NEW PERSPECTIVES FOR NUCLEAR ENERGY IN JORDAN AND ABROAD

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- The present situation
- Nuclear and decarbonization of the electricity
- Nuclear Plants under construction
- Some issues
Nuclear Generation by Country 2015

Source: IAEA PRIS Database

Note: Taipower used nuclear energy to generate 16% of electricity on the island of Taiwan in 2014.
## 2015 Investment by technology

<table>
<thead>
<tr>
<th>Technology</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil and gas upstream</td>
<td>583 billion</td>
</tr>
<tr>
<td>Wind</td>
<td>107 billion</td>
</tr>
<tr>
<td>Solar photovoltaic (PV)</td>
<td>98 billion</td>
</tr>
<tr>
<td>Hydro</td>
<td>59 billion</td>
</tr>
<tr>
<td>Nuclear</td>
<td>21 billion</td>
</tr>
<tr>
<td>Grid- scale electricity storage</td>
<td>10 billion</td>
</tr>
<tr>
<td>Biofuels</td>
<td>3 billion</td>
</tr>
<tr>
<td>Carbon capture and storage</td>
<td>0.7 million</td>
</tr>
</tbody>
</table>
The role of Nuclear for decarbonizing the electricity generation mix
Countries outside the OECD account for more than 80% of electricity demand growth to 2040 in all scenarios.
Global electricity generation by fuel and scenario

Coal-fired generation sees the greatest variation across scenarios
Evolution of the power generation mix in the 450 Scenario

The power sector is transformed and almost decarbonised by 2040 in the 450 Scenario
Nuclear Energy Generation - Forecast

Energy Agencies: an estimated **60% increase** in nuclear installed capacities by **2035**

Currently Installed Capacities
- 350 GWe

2035 Reference Scenario
- ~550 GWe

<table>
<thead>
<tr>
<th>Agency</th>
<th>Scenario</th>
<th>Capacity (GWe)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAEA 2015</td>
<td>low scenario</td>
<td>369</td>
</tr>
<tr>
<td>WEO 2015</td>
<td>low scenario</td>
<td>485</td>
</tr>
<tr>
<td>WEO 2015</td>
<td>high scenario</td>
<td>709</td>
</tr>
<tr>
<td>IAEA 2015</td>
<td>high scenario</td>
<td>733</td>
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<tr>
<td>WNA 2015</td>
<td>low scenario</td>
<td>369</td>
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<tr>
<td>WNA 2015</td>
<td>reference scenario</td>
<td>556</td>
</tr>
<tr>
<td>WNA 2015</td>
<td>high scenario</td>
<td>719</td>
</tr>
</tbody>
</table>
Nuclear capacities will grow to meet low carbon targets

- Energy demand will grow by 30% by 2040 in average
- *Electricity demand sees the fastest growth among the final energy sources* According to IEA scenarios, Electricity demand will grow by 70%
  - Over the same timeframe, share of electricity in the final energy demand will grow from 18% to 24%.
  - More than 60% of this additional electricity demand will come from Asian, non OECD-member countries
  - Forecast for total investments in the electricity sector is $20 000 Billions over 2015-2040

Nuclear energy in the energy mix will globally remain stable at 12% over 2013-40, meaning a significant increase in nuclear installed capacities
Global installed generation capacity in the New Policies Scenario

Renewables account for almost two-thirds of the overall growth in installed generation capacity to 2040
Cumulative power sector investment in the New Policies Scenario, 2016-2040

Two-and-a-half times as much is invested in renewable technologies than that of fossil-fuel plants
Global electricity generation by source in the 66% 2°C Scenario

Note: TWh = terawatt-hours; CCS = carbon capture and storage.
NUCLEAR PLANTS under CONSTRUCTION

- 51 000 MW (49 UNITS) ARE CURRENTLY UNDER CONSTRUCTION (and commissioned in 2020)
- 24 800 MW IN CHINA (50%)
- 11 600 MW in the rest of Asia & ME (23%)
- 4700 MW IN RUSSIA
Nuclear New Build – ASIA market is in the lead

New Projects
- AMERICAS: 5,715 MWe net
  - Brazil: 4,470 MWe
  - 1,245

- EMEA: 1,600 MWe
  - 1,600

- ASIA: 34,900 MWe net
  - China: 20,300 MWe
  - 19

Restarted Projects
- AMERICAS: 3,340 MWe
  - 4

- EMEA: 5,800
  - 5

- ASIA: 4,020
  - 3

Projects On Hold
- AMERICAS: 2,220
  - 2

- EMEA: 5,380
  - 4

- ASIA: 2,650
  - 2

- ASIA: 2,600
  - 2

- ASIA: 2,340
  - 3

TOTAL: 60,900 MWe net

Source: IAEA PRIS database
Some issues
Nuclear New Build: an exceptional endeavour

- Highest safety and security standards
  &
  - Rigorous licensing process

- Capital intensive with large upfront CAPEX

- Vast quantities of materials and equipments
- Millions Engineering hours
- Hundreds contracts
- Thousands people on construction site

- Significant Impacts and Benefits on Local communities and business

- Long Average Construction duration => belated Return On Investment
Hinkley Point C: a unique and exciting journey

The first nuclear power station to be built in the UK in a generation.

JAN 2006
Government policy proposes nuclear as a significant part of our future energy mix.

OCT 2008
Early engagement begins with local residents.

2006

2009

2012

2013

2014

2015

2016

2017

NOV 2009
Formal consultation begins with local communities over 2 years.

NOV 2012
Nuclear site licence granted.

MAR 2013
Secretary of State approves construction of HPC.

DEC 2012
UK EPR reactor approved under GDA.

FEB 2012
Preparatory works begin on-site.

Radioactive Substances Regulations Permit Granted

OCT 2014
European Commission approves agreement between EDF Group and UK Government.

FEB 2015
Opening of £1.5 million Construction Skills and Innovation Centre.

OCT 2015
EDF and CGN agree joint investment in HPC.

JUL 2016
£1.5 billion in contract values agreed - £225 million in value to the South West.

JUL 2016
Final Investment Decision (FID) by EDF Board

SEP 2016
Signature of contracts (UK Gov + partners and suppliers)

MAR 2017
Pouring of First Nuclear Concrete

2017
Thank you
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