The Potential of German-Iraqi Renewable Energy Partnership

Yesar Al-Maleki, Managing Director
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Sector Overview

Generation

Transmission

Distribution
Closing The Gap

Annual Power Supply & Demand (1967-2019)

Data Sources: Iraq's Ministry of Electricity and Iraq Energy Institute Analysis
Quick and Cost-Effective

Technology Options to Improve Electricity Supply by Time of Completion

Expand transmission
Upgrade T&D networks
Utility gas CCGT
Wind power
Utility solar PV
Utility oil/gas turbine
Refurbish generators
Rooftop solar PV
Mobile power units
Raising HFO use
Small oil generators

Solar PV LCOE Compared to Oil and Gas Fired Generation

Notes: T&D = transmission and distribution. CCGT = combined-cycle gas turbines. PV = photovoltaics. HFO = heavy fuel oil.

Note: LCOE = levelised cost of electricity. LCOEs for oil- and gas-fired power plants are based on a range of operational efficiencies.

Chart Source: International Energy Agency
Potential Impact

Shares of Iraq's Electricity Mix by Source & Technology

- IPP
- Iran Imports
- KRI Imports
- Hydro
- Diesel
- Gas
- Steam

Solar PV Displacement of Oil Consumption & Cost Savings

- 500 MW
- 6,000 bpd
- USD 175M / year

- 1000 MW
- 12,000 bpd
- USD 350M / year

- 2000 MW
- 24,000 bpd
- USD 700M / year

Source: Iraq's Ministry of Electricity, SolarGIS, Iraq Energy Institute Analysis
Challenges

- FiT vs Bidding
- Procurement Process
- Weak Off-Taker Credit
- IPP Track Record
- Renewable Energy Project Experience
- Future Grid Stability & Technology Integration
- Underdeveloped Banking Sector
- Renewable & Clean Energy Legislation
- Land Title Availability
- Safety & Security
- Subsidies
- Bureaucracy & Transparency
First Bid Round

Market Dynamics

<table>
<thead>
<tr>
<th>Year</th>
<th>Project</th>
<th>Tariff Evolution</th>
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<tbody>
<tr>
<td>2014</td>
<td>Jordan R1 (YIT)</td>
<td>$10</td>
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<td>2015</td>
<td>Egypt R2 (Tender)</td>
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<td>Egypt R1 (Tender)</td>
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<td>2016</td>
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<td>$4</td>
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<td>2017</td>
<td>GCC (Tender)</td>
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EPC Cost Reduction

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<tr>
<th>Year</th>
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<th>EPC Price Evolution</th>
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<td>2016</td>
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<td>2017</td>
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<tr>
<th>Project</th>
<th>Capacity (MWp)</th>
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<tr>
<td>Sawa-1</td>
<td>30</td>
<td>Muthana</td>
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<tr>
<td>Sawa-2</td>
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<tr>
<td>Khidhir</td>
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<td>Muthana</td>
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<td>Iskandariya</td>
<td>225</td>
<td>Babil</td>
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<td>Jissan</td>
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<td>Wassit</td>
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<tr>
<td>Karbala</td>
<td>300</td>
<td>Karbala</td>
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<tr>
<td>Diwania</td>
<td>50</td>
<td>Diwania</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>755</strong></td>
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</table>

Transparent, competitive, reverse auction... left to market to determine

BOO basis...

Access to government owned land, reduced customs fees, and ability to repatriate profits free of taxes...

Permits are valid for 20-50 years depending on the type of investment projects.

Energy Freedom?

Electricity Provided & Consumer Bill for an Upper Middle Class Household

- Electricity provided
  - Upper-middle class household
  - With reported tariffs for neighbourhood
  - With regulated tariffs for neighbourhood

- Consumer bill
  - Neighbourhood generation
  - Grid supply

Chart Source: International Energy Agency
Iraqi-German Partnership

- Legislative & Policy Frameworks
- Financial Frameworks & Mechanisms
- Technical & Technological Assistance
- Professional Skills & Capacity Building
- Research & Studies
- Codes and Standards Development
For more information:

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High potential but dependent on setting a supportive regulatory environment & embracing market mechanisms.