Energy, Water and Sanitation Authority- Rwanda

Energy Policy
Japan Tokyo, July 2011

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Presentation Outline

- Country overview
- Electricity subsector
  - Investment guiding documents
  - Short and Medium term strategic papers
- EWSA overview
- Demand forecast by 2017
- Overall target by 2017
- Internal and Regional Investment environment
- Challenges and Recommendations

End
Country overview
- Rwanda is a land locked country in central eastern Africa borders; DRC, Burundi, Uganda and Tanzania
- Population: 10,117,029
- Land area (Square km): 26338
- GDP per capita: 520USD (2009 data)
- Average Temperature: 24.6 - 27.6ºc
- Currency: Rwandan franc (RWF)
ENERGY SECTOR

Investment guiding documents
- Electricity Law
- National Energy Policy and National Energy Strategy
- Electricity Master Plan 2009-2025

Short and medium term strategic papers
- Investment Prospectus 2009-2013 (for EARP)
- Electricity Development strategy for the energy sector: 2011 – 2017
EWSA overview

- Installed and the imported capacity are 82.77MW and 16MW respectively.
- Peak demand 69MW.
- The HV transmission lines are 110 kV, 70kV and have in total 391.387km.
- The network has 18 substations.
- The network is monitored by SCADA System
## Overview Continues

<table>
<thead>
<tr>
<th>Projects</th>
<th>Current status (2011)</th>
<th>Targets/2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access</td>
<td>• 4900 Km MV &amp; LV&lt;br&gt;• 13% connections&lt;br&gt;• 90% Health Centers&lt;br&gt;• 26% Schools&lt;br&gt;• 90% Administrative Centers</td>
<td>• Additional of 1400Km of MV &amp; LV length&lt;br&gt;• 50% connections&lt;br&gt;• 100% Health Centers&lt;br&gt;• 100% Schools&lt;br&gt;• 100% Administrative Centers</td>
</tr>
<tr>
<td>GENERATION TYPE</td>
<td>GENERATION CAPACITY IN MW</td>
<td></td>
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<tr>
<td>---------------------</td>
<td>---------------------------</td>
<td></td>
</tr>
<tr>
<td>National Installed capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydro</td>
<td>35.85</td>
<td></td>
</tr>
<tr>
<td>Thermal</td>
<td>46.92</td>
<td></td>
</tr>
<tr>
<td>PV</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>Total National Installed capacity</td>
<td>82.77</td>
<td></td>
</tr>
<tr>
<td>Import capacity</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Total (generation +import) capacity</td>
<td>98.77</td>
<td></td>
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</table>
## Evolution of National Offer in KWh from 2000 to 2010

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>National offer</td>
<td>203,862,357</td>
<td>209,350,019</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
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<tbody>
<tr>
<td></td>
<td>235,251,447</td>
<td>204,027,563</td>
<td>192,532,097</td>
<td>230,356,298</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>248,623,363</td>
<td>277,449,623</td>
<td>307,789,939</td>
<td>353,228,826</td>
</tr>
</tbody>
</table>
EVOLUTION OF NATIONAL OFFER IN KWH FROM 2000 TO 2010
DISTRIBUTION SYSTEM

• Distribution system is composed of 30kV, 15kV, 11kV and 6.6kV lines
• Low voltage distribution is composed of 0.4kV lines

<table>
<thead>
<tr>
<th>Year</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Energy losses</td>
<td>22</td>
<td>18</td>
<td>18</td>
<td>20</td>
<td>19</td>
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</tbody>
</table>
## CUSTOMER EVOLUTION

<table>
<thead>
<tr>
<th>Year</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customers</td>
<td>48,581</td>
<td>57,679</td>
<td>67,008</td>
<td>68,314</td>
<td>70,187</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customers</td>
<td>77,181</td>
<td>86,537</td>
<td>109,502</td>
<td>142,497</td>
<td>186,487</td>
</tr>
</tbody>
</table>
**BILLING**

- All low voltage (0.4kV) customers use prepayment Energy meters known as Cash Power.
- All big customers (Medium voltage) are equipped with electronic meters with a GPRS and indexes are collected by the billing officer at his/her office.
- Electricity grid audit is undertaken for the reduction of the losses.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>2009</th>
<th>2010</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>BILLING</td>
<td>38,282,956,140</td>
<td>44,286,253,018</td>
<td>6,003,296,878</td>
</tr>
</tbody>
</table>
Overall targets by 2017

By 2017, Rwanda intends to have 50% electricity access connectivity and electricity production of 1000 MW
Targets and investment opportunities directory

links:

http://www.rdb.rw/about-rwanda/economy.html

http://www.ewsa.rw/projectsreco.html

Electricity Master Plan 2009-2025 and
Electricity strategic plan for the energy sector:
2011 – 2017
Internal and regional investment environment

- Political will, electricity and energy infrastructure considered GoR priorities
- Clear roadmap strategic papers/documents
  - Vision 2020
  - EDPRS
- Belong to Two strong regional economic bodies i.e. EAC and CEPGL
- Embarked on
  - regional interconnection of electric grids and
  - exploitation of shared resources (Hydro and Gas)
The energy policy objectives are to support national development through:

- ensuring the availability of reliable and affordable energy supplies for all Rwandans;
- encouraging the rational and efficient use of energy;
- establishing environmentally sound and sustainable systems of energy production, procurement, transportation, distribution and end-use
Energy efficiency approach

- CFLs promotion programme
- Solar Water Heaters (SWH)
- Promotion of use of Liquefied Petroleum Gas (LPGs)
- Promotion of Energy Audits in Industries
EDPRS CFLs promotion programme (2008-2012): implications

- Number of lamps: 800,000 lamps
- 1 lamp CFL of 20 watts is equivalent to 1 incandescent lamp of 100 watts, there is Saving of 80 W
- Per day: 80w × 4h/d = 320 Wh/day
- Per year: 320wh/d × 365 d × = 115 kWh/y
- Foreign exchange savings for 1 CFL: 115 kWh × 132 frw = Rwf 15,180
- For 800,000 CFLs savings = Rwf 12 Bn or 22,000,000 $/year
- Savings over the EDPRS period: US $ 88mil

- Targeted 5000 hhs should be using SWH
- On average 5000 SHW are equivalent to 10 000 m2 of Solar
- Collectors= 1000 ToE/y
- Energy saving: 11,000 MWh/y
- Indirect foreign currency savings: 11000 MWh/y x 132000 Frw/Mwh = Rwf
- 1,45 Bill/yr
- Savings over the EDPRS period: Rwf 5.8 Bill = US $ 10.56 mill
EDPRS LPG promotion programme (2008-2012): implications

- Programme: LPG: 5,000 tons /y : (about 20,000 households)
- 5,000 tons = 250,000 bottles of 20 kgs
- Consumption: 1 bottle/hh/month x 12 = 12 bottles/hh/y
- Number of hhs targeted by 2012 = 30,000 hh
- 30,000 hh x 12 bottles x 4 years = 1,440,000 bottles = 28,800 tons
- LPG consumed within the EDPRS period = 28,800 tons
- This would replace 190,080 tonnes of charcoal or 1,900,800 tonnes of wood
Promotion of Energy Audits in Industries

Most industries in Rwanda do not give the necessary weight to the use and management of energy. Annual energy audits of the industries will allow us to know the energy consumption of the industry and be able to recommend areas of saving by examining the whole industrial production chain. The programme also aimed at Sensitization campaigns on the efficient use of Energy in industries.
Achievements

- Distribution of CFLs has tremendously been achieved
- Reduction of network losses from 35% in 2002 to 19% in 2010 commercial being only between 5-7%
- Solar water heater adopted last month (April 2011)-creation of Revenue PU
- Deal to connect 300 secondary schools with PV panels-Pilot project
Challenges

- National Energy Policy and National Energy Strategy is still a draft not gazetted or approved yet
- Companies don’t understand the importance of energy efficiency
- Still depend on HFO and LFO as source of electricity (almost 50% of the total production)
- The country’s main focus today is to satisfy demand and increase connection rates, but supply is still low due to lack of diversification of energy sources.
Cont’n

- Financial mobilization and Resource allocations
- High tariff of electricity due to production cost. Rwanda is among countries that has highest tariff rate (cents 20 $/kwh)
- Determination of tariffs for IPPs (Independent Power Producers)
- Lack of adequate technical and financial capacity for private sector in energy sector
Recommendations

- Setting up a clear energy efficiency and conservation policy-2008-2012 need to be amended and adopted

- Carry out Regular energy audits and give incentives to the companies with good energy saving and conservation mechanisms

- Speed up the generation of other resources like geothermal, methane gas, biogas, solar, peat, to reduce the cost of electricity; - i.e. Methane Gas (300MW), Geothermal (310MW), Hydro (230MW), Peat (200MW)
End

Thank you

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