GCC Interconnection Authority
Interconnecting Our World

Developing Power Trade through the GCC Interconnector

3rd Power Trade Forum

September 28th & 29th, 2014
Yas Viceroy Abu Dhabi Hotel
Abu Dhabi, UAE
Beyond the GCC Power Market 2015-2020

Establishing The Interconnection 2005-2011

Initiating a GCC Power Market 2010-2015

GCCIA Role
GCCIA EFFORTS TO PROMOTE POWER TRADE

- **Platform** to facilitate power trade opportunities (EMMS)

- **Workshops** and training to raise awareness of the issues and benefits of power trade.

- **Visits** to policy makers to get their views and support for power trade initiatives.

- **Policy** changes to promote power trading through the Interconnector *(White paper).*
GCCIA EFFORTS TO PROMOTE POWER TRADE

- Regional forums to address issues that relate to promoting power trading.

*1st Forum on Power Trade Dec 2010*
Power Market initiation Road map

1. Interconnector congested?
   - Shareholders only
     - Trading partners?
       - FULL MARKET IMPLEMENTATION
         - Needs driven by limited capacity

2a. Auctioning
   - Grid Security
   - Fine tune NTC calculation
   - Tarriff structure
   - Time-to-market focus
   - Processes
   - People nominations and authorizations
   - Simple tools
   - Decide on NTC

2b. Automation
   - Settlement
   - Tarriff structure

3. EMMS
   - Automated system
   - Sophisticated tarriff models
   - ...
ENERGY EXCHANGES THROUGH GCC INTERCONNECTION

![Graph showing energy exchanges through GCC interconnection from 2010 to 2013. The graph indicates a trend of increasing unscheduled exchanges from 2010 to 2013, with a peak in 2013. Traded energy shows a decrease over the years.](image-url)
Absence of visibility and awareness of electricity costs and the benefits that can be achieved by power trading;

Energy price distortion due to varying levels of subsidies in GCC countries;

Differences in national energy policies;

Differences in local regulations towards cross-border power trading;

Differences in national power sector structure;

Low number of market participants.
<table>
<thead>
<tr>
<th>GCC MSs National Markets Status</th>
<th>Bahrain</th>
<th>Kuwait</th>
<th>Qatar</th>
<th>Saudi Arabia</th>
<th>UAE</th>
<th>Oman</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulator</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>ECRA</td>
<td>Bureau</td>
<td>AER</td>
</tr>
<tr>
<td>Electricity Law</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Transmission Grid Code</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Distribution Grid Code</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Subsidies Issue</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Authority to Trade</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Need Permission</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Price for Trade</td>
<td>Not ready</td>
<td>Not ready</td>
<td>Need update from QP</td>
<td>Need declaration from Ministry of Energy</td>
<td>As per request</td>
<td>They prices based on subsided fuel</td>
</tr>
<tr>
<td>Wheeling Charges</td>
<td>GCCIA 5$</td>
<td>GCCIA 5$</td>
<td>GCCIA 5$</td>
<td>GCCIA 5$</td>
<td>UAE Summer = 34$ Winter = $</td>
<td>UAE Summer = 34$ Winter = $</td>
</tr>
<tr>
<td>Power Offered</td>
<td>As per request</td>
<td>Not Declared</td>
<td>Full line capacity Price up on Time and quantities</td>
<td>Not Declared</td>
<td>As per request</td>
<td>Not Ready</td>
</tr>
<tr>
<td>CURRENT SITUATION OF THE INTERCONNECTOR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>successfully used</strong></td>
<td><strong>Not used for economic gains</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>for stability and support in around 1100 incidents</td>
<td>through economical trade of energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Utilization Factor around 8%**
Value of Economic Gains that can be Attained through Economic Trading

Optimal Energy Exchanges between the Member States through the GCC interconnection leads to a global reduction of operation and maintenance costs. The corresponding **Present Value of the Energy Exchanges Revenues** is of **1.8 Billion US$**.
What is needed to achieve Economic Trading between MSs?

Economic Energy Exchanges require:

- Coordination of power production between the Member States
- Development of an electricity market process through the GCC interconnection
Trading Opportunities Exist Amongst Member States

Variation in the load curves

Variation in the cost of generation
GCC Member States Demand During Winter Time

- KSA Demand
- KUW Demand
- QAT Demand
- UAE Demand

Graphs showing demand for each state over a 24-hour period.
### Variation in the Fuel Mix and Price

<table>
<thead>
<tr>
<th>GCC Countries</th>
<th>Gas (Million Cubic Meter)</th>
<th>Light Fuel (X 1000 Barrel)</th>
<th>Heavy Fuel (X 1000 Barrel)</th>
<th>Total (X 1000 Equiv. Barrel)</th>
<th>Total Oil Cost at rate 100$ per Barrel (Billion $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAE-Abu Dhabi</td>
<td>30720</td>
<td>2603</td>
<td>1933</td>
<td>168281</td>
<td>16.8281</td>
</tr>
<tr>
<td>Bahrain</td>
<td>5969</td>
<td>*</td>
<td>*</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Oman</td>
<td>6744</td>
<td>17706</td>
<td>*</td>
<td>17706</td>
<td>1.7706</td>
</tr>
<tr>
<td>KSA</td>
<td>42366</td>
<td>86040</td>
<td>186300</td>
<td>528998</td>
<td>52.8998</td>
</tr>
<tr>
<td>Qatar</td>
<td>11127</td>
<td>*</td>
<td>*</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kuwait</td>
<td>21412</td>
<td>10234</td>
<td>38891</td>
<td>163330</td>
<td>16.333</td>
</tr>
<tr>
<td><strong>Total In Equiv. Barrel</strong></td>
<td><strong>660802</strong></td>
<td><strong>117594</strong></td>
<td><strong>227124</strong></td>
<td><strong>1005520</strong></td>
<td><strong>100.552</strong></td>
</tr>
</tbody>
</table>
Trading Opportunities in Winter to buy energy

Below is the variation in the marginal cost of generation during the winter time period for the member states.
Trading Opportunities in Summer to buy energy

Shown below the variation in the marginal cost of generation during the winter time period for the member states.
Comparison of Average Marginal Costs

Mean Marginal Costs during High and Low Seasons (USD/MWh)

- Bahrain: High Load Season = 118.23, Low Load Season = 86.00
- Kuwait: High Load Season = 165.07, Low Load Season = 122.90
- Oman: High Load Season = 85.62, Low Load Season = 80.21
- Qatar: High Load Season = 101.89, Low Load Season = 91.45
- Saudi Arabia: High Load Season = 168.12, Low Load Season = 135.95
- UAE Abu Dhabi: High Load Season = 99.02, Low Load Season = 83.38

Legend:
- Red: High Load Season
- Green: Low Load Season
Economic Imports in a Peak day of High Season

Shown below the estimated energy to be imported from the GCCIA grid base on the marginal cost of generation during the winter time period for the member states.
Economic Exports in a Peak day of High Season

Shown below the estimated energy to be exported from the GCCIA grid base on the marginal cost of generation during the winter time period for the member states.
Exchange during the High Season

Phase I
Phase II
Phase III
The Consultant has estimated the total theoretical benefit of both countries from economic electricity exchanges between Saudi Arabia and UAE-Abu Dhabi during the period 2012-2030 of about 2,935 MUSD or 154.5 MUSD/yr. considering a link utilization factor of 50% of NTC.
The Consultant has estimated the total theoretical benefit of both countries from economic electricity exchanges between Saudi Arabia and Bahrain during the period 2012-2030 of about 2,024 MUSD or 106.5 MUSD/yr. considering a link utilization factor of 50% of NTC.
The Consultant has estimated the total theoretical benefit of both countries from economic electricity exchanges between Saudi Arabia and Kuwait during the period 2012-2030 of about 720 MUSD or 37.9 MUSD/yr. considering a link utilization factor of 50% of NTC.
The Consultant has estimated the total theoretical benefit of both countries from economic electricity exchanges between Saudi Arabia and Qatar during the period 2012-2030 of about 3,448 MUSD or 181.5 MUSD/yr. considering a link utilization factor of 50% of NTC.
SUGGESTED WAY FORWARD

Study

- Make a feasibility Study for capturing Power Trading opportunities between Member States
- Create a model where all MS’s agree to the proposed model and price structure.

GA & PETA

- Reflect outcome of the study and the proposed Market model in the revision of the GA & PETA agreement.
- MS to make any necessary adjustment to harmonize the market model proposed with their internal regulations.

Implement the market model

- All Member States and GCCIA shall work together to implement the proposed market model.
Thank you

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