IRENA - ETSAP
Innovation in long term energy scenarios

Paul Durrant
IRENA Innovation Networks
Stuttgart, 8th Nov 2018
9:00-12:30 – Session 6 ETSAP IRENA CEM collaboration

• **Chairs:** Prof. Brian Ó Gallachóir (IEA-ETSAP TCP), Dr. Paul Durrant (IRENA)

• **09:00-10:30:**
  - IRENA CEM Campaign and Innovation; Brian Ó Gallachóir and Paul Durrant
  - Disruptive innovation; Hans Christian Gils (DLR)
  - Limitations in representing innovation in energy systems models; Uwe Remme (IEA) and Fionn Rogan (MaREI, UCC)

• **10:30-11:00:** Coffee Break

• **11:00-12:30:**
  - New approaches to understanding innovation; Alessia Elia (MaREI and IRENA); Uwe Remme (IEA); Daniele Poponi (European Commission and Mission Innovation)
  - How do we improve representation of innovation in energy systems models? Discussion moderated by Brian Ó Gallachóir and Paul Durrant

• **12:30-13:30:** Lunch
Why long-term energy scenarios?

» Fundamental tool for policy making
  » National policy making
  » Global policy debates / Forum public opinion

» What is new?
  » Clear agreed mandate for the global decarbonization
  » Massive technology innovation around energy transition

» Long-term visions for clean energy transition
  » Avoiding risks of making poor, short-sighted decisions (stranded assets, disruptive innovations)
  » Represent transformative changes of energy systems (e.g., VRE, disruptive innovations in end-use sectors, digitalization and its impacts etc)
A new CEM campaign

Long-term energy scenarios for the clean energy transition (LTES)

» **Launch:** May 2018 at the 9th CEM meeting, Copenhagen
» **Duration:** one year (possible extension to multiple years)
» **Lead countries:** Denmark, Germany
» **Operating agent:** IRENA

Goal: promote the wider adoption and improved use of long-term energy scenarios for clean energy transition

State participants joining campaign:
### Three focus themes

<table>
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<th>Use of scenarios for policy making</th>
<th>Development of scenarios for clean energy transition</th>
<th>Approaches to capacity enhancement</th>
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<td>» Share experience in the use of energy scenarios for national and regional policy planning</td>
<td>» Showcase new tools &amp; methods to address new, disruptive elements of the transition</td>
<td>» Identify various institutional relationships between the use and development communities</td>
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<td>» Identify ways to make scenarios more relevant to policy and investment decisions</td>
<td>» Identify modelling gaps around e.g. end-use innovation, sector coupling, and variable renewable energy integration</td>
<td>» Share experience in building capacity within your country (in-house vs out sourcing approaches for scenario development)</td>
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IRENA’s Energy Transition Scenarios Network (ETS-N)

• The purpose of the Energy Transition Scenarios Network (ETS-N) is to share and expand best practice in long-term energy scenario development and use, in support of governments pursuing political consensus and informed policy-making.

• The ETS-N provides a global platform to facilitate such best practice exchange among national and regional scenario practitioners from around the world, while connecting them with experts from leading technical institutions.

• The network offers a number of opportunities for its members to engage in IRENA’s strategic and programmatic activities in the field of energy scenario development and planning, and also informs the CEM LTES.

• The specific focus of the ETS-Network is to define:
  - Key elements required in scenarios of the clean energy transition – particularly those addressing uncharted pathways
  - Modelling approaches to better develop robust clean energy transition scenarios
  - Planning processes to better integrate clean energy transition scenarios in policy making
  - Modalities to enhance scenario planning capacity

• The activities under the ETS-Network range from regular webinars, to high-level workshops and detailed technical sessions.
Activities

The Long-term Energy Scenarios for the Clean Energy Transition campaign aims to promote the wider adoption and improved use of long-term model-based energy scenarios.

» **Workshops (throughout the year):** for best practice exchanges among scenario planning stakeholders to enhance long-term energy scenarios

» **CEM campaign partner conference (Spring 2019, Bonn):** development of proposals and finalization of recommendations to the CEM ministerial meeting

» Reporting to the next **CEM Ministerial meeting (May 2019)**

» **Best practice reports (2019-2020):** informed by events and by additional analytical work by IRENA and partners
ETS-N Webinars

Webinar schedule

The LTES webinars will be held on a near-weekly basis, beginning on November 8th 2018 at 5:30 CET:

**November 8th, 2018, 9:30-10:30 CET:**
- Alec Waterhouse – UK Department for Business, Energy and Industrial Strategy (BEIS)
- [Cancelled] Reshma Francy – UAE Ministry of Energy

**November 15th, 2018, 16:30-17:30 CET:**
- Jesús Raymundo Duque – Mexico Secretary of Energy (SENER)
- Thilago Barrai and Gustavo Naciff – The Energy Research Office (EPE) of Brasil

**November 22nd, 2018, 16:30-17:30 CET:**
- Michael Paunescu – Natural Resources Canada (NRCan)
- Glasha Obrekhli and Li Xue – Environment and Climate Change Canada
- Michael Nadew – National Energy Board (NEB) of Canada

**November 29th, 2018, 16:30-17:30 CET:**
- Uwe Remme – International Energy Agency (IEA)
- Alex Santander – Chile Ministry of Energy

**December 6th, 2018, 9:30-10:30 CET:**
- Kaare Sandholt – China National Renewable Energy Centre (CNREC)
- Niels Bisgaard – Danish Energy Agency (DEA)

**December 13th, 2018, 9:30-10:30 CET:**
- Tiina Kojonen – VTT Technical Research Centre of Finland
- German Federal Ministry for Economic Affairs and Energy (BMWi) (TBC)

**December 20th, 2018, 9:30-10:30 CET:**
- Pieter Boot and Paul Koutstaal – Netherlands Environmental Assessment Agency (PBL)
- Hiroyuki Ishida – Japan Ministry of Economy, Trade and Industry (METI)

**January 17th, 2019, 16:30-17:30 CET:**
- George Giannakidis and Brian O’Gallaghoir – IEA ETSAP

**January 24th, 2019, 9:30-10:30 CET:**
- Jill Engel-Cox – NREL Joint Institute for Strategic Energy Analysis (TBC)
- Stathis Petees – EU Joint Research Centre (JRC) (TBC)
Questions for discussion:

• What’s missing in today’s long-term scenarios?
  ▪ Which innovations in technology or business models should be reflected in long-term scenarios of clean energy transitions to 2030-2050?
  ▪ To what extent are those innovations are currently reflected in scenarios?
  ▪ How long-term scenarios in general can be made more relevant to business planning and policy making under large innovation-related uncertainties?
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Innovation

- What to plan for, what to regulate/legislate for, what to invest in (RD&D and D)
- Rudiger Dornbusch: ‘In economics, things take longer to happen than you think they will, and then they happen faster than you thought they could.’ True of innovative change.
- Have we learnt lessons from historic trends? Offshore Wind example… wasn’t accurately foreseen… feedback loop, imperfect info (developers), effect of new policies…but likely more…
- Time horizon 30 years – plenty of scope for the unexpected…
- Accounting for the unexpected – are their many examples of disruptive innovations now that we didn't have hints off 20-years ago? In generation – maybe not – but surprises in pace and relative winners/losers. Digitalisation?
- Energy storage cost reduction, Hydrogen [ocean]
- Innovations in wider society – transport (automation, ride sharing), remote working (travel more/less?)
- Digitalisation – pace can/will be quicker than capital intensive generation technologies
- Beyond technology - innovations in market design, business models, system operation – can happen quickly.
Variable renewable grid integration costs

- Variable renewable grid integration costs - concerns over how this concept is defined and how this concept may have been misused.
- In most cases, externally defined grid integration costs that are linked with certain level of VRE penetration are added on the top of something.
- Renewable energy sceptics use this as counter augment to deny the cost advantage of the VRE.
- At IRENA we have our view on how the grid integration costs should be defined and should theoretically be calculated, but we lack an practical approach to actually calculating the numbers.
- We are very interested in establishing a (long-term energy systems modelling) community’s response to the grid integration costs issue.
- Unclear if TIMES the right modelling tool to help answer this question, or do we need different type of modelling approach than energy system models to address the grid integration costs?
- The issue of grid integration costs comes up again and again. The community should establish a common response to the issue of grid integration costs, and if the energy system models have limitation to address the issue the gap should be identified.
- No yet clear what possible engagement could look like, perhaps – discuss the concept of grid integration costs, define the concept, and agree on approaches to measure it, and using the common approaches and each modelling team to quantify the grid integration costs.
- The results will inform the IRENA’s Global Energy Transition report to be published in 2020 (too late for the 2019 report).
- We can’t fund work but we can contribute by organizing meetings, and (maybe by) supporting travel costs.
Long-term energy scenarios for the clean energy transition

73rd Semi-Annual ETSAP meeting, June 18, 2018
Clean Energy Ministerial (CEM)

» A partnership of 26 countries

» Annual high-level Ministerial meeting

» Year-round technical work through initiatives

» Time-bound campaigns to raise ambition or increase visibility of topics of potential impacts
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State participants joining campaign:
Engagement of partners

State actors – officially designated by the national CEM PoC

- policy makers who are or wish to use scenarios in their strategic planning
- expert teams who support policy makers through modeling and scenario building.

Non-state actors

- technical institutions that are specialized in this field
- companies utilizing scenarios in their business planning
- Non-CEM country governments
Partner contributions

Expected partner contributions

- To attend one or more CEM campaign workshops
- To provide best practice experience in the indicated areas of interests (use of scenarios, development of scenarios, and capacity building)
- To contribute to discussions and debate to inform recommendations

Potential additional partner contributions

- To represent the Campaign in other events
- To host/offer support to organize a workshop
- To support analytical work done jointly with IRENA
Possible cooperation with ETSAP

Become an official partner/cooperate without becoming official partners

- To host/organize an event/session branded under CEM campaign
- To represent the Campaign in other events
- To participate in events
- To share the best practice experience in the indicated areas of interests (use of scenarios, development of scenarios, and capacity building)
- To discuss the “guiding questions” at relevant events and share the outcomes
- To support analytical work done jointly with IRENA
Discussion with TSO modelling experts and NGO community, on how to better...

1. Use scenarios for policy making

» Who develops scenarios - and how – can be as important as their contents

» Different mandates often direct/constrain the development of scenarios, e.g. regulated TSOs cannot always assume radical transitions that academics or NGOs are well-positioned to explore

  » However, even in sensitive contexts, establishing parallel teams or departments dedicated to more free-thinking scenario development can be an institutional solution to provide flexibility for policy makers

» Need more multi-institutional, multi-organizational, multi-methodological approaches to provide robust basis for decision making

» Rather than overly-technical and falsely-accurate descriptions of 2050, scenario framing for impact should:

  » Link to a compelling narrative
  » Present possibilities within ranges
  » Connect results to policy steps that would need to be taken immedia
  » Refer to relevant existing political processes (e.g. elections, NDCs)
Discussion with TSO modelling experts and NGO community, on how to better...

2. Develop scenarios for the clean energy transition

» A key gap in today’s scenario modelling is disruptors – how to best model technical, political, and/or social disruptions if they are poorly understood or unknown?

» Improving approaches to modelling uncertainty is arguably more important than improving long-term model accuracy

» Using up-to-date costs and knowledge of cost dynamics is still an issue in many scenarios, particularly for renewables and other clean technologies

3. Build capacity for scenario use

» Governments are good targets – understanding of models and results is often lacking

» The number and variety of scenarios can be overwhelming, and comparison can be extremely difficult for non-experts – standardization in input/output parameters could be very helpful

» Model development community needs capacity to communicate scenarios, and engage openly and critically with a diverse range of stakeholders
Scenario based planning: stakeholders

Use of scenarios for policy making

- Government planning team
- Policy makers
- Decision makers
- Civil society

Development of scenarios for clean energy transition

- Government modelling team
- Academics and research community
- International organizations
- Private companies
Scenario based planning: stakeholders

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Types of scenarios

National focus

Government institutions

- Brasil
- Chile
- Mexico

Private institutions

- UK – National Grid
- Belgium – Elia Grid

Global scenarios

- IRENA REmap
- IEA WEO
- Shell
- IPCC
IRENA’s work on scenarios: overview

**Use of scenarios for policy making**

- REmap energy transition scenarios

**Development of scenarios for clean energy transition**

- Modelling methodologies: addressing variable renewable in long-term planning
- Power system model applications with member countries

**Building and enhancing capacity**

- Energy planning capacity building programme
- Capacity building framework discussions with donor communities