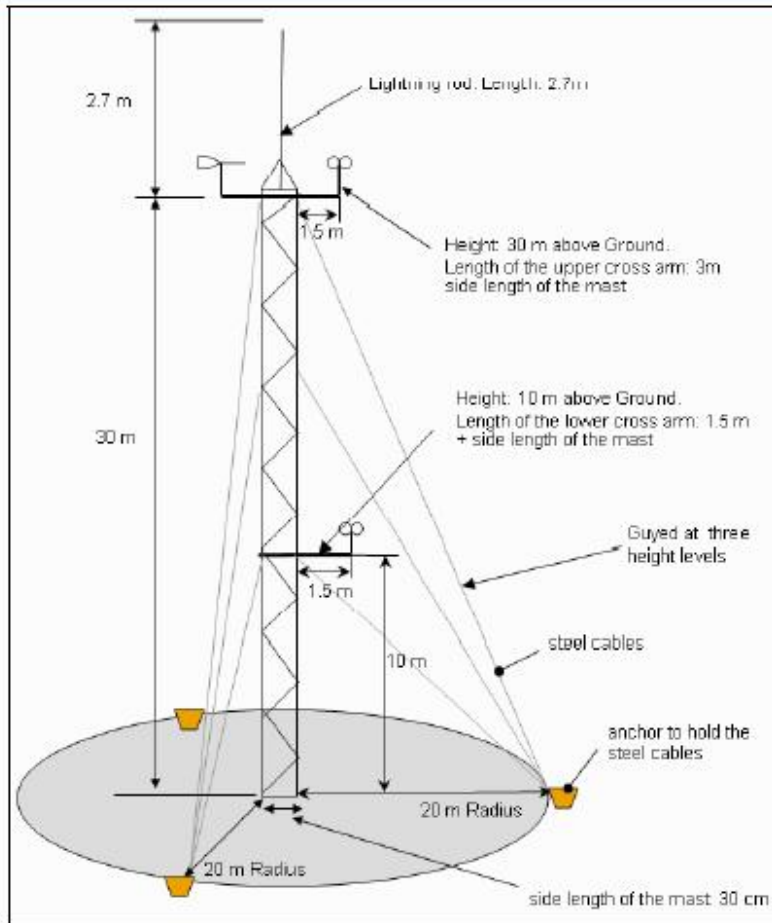
Renewable Energy Masterplan

- 2005 14-month study funded by ADB
 - Wind and solar measurement
 - 8 sites were chosen
 - Measurement for wind at 30m
- Results
 - Moderate wind speeds (coast)
 - Good solar irradiation

Solar Map for The Gambia

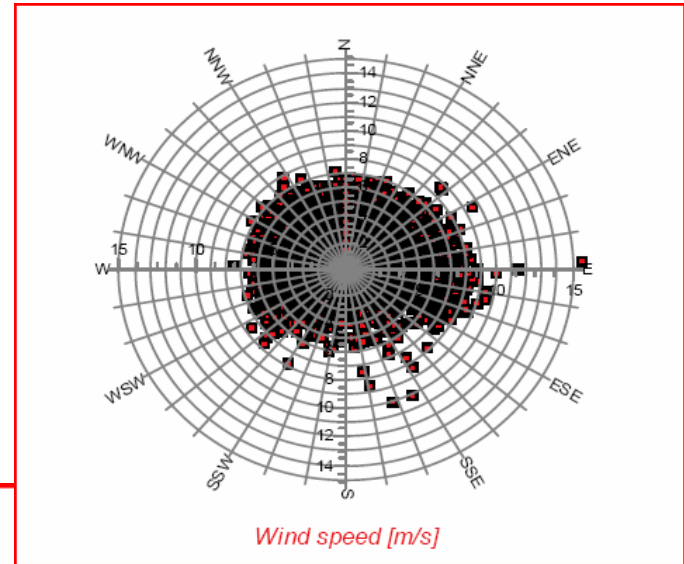


Wind Energy Measurements

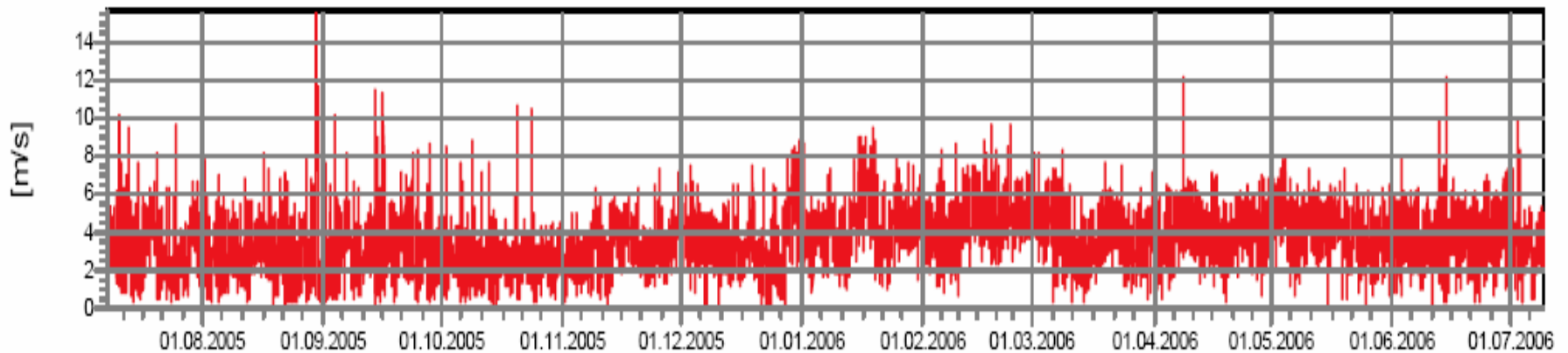


Wind Energy

- Modest wind resources
- Mostly along the coast
 - Two pockets inland



Wind speed



2010 – 2015

- Real concrete Projects
 - Utility scale
- Availability of grant funding
- Poor reliability of grid power
- Increasing penetration of high quality Chinese PVs
 - Very cheap solar panels
 - Access to Chinese made solar PV/ water heaters etc
 - Avgr. Gambian retail prices now at **US \$1.4/ Watt!!!!** (2015)
- Sharp increases in electricity tariffs
 - Fuel costs also increased from D28/L to D57

LEGAL & REGULATORY FRAMEWORK

- i. Policy
- ii. Legislation
- iii. Incentives

National Policy

- National Energy Policy
 - RE & EE prominently part of Strategic goals
- SE4ALL documents and Investment Proposal
- NREAP (with ECREEE)
 - National Targets set
- NEEAP

Legal and Regulatory Framework

- **RE Act** enacted in December 2013
- Objective: to promote the use of RE resources to achieve greater energy self reliance and thus reduce:
 - Exposure to fossil fuels
 - Harmful emissions
 - Demand burden currently on NAWEC

Key Provisions in RE Act 2013

- Establishment of RE Fund
- General Incentives for RE Facilities
- Streamlining the permitting process
- Adequate training for installers of RE Equipment
- Development of Feed In Tariff Rules (FIT)

Establishment of RE Fund

- A requirement under the Act – for promotion, development, sustainable management and utilisation of RE Resources
- Key emphasis on community based projects
- Funding
 - Funds appropriated by Natl. Assembly
 - Application Fees collected from RE Applicants
 - Donations, grants and gifts for RE Activities

RE Fund – May 2016

- Account opened with CBG
- D1m deposited by MOE
- Awaiting D1m from MOFEA
 - Interest subsidy scheme
 - 6 Banks shown interest + 2 microfinance agencies

R.E Fund Schemes

- Funding Considerations
- Three Initial Schemes
 - Interest / Investment Subsidy Scheme
 - Bank & Micro Finance Collaboration
 - Renewable Heat Program
 - Displace electric/diesel heating
 - Community Based Projects
 - Community/ Donor Backed / NGO etc

Target Technologies

Solar Home Systems



~D60,000

Solar Thermal Systems



~D25,000

RE Facilities -General Incentives

- Exemption from paying import tax and duty
- Corporate tax exemption – 15 yrs from commissioning
- Exempted from VAT and retail tax – 15 years from commissioning
- Proceeds from sale of carbon emission credits exempt from sales taxes

Streamlining the Permitting Process

- MoE to coordinate with other authorities in developing streamlined permitting process
eg:
 - Environmental Impact Assessment (EIA)
 - Land use
 - Water use
 - Construction permits
 - Issuance of licences

Streamlined Permitting for RE – max 60 days / 1.5MW projects

Step	Description	Duration
1	GIEPA reviews application and considers for SIC	2 weeks
2	NEA Accesses Environmental Impact	21 days
3	Investor negotiates PPA prices with NAWEC based on standard PPA.	2 weeks
4	PURA evaluates application package	1 week
5	PURA forwards application to the Hon. Minister. Decision conveyed to application	18 days

For systems < 20kW no licensing required

REAL PROJECTS IMPLEMENTED PUBLIC & PRIVATE

- i. Tourism
- ii. Education
- iii. Industrial
- iv. Household
- v. Public lighting

Kombo Beach (Novotel) 2007



Grid Connected Renewable Energy

Community Driven Wind Project 2009



Batakunku

- First grid –tied system
- Hugely successful
- Increased income
 - VDC licensed
 - Operated like a company
 - 80 households connected
 - Cell Phone towers charged commercial tariffs
- Business Start-ups
 - Welders, salons (3)
 - Barber
- Village borehole from own funds
 - Free water to community
- Tariff in 2009 was D2/kWh! (D6.18/kWh)

GAMWIND Ltd

700,000kWh



15/8/2012 18:41

Skills Transfer / Know -how



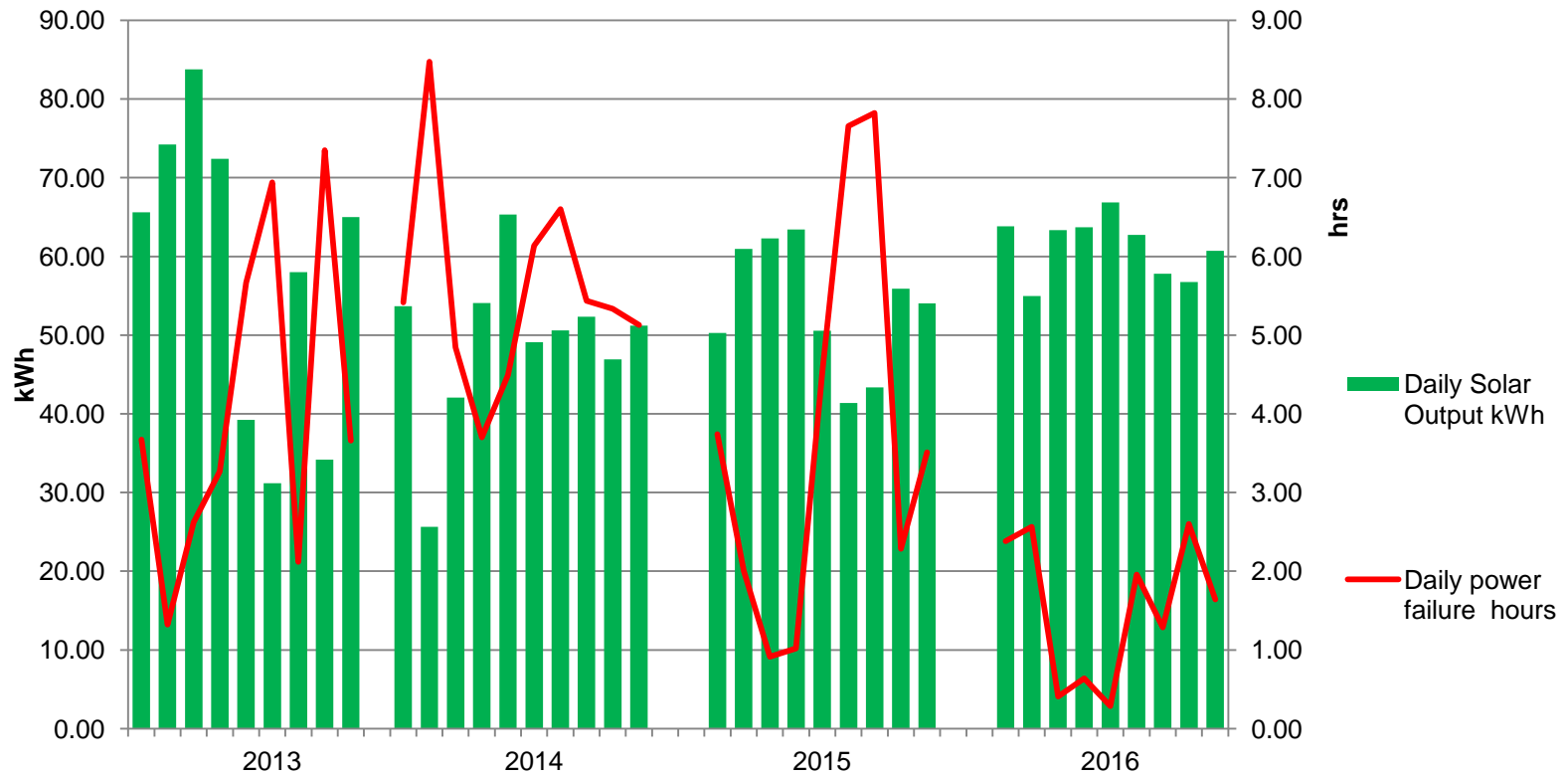
Grid Tied (Net-metering) 2013

- Allow small LV producers to be connected
- 20kW solar PV installed @ Hotel
 - 20,000 kWh , 1yr
 - Helps reduce bill
 - Grid reliability issue
 - Huge Solar potential

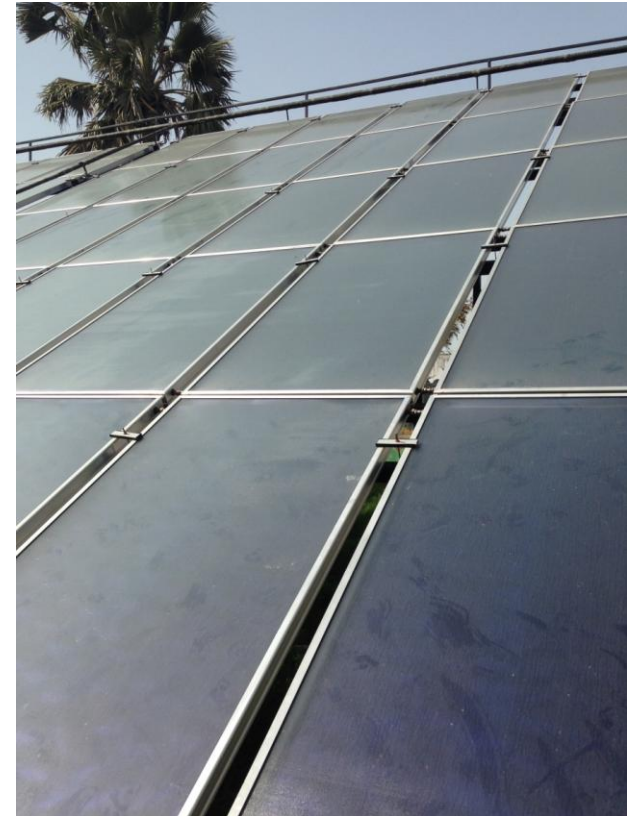


Leo's Hotel Production

Impact of Power Outages on RE (solar) Production



Large Scale Solar Water Heating (2013) – Senegambia Hotel



- Saving 250L (~D15,000) of diesel /day!!!

60 kW Solar PV (Off-grid back up)



56 Rooms:

On season 1/3 of Demand met by Solar

Off Season >1/2 of demand met

Savings **D10,000** /day before Solar

Now **D5000 / 2-3 days!!!**

However maintenance by local staff

System continuously monitored online –Spain

Expansion by additional 50%

Lemon Creek Hotel

- Currently using solar / electric boilers (300L) for each block
- Planning to use more solar thermal
 - Electric at night
 - expensive



20kW Grid Tied Solar 2016



- 20kW grid tied Women's Skill Centre
 - Youth empowerment and 100% renewable.

Utility Scale Hybrid Mini Grid

- Kaur – electrified in 2006/2007
- Rapid rise in peak load and energy demand
- 200kW diesel gen-set
 - US \$0.70¢/kWh
 - Subsidised by harmonised national tariff
 - Un-sustainable

Kaur 60 kWh hybrid system



Commissioning Issues: inability to synchronise with diesel genset
National Electrification has linked Kaur with regional Capital

Lessons Learnt

- Strong interest from Hotels
 - RE heat
- RE (Solar) still requires support but <30%
 - Public / community projects
- Solar is very competitive
 - Reliability
 - Despite reduction in fuel prices
- Grid Tied Systems
 - Becoming more popular
 - kWh/kWh to offset NAWEC costs

Major Challenge & Way Forward

- Poor Design/ Installation
 - Bad installations
 - Dissatisfaction by many consumers
 - Sub-standard equipment
- Lack of modern techniques especially with Grid Tied systems
 - Programming SMA inverters
- Delay in FiT
 - investors

Future

- Encourage more grid tied systems
- National Solar thermal programme
 - Especially for hotels
- Launch RE Fund
 - Mid June
 - National window for all RE funding
 - Centralised application

Thanks
see@pura.gm