



## Exchanging Best Practices to Incorporate Variable Renewable Energy into Long-term planning in Arab countries

### Agenda

#### Day 1 (April 21, 2019)

Time	Session title	Speaker/ facilitator
9:00 – 9:30	Registration	
<b>Session 1</b>	<b>Opening session</b>	
9:30 – 10:15	Opening and welcome remarks <ul style="list-style-type: none"><li>• H.E Hala Zawati, Minister of Energy and Mineral Resources, Jordan</li><li>• Ms. Jamila Matar, Head of Energy Department, LAS General Secretariat, Energy Department</li><li>• Dr. Ahmed Badr, Executive Director, Regional Center for Renewable Energy and Energy Efficiency (RCREEE)</li><li>• Dr. Zoheir Hamedi, Regional Programme Officer, IRENA</li></ul>	
10:15 – 10:45	Self-introduction and expectations of participants	
10:45– 11:30	“Long-term energy planning under high RE scenarios – introduction and workshop overview” <ul style="list-style-type: none"><li>• Define the focus of the workshop: long-term generation expansion planning</li><li>• Based on IRENA's "Planning for the Renewable Future Report", discuss role of long-term energy planning; tools used in energy planning; features of VRE; and how VRE features have been incorporated in long-term energy planning</li><li>• Introduce the objective and structure of the workshop in relation to the planning concepts</li></ul>	Asami Miketa (IRENA)
11:30 – 12:00	<i>Group photo and coffee break</i>	
12:00 – 13:00	Presentation: RCREEE Engagement in the Arab region	Dr. Ahmed Badr
13:00 – 14:00	<i>Lunch</i>	
<b>Session 2</b>	<b>Country experience</b>	Chaired by LAS
14:00 – 15:10	Introduction of the format <ul style="list-style-type: none"><li>• Discuss each country's long-term planning process for generation capacity expansion, including how utility and government work together</li><li>• Describe energy or power system models used for generation capacity expansion planning</li><li>• Describe how solar and wind are currently modelled in these modelling tools</li><li>• Discuss challenges in developing scenarios with high shares of solar and wind using these tools</li></ul>	Daniel Russo (IRENA)



	Country presentations – Group 1 [15 minutes presentation plus 5 minutes discussion]	Participating Country representative (s)
15:10 – 15:40	<i>Coffee break</i>	
15:40 – 16:40	Country presentations – Group 2	Participating Country representative (s)
16:40 – 19:00	<i>Intermission/ Break</i>	
19:00 – 21:00	Round table Discussion: Establishing the Monitoring mechanism for the implementation of the Arab Strategy for Sustainable Energy	
21:00 – 22:00	<i>Dinner</i>	

## Day 2 (April 22, 2019)

Time	Session title	Speaker/ facilitator
9:00– 9:30	Recap from Day 1 Plan for Day 2 / Q&A	Reem Korban (IRENA)
<b>Session 2</b>	<b>Country experience (cont'd)</b>	Chaired by Dr. Maged Mahmoud, Technical Director (RCREEE)
9:30 – 10:30	Country presentations – Group 3	Participating Country representative (s)
10:30 – 11:30	Country presentations – Group 4	Participating Country representative (s)
11:30 – 12:00	<i>Coffee break</i>	
12:00 – 13:00	Key planning considerations with a higher share of VRE <ul style="list-style-type: none"> <li>Briefly introduce four planning concepts – capacity credit, flexibility, transmission investment needs, and stability constraints, in relation to long-term energy planning</li> <li>Discuss the need for high-quality, location- and time-specific RE resource data, and the value of iteration between capacity, dispatch, and power flow models</li> </ul>	Asami Miketa (IRENA)
13:00 – 14:00	<i>Lunch</i>	
<b>Session 3</b>	<b>Planning with accurate VRE cost data</b>	Chaired by LAS
14:00 – 15:00	Input presentation 1: cost reduction of VRE and its relevance to long-term energy planning <ul style="list-style-type: none"> <li>Discuss how cost influences the future mix of technologies</li> <li>Discuss the cost reduction trends of VRE in the past and projected future trends – global perspective and regional perspective</li> </ul>	Daniel Russo (IRENA)



15:00 – 15:30	<i>Coffee Break</i>	
15:30 – 16:45	<p>Exchange of country experiences and discussions</p> <ul style="list-style-type: none"> <li>• Questions and clarifications to the input presentations</li> <li>• Discuss the best sources for VRE costs and how to integrate them regularly into models and forecasts</li> </ul> <p>Discuss the gaps in the planning process</p>	Moderated by Zoheir Hamed (IRENA)

### Day 3 (April 23, 2019)

Time	Session title	Speaker/ facilitator
9:00 – 9:30	Recap from Day 2 Plan for Day 3 / Q&A	Reem Korban (IRENA)
<b>Session 4</b>	<b>Planning for generation adequacy</b>	Chaired by LAS
9:30 – 10:25	<p>Input presentation 1: generation adequacy and capacity credit concept and its relevance to long-term energy planning under high share of VRE.</p> <ul style="list-style-type: none"> <li>• How generation adequacy is impacted by a high share of VRE in a system?</li> <li>• What is capacity credit?</li> <li>• What would happen when the capacity credit is not reflected in the capacity expansion planning</li> </ul> <p>Examples of how the capacity credit concept is used in the capacity expansion planning</p>	Benoit Janssens (IRENA/Tractebel)
10:25 – 11:15	<p>Input presentation 2: how generation adequacy and capacity credit concept may be reflected in energy planning models</p> <ul style="list-style-type: none"> <li>• Discuss ways to mimic the capacity credit concept and its implications in capacity expansion models, including, defining time slices better, using capacity margin constraints.</li> </ul>	Asami Miketa (IRENA)
11:15 – 11:45	<i>Coffee break</i>	
11:45 – 13:00	<p>Exchange of country experiences and discussions</p> <ul style="list-style-type: none"> <li>• Questions and clarifications to the input presentations</li> <li>• Discuss the relevance of the capacity credit concept in each country's planning process</li> <li>• Discuss how the capacity credit concept is implemented in each country's model</li> </ul> <p>Discuss the gaps in planning process</p>	Moderated by Zoheir Hamed (IRENA)
13:00 – 14:00	<i>Lunch</i>	
<b>Session 5</b>	<b>Planning for a flexible power system</b>	Chaired by Dr. Maged Mahmoud, Technical Director (RCREEE)
14:00– 15:00	Input presentation 1: the flexibility concept and its relevance to long-term energy planning under high share of VRE	Benoit Janssens (IRENA/Tractebel)



	<ul style="list-style-type: none"> <li>• What is flexibility?</li> <li>• What are the measures to improve flexibility and which of these are particularly relevant to capacity expansion planning?</li> <li>• Discuss what would happen when the flexibility is not reflected in the capacity expansion planning</li> <li>• Discuss the flexibility of power plants (fossil, hydro, and renewable plants)</li> <li>• Discuss roles of inter-connectors, storage (including pumped hydro), demand side management, self-consumption</li> </ul> <p>Examples of how the flexibility concept is used in the capacity expansion planning</p>	
15:00 – 15:30	<i>Coffee Break</i>	
15:30 – 16:15	<p>Input presentation 2: how the flexibility concept may be reflected in energy planning models</p> <p>Discuss ways to mimic the flexibility concept and its implications in capacity expansion models, including, defining time slices better, using flexibility balances, linking with dispatch models</p>	Asami Miketa (IRENA)
16:15 – 17:30	<p>Exchange of country experiences and discussions</p> <ul style="list-style-type: none"> <li>• Questions and clarifications to the input presentations</li> <li>• Discuss the relevance of the flexibility concept in each country's planning process</li> <li>• Discuss how the flexibility concept is implemented in each country's model</li> </ul> <p>Discuss the gaps in planning process</p>	Moderated by Zoheir Hamedi (IRENA)

## Day 4 (April 24, 2019)

Time	Session title	Speaker/facilitator
9:00 - 9:30	Recap from Day 3 Plan for Day 4 / Q&A	Reem Korban (IRENA)
<b>Session 6</b>	<b>Planning for adequate transmission</b>	Chaired by IRENA
9:30– 10:15	<p>Input presentation 1: VRE resource and zoning evaluations, the tradeoff between transmission investment and RE resource quality, and its relevance to long-term energy planning under high share of VRE</p> <ul style="list-style-type: none"> <li>• Discuss the importance of geo-spatial information for planning with VRE</li> <li>• Discuss the methodologies to assess transmission investment needs <ul style="list-style-type: none"> <li>○ Zone planning: renewable energy zones</li> </ul> </li> </ul>	Benoit Janssens (IRENA/Tractebel)



	<ul style="list-style-type: none"> <li>• Discuss how to feature transmission constraints in planning process</li> <li>• Discuss the ways to represent the transmission investment, including detailed geo-spatial representation of a model, and cost markup methodology</li> </ul>	
10:15– 11:15	<p>Exchange of country experiences and discussions</p> <ul style="list-style-type: none"> <li>• Questions and clarifications to the input presentations</li> <li>• Discuss the best sources for VRE geospatial data and how to integrate it into models</li> <li>• Discuss the relevance of the VRE's transmission investment needs in country's planning process</li> <li>• Discuss how the VRE linked transmission investment needs is implemented in each country's model</li> </ul> <p>Discuss the gaps in the planning process</p>	Moderated by Zoheir Hamedi(IRENA)
11:15 – 11:45	<i>Coffee break</i>	
<b>Session 7</b>	<b>Planning for stability related operational constraints</b>	Chaired by Dr. Maged Mahmoud, Technical Director (RCREEE)
11:45 – 12:45	<p>Input presentation 1: stability-related operational constraints and their relevance/irrelevance to long-term energy planning</p> <ul style="list-style-type: none"> <li>• Discuss the sources of limits to instantaneous penetration of VRE</li> <li>• Discuss the relevance of power system operation with limited synchronous generators in long-term energy planning</li> <li>• Discuss the importance of reflecting VRE adequately in grid codes</li> <li>• Establish different types of stability problems and discuss their relevance/irrelevance to long-term energy planning</li> </ul>	Benoit Janssens (IRENA/Tractebel)
12:45 – 13:30	<p>Exchange of country experiences and discussions</p> <ul style="list-style-type: none"> <li>• Questions and clarifications to the input presentations</li> <li>• Discuss the relevance of the stability concerns in country's planning process</li> <li>• Discuss available VRE grid integration studies and how they relate to long-term capacity expansion planning</li> </ul> <p>Discuss the gaps in planning process</p>	Moderated by Zoheir Hamedi (IRENA)
13:30 – 14:30	<i>Lunch</i>	
<b>Session 8</b>	<b>Planning gaps</b>	Chaired by IRENA
14:30 – 16:30	<p>Identification of planning gaps</p> <p>Identify the gaps in each country's planning process with aiming at a higher share of VRE, including planning concepts, data, methodologies, human resources</p>	Dr. Maged Mahmoud, Technical Director (RCREEE)



16:30 – 17:00	<i>Coffee Break</i>	
17:00 – 17:45	Identification of areas for follow up action <ul style="list-style-type: none"><li>Identify the areas of follow up actions that can be supposed by IRENA and partners</li></ul>	
17:45 – 18:15	Closing of the workshop <ul style="list-style-type: none"><li>Jordan’s Ministry of Energy and Mineral Resources</li><li>Regional Center for Renewable Energy and Energy Efficiency (RCREEE)</li><li>Dr. Zoheir Hamedi, Regional Programme Officer, IRENA</li></ul>	