State of Kuwait
Ministry of Electricity & Water

Future Renewable Energy in Kuwait

By: Eng. Ahmad Alazemi
Private Sector Projects Department
Outlines

• Peak Demand & Available Capacity by 2040.
• Future Projects (Power & Water).
• Upcoming Power & Water Plants
• Renewable Energy in Kuwait (RE Vision 2030).
• Current & Future Renewable Energy.
• Questions
<table>
<thead>
<tr>
<th>Year</th>
<th>Peak Load Including Projects (MW)</th>
<th>Available + Expected Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>13,800</td>
<td>15,500</td>
</tr>
<tr>
<td>2020</td>
<td>15,566</td>
<td>17,081</td>
</tr>
<tr>
<td>2025</td>
<td>21,989</td>
<td>23,971</td>
</tr>
<tr>
<td>2030</td>
<td>27,259</td>
<td>29,039</td>
</tr>
<tr>
<td>2035</td>
<td>32,010</td>
<td>35,379</td>
</tr>
<tr>
<td>2040</td>
<td>35,936</td>
<td>37,179</td>
</tr>
</tbody>
</table>
Water Demand & Available Capacity MIGD - 2030

<table>
<thead>
<tr>
<th>Year</th>
<th>MAX Demand including Projects (MIGD)</th>
<th>Available + Expected Capacity (MIGD)</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>434</td>
<td>492</td>
<td>2017</td>
</tr>
<tr>
<td>2020</td>
<td>473</td>
<td>659</td>
<td>2020</td>
</tr>
<tr>
<td>2025</td>
<td>649</td>
<td>836</td>
<td>2025</td>
</tr>
<tr>
<td>2030</td>
<td>775</td>
<td>1114</td>
<td>2030</td>
</tr>
<tr>
<td>2035</td>
<td>910</td>
<td>1114</td>
<td>2035</td>
</tr>
<tr>
<td>2040</td>
<td>1182</td>
<td>1189</td>
<td>2040</td>
</tr>
</tbody>
</table>

Water Forecast

- Water max Demand
- Water Availability
## Future Generation & Desalination Expansion Projects 2017 – 2030

<table>
<thead>
<tr>
<th>Station</th>
<th>Power MW</th>
<th>Water MIGD</th>
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</thead>
<tbody>
<tr>
<td>Al Zour North Phase II + III</td>
<td>2,700</td>
<td>165</td>
</tr>
<tr>
<td>Al-Kheran Power Station phases I</td>
<td>1,800</td>
<td>125</td>
</tr>
<tr>
<td>Al -Khairan Power Station phases II</td>
<td>1,800</td>
<td>Est 125</td>
</tr>
<tr>
<td>Al -Khairan Power Station phases III</td>
<td>1,800</td>
<td>Est 125</td>
</tr>
<tr>
<td>Al Nuwaiseeb phases I</td>
<td>3,600</td>
<td>75</td>
</tr>
<tr>
<td>Al Nuwaiseeb phases II</td>
<td>3,600</td>
<td>75</td>
</tr>
<tr>
<td>NEW Shuaiba South</td>
<td>1,800</td>
<td>50</td>
</tr>
<tr>
<td>NEW Doha East Steam Turbines</td>
<td>2,400</td>
<td>100</td>
</tr>
<tr>
<td>Doha Phase I+II (RO)</td>
<td>-</td>
<td>60+60</td>
</tr>
<tr>
<td>Subiya ext 1</td>
<td>250</td>
<td>-</td>
</tr>
<tr>
<td>Subiya ext 1</td>
<td>960</td>
<td>-</td>
</tr>
<tr>
<td>Subiya ext 3</td>
<td>250</td>
<td>-</td>
</tr>
<tr>
<td>Subiya ext 4</td>
<td>1,100</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21,960</strong></td>
<td><strong>960</strong></td>
</tr>
</tbody>
</table>
Kuwait Renewable Energy Projects

H.H. Amir Sabah Al Ahmad Al Jaber Al Sabah’s Vision: To Cover 15% of Kuwait’s peak load with renewable energy by 2030
Raise Renewable Energy Policy
Source: Ministerial decree 126/2018

All government buildings shall include no less than 10% of the building peak demand using RE “Roof top”.
MEW Buildings (Under Operation)

- MEW & MPW 0.5 MW installed on each building. Total installed Capacity is 1 MW (2014)
- MEW Parking = 0.18 MW (2018)
- MEW 6 storages building = 3.75 MW (2019)
PV on the MEW Reservoirs

25 Locations ~= 300 MW Total installed capacity
Ph1- 30 MW @ Subiya " North East "
expected to be Tendered Q4 2019
Upcoming PV Rooftops Projects

Tendering Installation PV’s on the roofs of existing and new parking areas at

- Emergency Department - Main Work shops - Installed Capacity 2.7 MW
- Power Stations’ Spaces - Installed Capacity 5 MW (expected 2^{nd} Q 2020).
- 10 MEW’s buildings 3.64 MW (expected \approx 2022).
Total Capacity “PV Rooftops”

> 10 Gov. Institutions

More than 73 projects = 2221 MW
SHAGAYA PARK

Consists of 3 phases:

- Phase 1: KISR & MEW
- Phase 2: KNPC & MEW
- Phase 3: KAPP & MEW

Total installed: ≥ 4000 MW
Shagaya Phase 1

KISR

- CSP 50 MW
- PV 10 MW
- Wind 10 MW

Total: 70 MW

Commercial Operation Dec, 2018
Shagaya Phase 2 “Al Dibdiba”

KNPC (PPA with MEW)

PV 1500 Mwac (25 yrs PPA)
Exp Commercial Operation  Q1, 2022
Shagaya Phase 3 “Al Abrag” (several Packages)

KAPP & MEW

No less than 200 MW “CSP”
No less than 1200 Mwac “PV”
No less than 100 MW “Wind”

Total: > 2000 MW installed on 58 $km^2$

TA RFQ – Q1 2020
Shagaya Park
KISR, KAPP, KPC, & MEW

Total installed capacity > 4000 MW

Energy: 8 TWh/yr
Houses: 150,000

CO2 offset: 6 million Tons / yr
Equivalent 7 millions trees

Save: 13.5 million barrel/yr
Equivalent to save 675 million $ / yr
Conclusions

Challenges are always exist.

Partnerships for RE growth

Regulatory aspects and lessons learned.

RE is strongly compete with traditional power.

Private sector enhancement

Reach 15% of peak demand by 2030
QUESTIONS?

Contact (24/7):
Eng. Ahmad M. Alazemi
Private Sector Projects Department
Email: amadalazmi@mew.gov.kw
Mob: +965 95565997

Thank you!