First Pan-Arab Energy Trade Conference
Towards an effective regional cooperation in electricity and gas trade among the Arab countries

THE NILE RITZ-CARLTON • CAIRO
NOVEMBER 6-7, 2019

The Pan-Arab Electricity Market: From Vision to Execution and Results

Ambassador Dr. Kamal Hasan Ali
Assistant Secretary General – Head of Economic Sector
INTRODUCTION

The PAN – ARAB ELECTRICITY MARKET
- The Current situation
- The Future
- The next steps
INTRODUCTION

Oil, Gas and RE

Area: 13.3 M sq.km
9.6 % of the world

Energy:
- Oil reserves: 48.6%
- Natural gas reserves: 27.0%

415.5 M inhabitants
5.4 % of the world

Countries: 22
GDP: 2.68 trillion $
GDP per Capita 6638 $
INTRODUCTION .. Electricity Sector

Installed capacity over **288 GW**

Type of Consumption:
- 46% Residential,
- 18% Industrial,
- 17% Commercial,
- 19% Others

18.3 GW Renewable energy installed capacity

1,137,644 GWh energy produced in 2017

More than 212, 500 km Transmission Network
Role of Partners

I. Develop a strategy & master plan for upgrading of trade & energy between Arab Countries

II. Comparison of costs & benefits of exchange of electricity or NG

III. Institutional & Regulatory frameworks

Recommended Electrical Interconnection Projects

Recommended Gas Projects

Present value (PV) of saving is $35 Billion

Plus an additional $11 Billion in Reduction of emissions of harmful gases
INTRODUCTION:
Generation cost expected savings 2012-2030

Total cost of generation

- $127 Billion
- Re-inforced electrical Interconnection
- Preferred Scenario

Disbudded as follows

- 7 Billion Capital investment
- $120 Billion operational costs
- Present value (PV) of saving is $35 Billion

Plus an additional $11 Billion in Reduction of emissions of harmful gases
MOU Signing Ceremony (6/4/2017)
CURRENT SITUATION
The size of energy exchange is still in its start.

Trading by Member States - Imports & Exports (2016-2018) in GWh
• Demand for electricity will increase by about 84% by 2020 compared to 2010, which requires the addition of generating capacity of about 135 GW.

• An investment in the electricity sector is only required for US 450 billion by 2020.
THE EXISTING INTERCONNECTION BLOCKS

**COMELEC:** Tunisia, Morocco, Algeria

**GCCIA:** KSA, UAE, Kuwait, Qatar, Bahrain, Oman

**European Network of Transmission System Operators for Electricity (ENTSO-E)**

- **Morocco - Spain**
- **Tunisia - Italy**
- **Morocco - Spain**
- **Syria - Turkey**
- **Egypt - KSA**
  - Trial runs in 2021 to be completed in 2022
- **Jordan - KSA**, 2022
- **Iraq - Kuwait**, 2020
- **KSA - Yemen**, 2025
- **Egypt - Sudan**, 2020
- **Sudan**
- **Yemen**

**EIJLLPST:** Egypt, Jordan, Iraq, Libya, Lebanon, Palestine, Syria, Turkey

- **Tunisia - Libya**, 2020
The Future
The envisaged PAEM .. A global overview

<table>
<thead>
<tr>
<th>System Size (GW)</th>
<th>Electricity Pool</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,030</td>
<td>European network of transmission system operators for electricity (ENTSOe)</td>
</tr>
<tr>
<td>280</td>
<td>Pan-Arab Regional Electricity Market (PAEM)</td>
</tr>
<tr>
<td>130</td>
<td>Brazil – Uruguay – Argentina</td>
</tr>
<tr>
<td>110</td>
<td>Mid-Western (US) and Manitoba (CA)</td>
</tr>
<tr>
<td>83</td>
<td>Greater Mekong Sub-region and Nam-Theun 2</td>
</tr>
<tr>
<td>56</td>
<td>South African Power Pool (SAPP)</td>
</tr>
<tr>
<td>10</td>
<td>SIEPAC (Central American Countries)</td>
</tr>
</tbody>
</table>
PA Electricity Market: Governance Docs

MOU
- Commitment of Arab countries to Pan-Arab market integration
- Legal basis for Pan-Arab market and subsequent reforms
- Legal basis for Pan-Arab market institutions

GA
- Objectives of Pan-Arab electricity market
- Guiding principles for development of Pan-Arab market
- Formation of, and roles and responsibilities of PA market institutions

PAEM
- Commercial aspects of the Pan-Arab market, including operation, participation and administration
- Roles and responsibilities
- Metering, billing and settlement

Arab Grid Code
- Minimum technical requirements for operation and planning national transmission networks & international interconnections
- Roles and responsibilities + Metering

GA: General Agreement, PAEM: Pan-Arab Electricity Market Agreement
PAEM: Market Integration Plan

**Focus:**
- **2010-2018:** Existing Regional Markets
  - Focus: GCC, EIJLLPST (8 countries) and Maghreb
- **2019-2024:** Transition Market
  - Focus: Identify and expand trade opportunities
- **2025-2031:** Expand Regional Market Function
  - Focus: Unbundle TSOs and introduce wholesale comp.
- **2032-2036:** Ultimate Pan-Arab Market Design
  - Focus: Full wholesale competition supported by multiple markets
- **2037-2038:** Fully-integrated Pan-Arab Market
  - Focus: Fully Inter-connected and synchronized Pan-Arab electricity network
PAEM: Proposed Regulatory Framework

Arab Ministerial Council for Electricity

Executive Bureau

Pan-Arab Advisory and Regulatory Committee

AMCE Secretariat

Arab TSOs Committee

Sub-Regional Market Operators/Facilitators

Operators of Transmission Systems in Member States
## Market Governance Documents

<table>
<thead>
<tr>
<th>Title of Document</th>
<th>Authorized to Sign</th>
<th>Current/expected Situation</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOU</td>
<td>Ministry of Electricity</td>
<td>Signed by 16 Countries</td>
<td></td>
</tr>
<tr>
<td>General Agreement</td>
<td>Member States Governments</td>
<td>2019</td>
<td>Reservation from 1 country</td>
</tr>
<tr>
<td>Market Agreement (the PAEM)</td>
<td>Asset Owners (transport system operators, single buyer entities)</td>
<td>2019</td>
<td>Reservation from 1 country</td>
</tr>
<tr>
<td>Arab Grid Code</td>
<td>Transmission system operators - and other market participants</td>
<td>2020</td>
<td>a consultant has been selected and the work is ongoing (financed by the Arab Fund)</td>
</tr>
</tbody>
</table>
NEXT STEPS
Requirements for Establishing the PAEM Market

Legal and Legislative Frameworks
- Memorandum of Understanding ✓
- General Agreement ✓
- Market Agreement ✓
- Arab Grid Code (in progress)

Institutions
- Market Committees (1- Regulatory and Advisory, 2- Market Systems Operators)
- Market Secretariat
- Market Facilitator

Infrastructure
- Existing on Ground Projects
First Pan-Arab Energy Trade Conference
Towards an effective regional cooperation in electricity and gas trade among the Arab countries

THE NILE RITZ-CARLTON • CAIRO
NOVEMBER 6-7, 2019

Thank You!