Energy Transition in the Arab Region: Challenges and Opportunities
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The Pan-Arab Electricity Market: Creating Regional Momentum for Energy Trade

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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 $
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

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.
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.

<table>
<thead>
<tr>
<th>2020 Electricity Generation Capacity to be Added</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Without regional integration</td>
<td>135 GW</td>
</tr>
<tr>
<td>With regional integration (electricity interconnection)</td>
<td>102 GW</td>
</tr>
</tbody>
</table>
THE EXISTING INTERCONNECTION BLOCKS

**COMELEC:** Tunisia, Morocco, Algeria (Comité Maghrébin de l'Electricité)

- Tunisia – Italy
- Morocco - Spain
- Tunisia – Libya, 2020

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

- KSA – Yemen, 2025
- Iraq – Kuwait, 2020
- Jordan – KSA, 2022

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

- Egypt – Sudan, 2020
- Sudan
- Yemen

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

- Separated, (currently not working)
The Future
The envisaged PAEM .. A global overview
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

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
<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