Modern Techniques including Renewable Energy Auctions for Economizing Renewable Energy Tariff

Pakistan Presentation
1. Power Sector Overview
2. Tariff Mechanism in Pakistan
3. Competitive Bidding Mechanism
4. Reverse Auction Mechanism
POWER SECTOR OVERVIEW

- **1947-58**: Localized generation and distribution of power
- **1958**: Water and Power Development Authority
- **1982**: Provisional Electricity Departments were transferred to WAPDA and accordingly Area Electricity Boards (AEBs) were established in 1982
- **1992**: Independent Power Producers (IPPs)
POWER SECTOR OVERVIEW

1997
1998
2002
2006
2015

Power Policy 2002
RE Policy 2006

Power System Planning
National Transmission and Despatch Company (NTDC)
POWER SECTOR OVERVIEW

POLICY MAKERS
- Government of Pakistan | Provincial Governments | Planning Commission | Ministry of Energy

REGULATOR
- NEPRA

MARKET OPERATOR
- CPPA-G

SYSTEM OPERATOR
- NPCC

GENERATION
- WAPDA | GENCOs | IPPs | PAEC

TRANSMISSION
- NTDC

DISTRIBUTION
- LESCO | GEPCO | PESCO | SEPCO | HESCO | IESCO | MEPCO | FESCO | IESCO | TESCO

ELECTRICITY MARKETS
- Under development phase – coming soon
### Current Scenario

<table>
<thead>
<tr>
<th>FUEL TYPE</th>
<th>CAPACITY (MW)</th>
<th>Percentage Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro</td>
<td>7,244</td>
<td>24%</td>
</tr>
<tr>
<td>Furnace Oil</td>
<td>7,185</td>
<td>24%</td>
</tr>
<tr>
<td>HSD</td>
<td>451</td>
<td>1%</td>
</tr>
<tr>
<td>Coal</td>
<td>2,690</td>
<td>9%</td>
</tr>
<tr>
<td>Gas</td>
<td>5,996</td>
<td>20%</td>
</tr>
<tr>
<td>RLNG</td>
<td>3,651</td>
<td>12%</td>
</tr>
<tr>
<td>Nuclear</td>
<td>1,345</td>
<td>4%</td>
</tr>
<tr>
<td>Bagasse</td>
<td>296</td>
<td>1%</td>
</tr>
<tr>
<td>Solar</td>
<td>400</td>
<td>1%</td>
</tr>
<tr>
<td>Wind</td>
<td>937</td>
<td>3%</td>
</tr>
</tbody>
</table>

**TOTAL INSTALLED CAPACITY**: 30,195 MW

PEPCO System: Installed Capacity as of 19-04-2018
POWER SECTOR OVERVIEW

- Hydro
- Furnace Oil
- HSD
- Coal
- Gas
- RLNG
- Nuclear
- Bagasse
- Solar
- Wind

Pie chart showing the distribution of energy sources in the power sector.
POWER SECTOR OVERVIEW

<table>
<thead>
<tr>
<th>Voltage Level (kV)</th>
<th>Transmission Length (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>5,127</td>
</tr>
<tr>
<td>220</td>
<td>10,063</td>
</tr>
<tr>
<td>132</td>
<td>29,080</td>
</tr>
</tbody>
</table>

PEPCO System FY 2017

<table>
<thead>
<tr>
<th>Voltage Level (kV)</th>
<th>Number of Grid Stations</th>
<th>Capacity (MVA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>16</td>
<td>20,061</td>
</tr>
<tr>
<td>220</td>
<td>55</td>
<td>29,067</td>
</tr>
<tr>
<td>132</td>
<td>645</td>
<td>41,942</td>
</tr>
</tbody>
</table>

PEPCO System FY 2017
POWER SECTOR OVERVIEW

ENERGY GENERATION
108,416 GWh

TRANSMISSION LOSSES (500kV/220kV)
2.3%

DISTRIBUTION LOSSES (220kV/132kV)
19.4%

ENERGY CONSUMPTION
86,763 GWh

TOTAL CONSUMERS
25,571,803

PEPCO FY 2017
TARIFF MECHANISM IN PAKISTAN
TARIFF MECHANISM IN PAKISTAN

STEP 1
- LOI + Feasibility Study by NTDC
- Request

STEP 2
- LOI
- LOI + Tariff + License + LOS
- Request

STEP 3
- LOS
- Tariff + Generation License

STEP 4
- Financial Close
- LOI + Tariff + License + LOS

Project Executing Agency

Tariff + Generation License

IPP

Power System Planning
National Transmission and Despatch Company (NTDC)
TARIFF MECHANISM IN PAKISTAN

The tariffs for IPP projects are determined by National Electric Power Regulatory Authority (NEPRA). There are three ways for determination of tariff for RE power projects on IPP mode:

- Cost-Plus Tariff
- Upfront Tariff
- Competitive Bidding (solicited mode)

Source: http://aedb.org/about-us/staff-directory/31-faq
Cost-Plus Tariff

Cost-plus tariff is one in which RE IPP is paid its actual cost plus an agreed profit. In this mode, the IPP is required to submit a tariff petition to NEPRA for award of tariff for a particular project along with the tariff proposed for the project and supporting documents evidencing the cost.

Source: http://aedb.org/about-us/staff-directory/31-faq
Upfront Tariff

Upfront Tariff is one which is determined and announced by the Regulator based on its own scrutiny and calculations with certain terms and conditions. The project sponsors may accept the Upfront Tariff based on its viability for their project.

Source: http://aedb.org/about-us/staff-directory/31-faq
COMPETITIVE BIDDING MECHANISM
Part III – Conditions of Competitive Bidding*

(1) The Competitive Bidding shall be conducted by the Relevant Agency keeping in view the demand forecasted by national grid company in accordance with the least cost generation plan of each distribution company.

* No. NEPRA/LA/(Leg.)/NCBT-01/6072 dated: 03-MAY-2017
(2) The Relevant Agency may carry out site specific or neutral and technology specific Competitive Bidding.

* No. NEPRA/LA/(Leg.)/NCT-01/6072 dated: 03-MAY-2017
(3) The Relevant Agency may adopt any method of bidding as may be approved by the Authority, which shall be specified in the RFP.
(4) In case the Relevant Agency adopts a reverse bidding method, a Benchmark Tariff shall be approved by the Authority.
(5) Where applicable, the Relevant Agency may reject all bids if the quoted rate is equal to or higher than the Benchmark Tariff.
REVERSE AUCTION MECHANISM
Reverse Auction Mode

SCOPE
TIME

IPPs

MIN. COST

Power System Planning
National Transmission and Despatch Company (NTDC)
THANKYOU

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4th Floor PIA Building, Egerton Road, Lahore.