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

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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
The 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

7 Recommended Electrical Interconnection Projects

3 Recommended Gas Projects

AMCE Comprehensive Study
Generation cost expected savings 2012-2030

Total cost of generation

- re-infored electrical Interconnection
- Preferred Scenario

$127 Billion

Disbudded as follows

- $120 Billion operational costs
- 7 Billion Capital investment

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)
Requirements for Establishing the PAEM

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
CURRENT SITUATION
Trading by Member States - Imports & Exports
(2016-2018) IN GWh

The size of energy exchange is still in its start

- Export 2016
- Import 2016
- Export 2017
- Import 2017
- Export 2018
- Import 2018

Jordan 33.8 33.4 33.8 33.4
UAE 33.4 33.4 33.4 33.4
Bahrain 33.4 33.4 33.4 33.4
Tunis 33.4 33.4 33.4 33.4
Algeria 33.4 33.4 33.4 33.4
KSA 33.4 33.4 33.4 33.4
Sudan 33.4 33.4 33.4 33.4
Syria 33.4 33.4 33.4 33.4
Saudi Arabia 33.4 33.4 33.4 33.4
Oman 33.4 33.4 33.4 33.4
Palestine 33.4 33.4 33.4 33.4
Qatar 33.4 33.4 33.4 33.4
Kuwait 33.4 33.4 33.4 33.4
Lebanon 33.4 33.4 33.4 33.4
Libya 33.4 33.4 33.4 33.4
Egypt 33.4 33.4 33.4 33.4
Morocco 33.4 33.4 33.4 33.4
Yemen 33.4 33.4 33.4 33.4
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 of US 450 billion is required by 2020 in the electricity sector only.

2020 Electricity Generation Capacity to be Added

<table>
<thead>
<tr>
<th></th>
<th>2020 Electricity Generation Capacity to be Added</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

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

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

**ENTSO-E:**
- Morocco - Spain
- Tunisia - Italy

**EIJLPST:**
- Egypt, Jordan, Iraq, Libya, Lebanon, Palestine, Syria, Turkey
- Tunisia - Libya, 2020
- Egypt - Sudan, 2020

**Syria - Turkey**
- Separated, (currently not working)
- Trial runs in 2021 to be completed in 2022

**GCCIA:**
- KSA - Yemen, 2025

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

**EIJLPST:**
- Egypt, Jordan, Iraq, Libya, Lebanon, Palestine, Syria, Turkey
- Tunisia - Libya, 2020
- Egypt - Sudan, 2020

**Jordan - KSA, 2022**
- Iraq - Kuwait, 2020

**KSA - Yemen, 2025**
The Future
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
PAEM: Proposed Regulatory Framework

Arab Ministerial Council for Electricity

Executive Bureau

AMCE Secretariat

Pan-Arab Advisory and Regulatory Committee

Arab TSOs Committee

Sub-Regional Market Operators/Facilitators

Operators of Transmission Systems in Member States
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 interconnected and synchronized Pan-Arab electricity network
NEXT STEPS
## 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>2020</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>2020</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>

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- **General Agreement**: 2020, reservation from 1 country.
- **Market Agreement (the PAEM)**: 2020, reservation from 1 country.
- **Arab Grid Code**: 2020, consultation selected and work ongoing (financed by the Arab Fund).