



The Botswana Electricity Situation

A TRAIL ON CLEAN ENERGY DEVELOPMENT FOOTPRINT

Presenter
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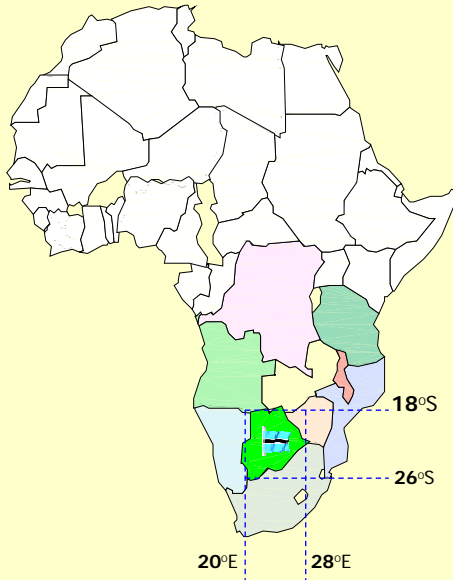


Presentation Breakdown

- 1 Introduction  Including some country statistics
- 2 The Energy Situation  Electricity Demand-Supply
Electricity imports
- 3 Remedial Developments  Energy efficiency, DSM Programmes
 RE-based Electricity plans
 CDM initiative
- 4 Challenges  Poverty alleviation
 Local capacity
 Data for Energy planning
- 4 Role of the CSRSE  Strategic CET Research
- 5 Conclusions  Collaborative links



INTRODUCTORY STATISTICS



CIA Factbook

Population: 1,84 million
GDP (PPP): \$25.68 Bi (2007)
GDP (of. X rate): \$12.31 Bi ('07)

Area > France

Economy:

Agriculture: 1.6%,
Industry : 51.5%
(Of which mining: 36%)
Services: 46.9%

Human Development Index
(HDI) ranking: 122



INTRODUCTORY STATISTICS

Coal Reserves:

Estimated:
212.8 Billion Tons

Exploited:
Sparingly at Morupule

3200 sunshine hours
per year on
average

**Moving Towards
Clean Energy
Technology
(CET)**



What is the Supply Situation?

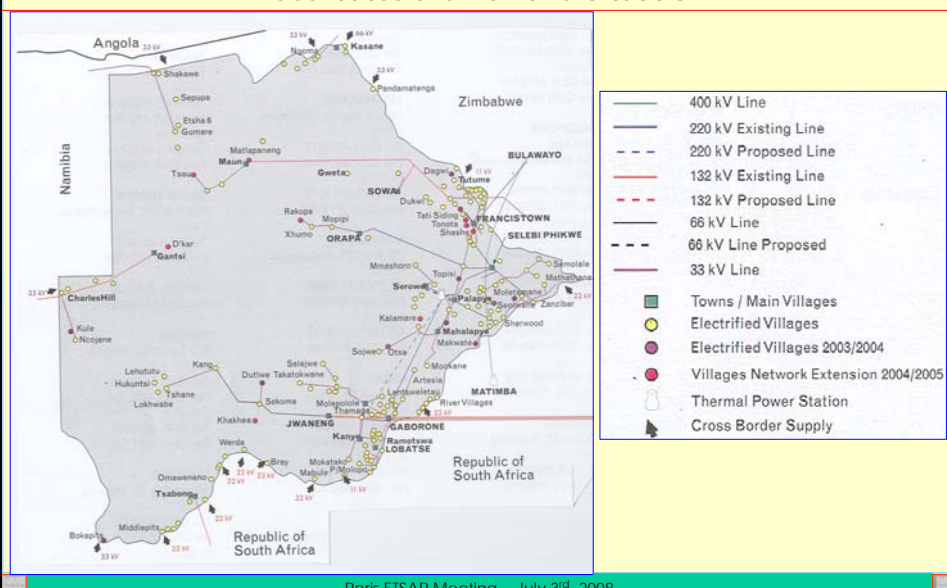
Single 132MW Coal-Fired Thermal Power Station at the Morupule

- ❑ 132MW,
 - ❑ Total Demand is ~ 500MW
 - ❑ Local generation satisfies ~ 30% of the total demand
 - ❑ Approximately 70% imported from mainly South Africa and some from Mozambique
 - ❑ Import arrangements on renewable contractual terms
 - ❑ Last contract with SA expired in 2007, mainly due to electricity constraints in South Africa
- (Rural electricity programmes, Olympic Games 2010 etc)
- ❑ Current demand exceeds supply



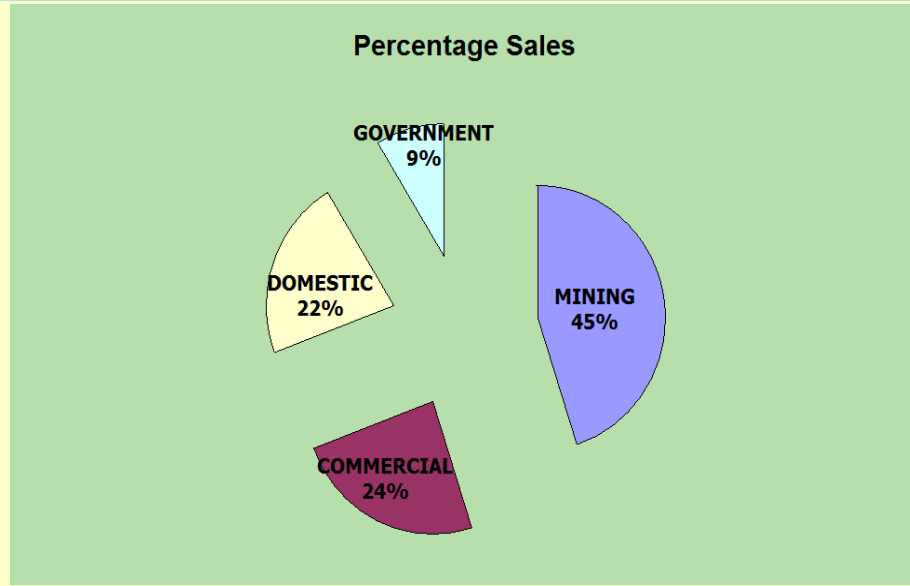
RURAL ELECTRIFICATION PROGRAMME

Exacerbates the Demand Situation





Electricity Sales in 2006 (2006 Annual Report)



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ELECTRICITY IMPORT CONSTRAINTS

Source: BPC

SOURCE	QUANTUM	REMARKS
Morupule Power Station	90 MW	Gen. Trans Repairs - June 2008 Turbine Shaft Repairs - May 2008
ESKOM (South Africa)	350 MW - 2008 350 MW - 2009 250 MW - 2010 150 MW - 2011 150 MW - 2013	5 Year stepped Reduction Mandatory 10% Reduction on 2007 Profile. (Max imports limited to 315 MW)
HCB (Mozambique)	Up to 50 MW	1 Year Renewable Supply Agreement Transmission Limitations in ZESA
EDM (Mozambique)	Up to 40 MW	1 Year Renewable Supply Agreement Not Available at Peak (1700- 22:0Hrs)

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CONSEQUENCE

Frequent Load-shedding,

Loss in Revenue:

Example:

During a brief country-wide blackout in May 2005, Loss of revenue loss at Jwaneng mine alone estimated : P13Mi before the mine's stand-by generators was run up to operational speed

Hence load shedding confined mainly to the residential sector.



IMPACT OF LOAD SHEDDING ON THE ECONOMY Source: BPC

(Energy not delivered to customers in January and February 2008)

Period	Un- Served Energy (Load Shedding) (MWh)	Revenue Loss to BPC (Pula)	Cost of Un-served Energy (Pula)
January	2 257	647 759	45 365 700
February	1 340	384 580	26 934 000
Total	3 597	1 032 339	72 299 700

TIME VALUE OF ELECTRICITY?
OPPORTUNITY COST FOR PROMISED BUT NOT DELIVERED ELECTRICITY!



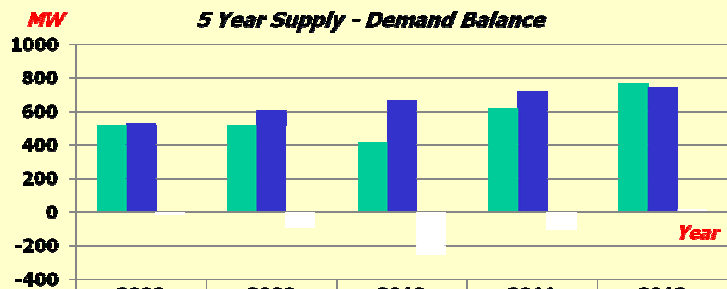
REMEDIATION - TIMETABLE FOR MORUPULE B COMMISSIONING

Source: BPC

DATE	UNIT 1 (MW)	UNIT 2 (MW)	UNIT 3 (MW)	UNIT 4 (MW)	Total (MW)
Mar 2011	150	0	0	0	150
June 2011	150	150	0	0	300
Sept 2011	150	150	150	0	450
Dec 2011	150	150	150	150	600



WHAT IS THE SUPPLY-DEMAND OUTLOOK UP TO 2012?



	2008	2009	2010	2011	2012
Total Supply	520	520	420	620	770
Demand	530	610	670	720	750
Surplus / Shortfall	-10	-90	-250	-100	20

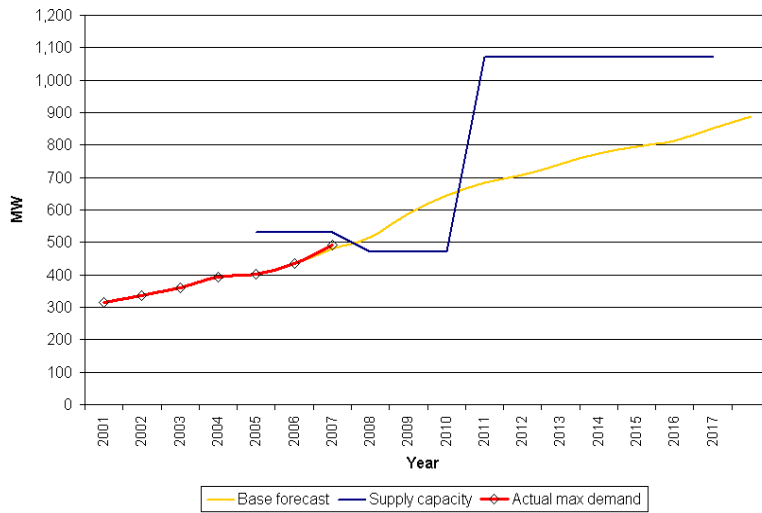
Assumptions

- Morupule & Eskom At Maximum Level in Each Year
- HCB Imports at 50 MW up to 2012
- EDM Supply Not Available at Peak (Not Included)
- Morupule B Phase 1 Time Frame as in Next Slide



OUR WORLD BEYOND 2012

Maximum Demand forecast compared to actual demand



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REMEDIAL PROGRAMMES

New Plant – In progress

Clean Coal Export Power IPP Plant

Energy-management
principles
Underpinning
the design and operation of
Buildings,
Leverage awareness on EE
among professionals,
Stir awareness in energy-
conscious building design
and operation

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REMEDIAL PROGRAMMES

DSM Programmes –in Progress/Planned

CFL Project
Load Shifting targeting water heating
Demand Market Participation
NEEC / Power Alert
Power Conservation Program (PCP)
Tariff Restructuring



REMEDIAL PROGRAMMES

Energy Conservation targeting the Building Sector

DANIDA Consultancy

TASKFORCE 2
Building Design and Operation
 Energy-management principles
 Underpinning the design and operation of Buildings,
 Leverage awareness on EE among professionals,
 Stir awareness in energy-conscious building design and operation

TASKFORCE 2
Energy Efficiency Guidelines
 Develop control codes, regulations and incentive instruments for promoting Energy-efficient practice

TASKFORCE 3
Knowledge & Skills
 Develop energy management curricula for technical colleges and the University of Botswana



REMEDIAL PROGRAMMES

Rural Solar PV Electrification Programme

REbotswana

Funded by UNDP/GEF

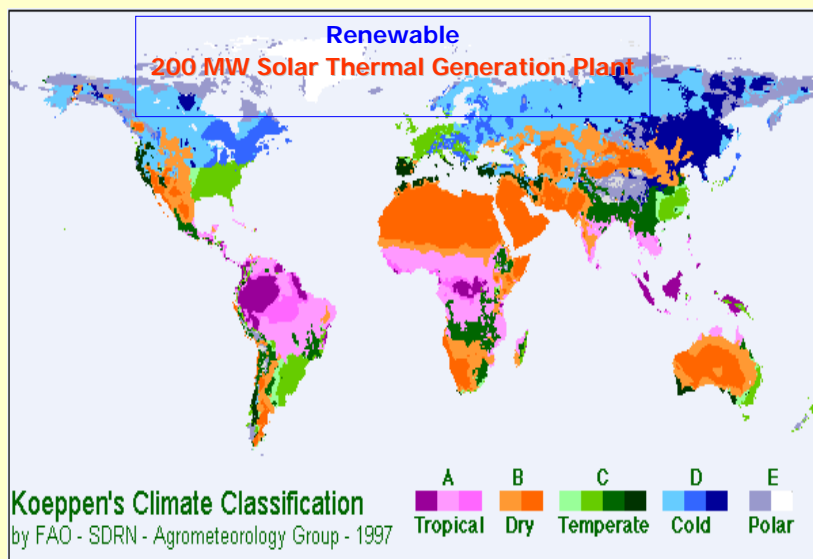
**Augments the Grid
Electrification**


**Corrects some misgivings of
the earlier Rural PV
Electrification Masterplan
(JICA)**



REMEDIAL PROGRAMMES

New Solar Thermal Power Plant - Planned

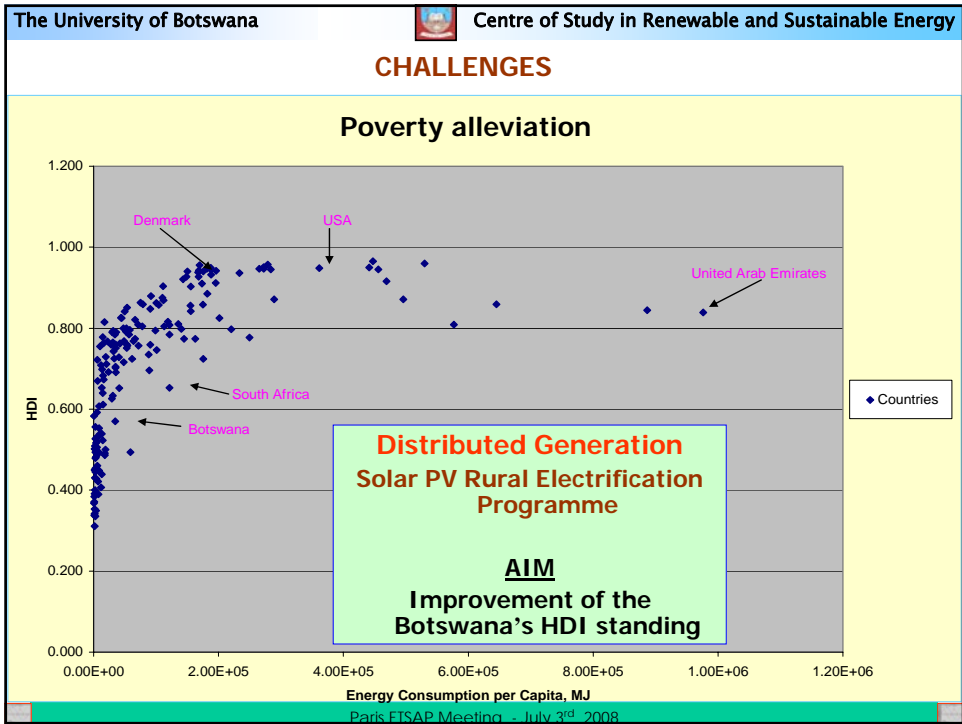


The University of Botswana  Centre of Study in Renewable and Sustainable Energy

REMEDIAL PROGRAMMES

The CDM Initiative

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CHALLENGES

Lack of Local Capacity

E.g. Energy Panning
IEA Training
MAED/MESSAGE

TIMES



ROLE OF THE CSRSE

The Centre of Study in Renewable and Sustainable Energy (CSRSE)

Established to conduct strategic
Energy Research

Example

Establish a

- Reliable Energy System for Botswana
- SAPP Energy System for Botswana



Conclusions

Botswana has embarked on tangible projects and Programmes making a mark on the ground on

Clean Energy Technologies

When all plans are implemented,

Botswana can expect to have:

1. Secured its electricity supply,
2. Done away with vulnerabilities brought about by electricity imports
3. Extended essential benefits to its rural communities
4. Earned substantial revenues through pCDM
5. Boosted its sustainable development aspirations



Expectations

The CSRSE

is

open to best-practices

and

experiences of partners engaged in similar business.

We seek for and wish to extend collaborative links.

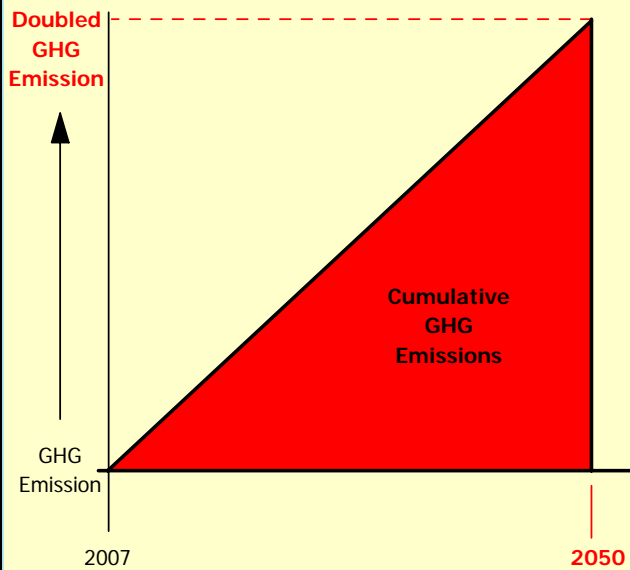
Thank you already now for being our partner



Thank You!



GHG Emission Predictions



IPCC
Predictions:

GHG emissions shall Double
Their current
values
between
now and 2050
if nothing done



THE CET SOLUTION

(Steve Pacala – Stanford University)

