

Proceedings - CEM10 side event

Planning the clean energy transition: How long-term energy scenarios can support decision makers

Part of IRENA's CEM campaign "Long-term Energy Scenarios for the Clean Energy Transition"

Wednesday, 29 May 2019, 8:00-9:00
Room MR 208/209, CEM10 Vancouver



Background

The world's energy systems are entering profoundly uncharted territory – unprecedented technological advances in power generation, transport and innovation in digitalisation make predictions about future energy conversion and use highly uncertain. At the same time, urgent Sustainable Development Goals and the Paris climate accord insist on a transition to clean energy use as fast as possible, thus compounding the complexity of representing integrated energy systems in long-term scenarios. In this context, clear views of the future energy landscape have become invaluable, and the way in which those views are developed requires a sea change.

IRENA is coordinating a group of leading government institutions from 11 countries, seven technical institutions/associations as well as other interested stakeholders and agencies to explore these issues as part of the "Long-term Energy Scenarios (LTES) for Clean Energy Transition" Clean Energy Ministerial (CEM) campaign. The campaign aims to promote the improved use of scenarios for clean energy transition, enable the exchange of best practices and facilitate work to strengthen and broaden their use. The campaign has been running since May 2018 and has since organized fourteen events and 20 webinar sessions.

This side event highlighted the insights gathered in the first year of the CEM LTES campaign. Senior decision makers from participating countries shared their experiences with effective scenario-based planning, and national experts in scenario development discussed the different roles of scenarios, how they can be communicated effectively and the scope to enhance and broaden their use.

Session format

The session started with introductory remarks from Francesco La Camera, Director General of IRENA, who provided an overview of the CEM LTES campaign, introduced the campaign's first-year findings summary, and highlighted critical questions identified during the campaign's first year of activities.

Following the introduction, a panel with high-level government users and developers from LTES campaign participating countries had the opportunity to address the audience with short interventions which later was followed by a moderated panel discussion.

After the panel discussion, two distinguished participants from the audience voiced their opinions to complement the panel discussion.

The session closed with final remarks from the moderator.

The complete programme of the side event is detailed below:

Programme

8:00 Welcome and introductory remarks from Francesco La Camera, IRENA Director-General

8:05 Panel discussion with high-level government users and developers of LTES for clean energy transition

Moderator: Dr Jill Engel-Cox, Director, Joint Institute for Strategic Energy Analysis National Renewable Energy Laboratory (NREL)

» LTES use and development for long-term policy making (5 -minute interventions):

▪ *User's perspective:*

Anders Hoffmann, Deputy Permanent Secretary, Danish Ministry of Energy, Utilities and Climate, Denmark

Thorsten Herdan, Director General, Federal Ministry of Economic Affairs and Energy, Germany

▪ *Developer's perspective:*

Thiago Barral, Executive President, Energy Research Office, Brazil

Abha Bhargava, Director, Energy Outlook, Integrated Energy Information and Analysis, National Energy Board, Canada

» How the clean energy transition demands new approaches for LTES to be relevant for policy making (20-minute moderated discussion)

8:45 Invited interventions from LTES members and distinguished attendees

Riku Huttunen, Director General of Energy Dept. Ministry of Economic Affairs, Finland

David Hochschild, Chair of the California Energy Commission, United States of America

8:55 Brief summary of the discussion from the moderator

9:00 End of session

Summary of the discussion

Opening remarks

Francesco La Camera (DG, IRENA) began by welcoming attendees and highlighting the importance of long-term visions to support short-term decision making. He mentioned that traditional modelling approaches are challenged now by the disruptions and changes that are happening in the energy sector. It has become increasingly complex to model the long-term because of the variety of assumptions that can be taken about the future. Mr La Camera presented an overview of IRENA's work and the rationale for the CEM LTES campaign. The side event will also present a brochure with first-year findings collected during the campaign activities. Among the most important findings detailed in the document are:

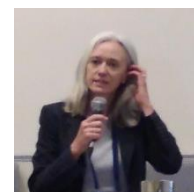


1. To be useful for decision making, scenario assumptions and results need to be transparent and clearly communicated. Conveying a crisp and clear message is key to making the most of scenario insights. Innovative communication methods are emerging that allow not only engagement with policy makers, but with a broad range of stakeholders and the public.
2. An additional finding is that the boundaries of scenarios need to be expanded to adequately reflect the complexities of the clean energy transition. Energy modelling tools and approaches that were suitable 20, 10, or even 5 years ago may no longer be up to the task. Models and approaches to plan the energy system need to better address new technologies, business models and disruptive innovations.

Mr La Camera finishes his remarks by welcoming all attendees and wishing a fruitful discussion.

Panel discussion

Moderator: Jill Engel-Cox (NREL, U.S.) mentions that JISEA collaborates with government and analysts that are looking at the integration of VRE with traditional energy sources in multiple sectors. These activities support energy transition planning in the US and internationally through several CEM campaigns: 21CPP, NICE future, Innovation future. Energy transition scenarios are important for planning the transition. The ability to model (quantitatively) and evaluate different futures is important to set research objectives, set targets, inform investment decisions and reach policy makers. Dr Engel-Cox invites panellists to join her on stage.



Anders Hoffmann (Danish Ministry of Energy, Utilities and Climate, Denmark) mentions that Denmark has been using LTES for many years. It has allowed to set realistic targets that are more ambitious and to map out the ways reach them. However, what Denmark is now seeing is that as we get closer to the desired targets, scenarios are getting more important because they will involve the general population (e.g. electric transport). Denmark has traditionally been very proud of how stable its energy system is, with high shares of VRE (wind) and high flexibility through biomass



and district heating. Currently, around 40% of the electricity mix is RE and 25% of the overall energy system, but it is agreed that these numbers could be doubled and tripled, respectively.

Dr Hoffman mentions that scenarios have been vital for political consensus in Denmark, to decide what the country wants to achieve. In the last 4 years, most stakeholders have agreed on the direction of the energy transition, but now the discussion is about the speed of the transition: some say 40, others say 50 years, based on scenario analysis. Scenarios create a common platform, it goes beyond the numbers into what the country wants to achieve.

It is mentioned that LTES are rather inflexible and therefore a second type of scenarios are developed to assess and plan the power grid i.e. dynamic modelling that considers price shifts and integration of variable renewables. This helps to assess if LTES are technically and market feasible. It is recognized that more modelling and scenario work is needed to assess the deployment of microgrids and isolated systems.

Dr Hoffman ends by mentioning that LTES with big policy bagging have been the key driver for private capital moving into Denmark. Investors know what the models are, they have access to them and they know what policies are on top of that. There is full transparency of scenarios, which reduces the risk premium for the private sector, and promotes RE investment.

Thorsten Herdan (Federal Ministry of Economic Affairs and Energy, Germany)

mentions that without LTES the transition will fail, however this does not mean that scenarios will tell the truth about the future. He presents the issues of scenarios vs. targets, which is one of chicken and egg – i.e. scenarios can be based on targets, or targets can be set with scenarios. He elaborates by mentioning the German experience of setting a target and have therefore ‘targeted-scenarios’, which inherently means that scenarios will always hit the target. He questions, if this is useful at all and agrees that it is because it shows what to do in order to reach the target. However, at the end of the day, the scenario is not telling you whether you will be able to reach the target.



Mr. Herdan states that the problem with scenario use is that, people developing scenarios believe that those scenarios will happen, as if they had a crystal ball. There is a big debate in Germany, on the ability of scenarios to capture ‘acceptance’. For example, it is understood that to deploy more renewables, Germany needs to deploy more north-south transmission infrastructure, but scenarios cannot gauge how the acceptance for this transmission line deployment will follow.

It must be clear what scenarios hint, but they will never tell the truth about the future. He also mentions that scenarios are also limited by the technology we know today and thus their inability to capture unexpected disruptions. He suggests that a good practice is to complement LTES with short-term scenarios that measure acceptance of the public, acceptance in politics, new technologies, etc.

He finishes his intervention with two examples from Germany:

1. Coal phaseout in Germany by 2038. A scenario that supports a faster market driven coal phase out could be modelled. There might be a faster way for the coal phaseout, but 2038 is what was agreed with the coal sector, this could not be simulated. However, scenarios should advise how the system should cope once coal is removed, how will VRE need to develop to replace coal and have security of supply.

2. RE target: 65% of RE by 2030. Mr. Herdan poses the issues that the basis for the 65% is not clear, and that conditions on which this basis was established will surely change in the mid-term.

Thiago Barral (EPE, Brazil) mentions that EPE is part of the structure of Ministry of Mines and Energy. EPE's mission is to provide studies, energy statistics and to support implementation of energy policy in Brazil. EPE is in the middle of the policy and practical world. EPE has been using scenarios for a long time and recently provided the energy perspective for Brazil's NDC for Paris.



Mr. Barral mentions three topics:

1. Be inclusive when developing scenarios. Not talking to IEA, IRENA, private sector, public institutions and communities, will result in poor understanding and support towards the scenarios being developed. It is valuable to have a neutral institution/developer of scenarios to coordinate and moderate between stakeholders. EPE has taken this role in Brazil and has increased accountability and trust of scenarios.
2. Long-term capacities for scenario building. Mr. Barral argues that building this capacity is difficult and requires major effort for an institution. There is also a dilemma on modelling the energy system in an integrated manner or by individual sectors (power, oil, refining, etc.) and later assess consistency? There are divided views on these approaches in the EPE modelling team.
3. Communication (the hardest and most important). A lot of work is needed to develop scenarios and it can be frustrating if at the end of the process the insights cannot be communicated to the users (policy makers). The ambition should be to use scenarios to create shared and more ambitious visions for the future. Politicians tend to prefer the shorter term to show results and concrete numbers. The only way to overcome this and provide a long-term vision, is with scenarios that can contrast short-term decisions with long-term goals.

Mr. Barral closes by stating that the energy transition is not only about power decarbonization, but how to decarbonize the economy and how to make decarbonization part of the development strategy for a country.

Abha Bhargava (National Energy Board, Canada) starts with an overview of NEB's two mandates: i) regulatory and ii) energy information. The latter is why NEB is participating in the present discussion. NEB has been building scenarios for over 50 years (first report 1967). NEB has been developing Canada's baseline for energy supply and demand and with that experience, it is cognizant of the challenges faced today: policies, technology, markets; which is evidenced by the increase in publication frequency of studies: before every 4 years, then every 2 years, and now every year, and still sometimes new things cannot be captured.



Dr Bhargava offers three points for the discussion:

1. NEB in-house modelling development. Although NEB was invited to speak from developers' perspective, the NEB is also a user of models, in fact large commercial energy models are used to produce outlooks. Macroeconomic models are also used to capture interlinkages between energy and the economy. However, to be flexible and responsive to the speed of the transition,

NEB has also developed in-house models to capture uniqueness of Canada's energy system (oil & gas). Opensource models are also being used.

2. Flexibility of the scenario development process. LTES need to be complemented with short-term scenarios. In other terms, scenarios have to be flexible to incorporate the developments taking place. Forty years ago, there was no need for flexible scenarios, but now scenarios need to 'walk-the-talk' i.e. consider what things are happening around and include them.
3. Importance of transparency and cooperation. Disclose data and assumptions and what the scenarios are about. The more transparent the scenarios are, the more comparable they are and the more the number of insights that can be derived from them. NEB has very granular data that supports the scenario work. Data visualization tools for transparency are also being developed, and the goal is to reach the average user. Coordination and cooperation are also very important. In Canada there is collaboration and communication with fellow partners (NRCan, StatsCan), and initiatives under way are very collaborative. It is important to connect with the 'bests' in the scenario development spectrum and data handling e.g. EIA and IEA, and what are the gold standards for scenario development.

Jill Engel-Cox (NREL, U.S.), post a question for all panellists: *One of the challenges for scenarios is addressing the potential for disruptions and when a tipping point might occur. How is the potential for tipping points balanced in scenarios?* For example, the upscaling of electromobility.

- **Anders Hoffmann.** Two approaches to handle this: i) more sophisticated modelling and ii) constant updating of technologies and costs in the model. The more sophisticated the modelling, the more complex, so some of the shifts just cannot be expected to appear in the scenarios. Therefore, in Denmark it is followed to keep models as simple as possible but try to update them at least every year.
- **Thiago Barral.** Caveats are included in scenario publications. It is clearly mentioned that the story could change, because there is possibly of a certain technology disruption that could occur. In this manner, those who are reading the scenario understand that the scenarios are not a prediction of the future but a way to understand trade-offs in different decisions.
- **Thorsten Herdan.** Answers the question by stating that any scenario that tries to include a disruption does not work at all. He mentions that what is called a disruption is an assumption, a wish from certain interest groups. For example, no one would have thought about the shale gas revolution in the US or being able to put wind turbines in the sea. It is better to have flexible scenarios. What does not help the policy maker is presenting a scenario with massive caveats. He closes by stating that we should move away from the 'disruptions' talk and move into assessing 'assumptions' better.
- **Abha Bhargava.** Reiterate that disruptive scenarios cannot be really modelled. The focus should rather be on identifying and assessing uncertainties. Every projection should contain the number of critical uncertainties for the results: This is what has been assumed and this is what could happen. NEB next step is to build 'niche models' (e.g. for EV deployment) and put them out as to let others change the assumptions and see what comes out. This can be a way to map the uncertainties that a wider audience could have.

Jill Engel-Cox (NREL, U.S.) closes the panel session agreeing that advancing computing capability should help make models and scenario building more available for people. Dr Engel-Cox invites tow distinguished guests in the audience to present their views on the topic.

Invited interventions from LTES members and distinguished attendees

Riku Huttunen (Ministry of Economic Affairs, Finland) mentions that one of the difficulties for LTES use is scope differing from economic planning horizons. Long-term for LTES is 2040-2050, while long-term for planning is max 2025. In Finland, there is a long history of producing LTES and long-term strategies. One important point is the involvement of different stakeholders: ministries and specially citizens (which is hard). It is necessary to look at all the societal aspects: urbanization, digitalization when building scenarios. VTT has aided Finland in creating many scenarios. The EU asks each member state for long-term strategies. For the case of Finland, it is estimated that by 2030 RE will be 50% share of the total energy mix (with existing technologies) and phase out the use of crude oil in the economy. By 2050 (EU long-term strategy) Finland could cut emission by 85-90% compared to 1990 levels but with the use of CCS and BECCS, therefore carbon sinks are important for the country. Carbon neutrality is considered to be impossible to achieve by 2035-2040. New presidency of the EU (1 July), will work on a revised EU long-term strategy.



David Hochschild (Chair of the California Energy Commission, United States of America) mentions that he is a big believer of setting bold long-term targets. For example, ten years ago a goal of having 1 million solar roofs was set in California (this accompanied by a 3bn US incentive programme). Last month California hit 1 million solar roofs and now a law has passed for 100% RE electricity by 2045. Long-term stable targets invite investment and send signals to companies to where to scale up. It creates a market transformation effect. The next goal is to have 5 million EVs by 2030 in California. Tesla is producing 1000 vehicles per day in California. Bold goals and stability send the signals to the market that drives innovation and drives costs down. Despite criticism California has noticed that doubling energy goals in the state has helped the GDP.



Brief summary of the discussion from the moderator

Jill Engel-Cox (NREL, U.S.) states the following takeaways from the session:

- » Communication of results and assumptions is important, as well as engagement with policy makers and citizens. Engaging with them to jointly set objectives is key.
- » Flexibility of scenarios to handle disruption and change. What is the purpose LTES? Is it exploring goals or establishing goals to drive action, or both?
- » Importance of collaboration. Between users and developers, countries and regions.

For any questions or more information, please contact LTES@irena.org.