

“Scaling-up renewables through decentralised energy solutions”

Paris, 28 March 2017

Workshop Report

What contribution can decentralised, local energy solutions make to driving renewables deployment and the decarbonisation of energy systems? This was the central question addressed by the annual workshop of the IEA’s Renewable Energy Working Group for which 180 government officials, industry representatives and other experts gathered in Paris. More than 20 speakers and panellists provided insightful contributions, while great audience participation made for rich discussions.

Key conclusions

Renewable energies have clearly entered the energy mainstream and there is consensus that they are a central pillar of a sustainable energy system. However, the uneven growth of renewables across sectors is becoming more and more apparent. There is an increasing realisation that tackling CO₂ calls for more attention to heating and transport which needs to be done at the local level. Meanwhile, system integration issues around wind and solar PV are emerging in more countries.

What became clear in the workshop discussions was that decentralised energy solutions cannot simply be captured by the idea of adding many batteries and solar panels together with some heat pumps and electric vehicles (EVs). What all approaches to decentralised options had in common was their focus on what service needs to be provided, rather than starting from the supply side. This is the real paradigm shift. It was also evident that energy efficiency has a critical role in integrated to meet demand for services. All cities that presented shared this, despite very different levels of potential for distributed renewables generation.

Another issue that emerged was that such a ‘systems approach’ requires the selection of an appropriate system to optimise. Cities are again a good example for this, because they are not only technically closely linked but often also there is a common governance structure across different sectors. However, planning an integrated approach between transport, industry, buildings, electricity, heating, cooling, and even water supply is a highly complex task and we have only started to really focus on developing dedicated models. There is still vast room for improvement.

Finally, the workshop demonstrated that there are many examples where policies and regulations are not well adjusted to facilitating a more decentralised and integrated approach to renewables. If renewables deployment is to successfully ramp up across sectors, it is important to get policy, markets and regulation right.

Session summaries

The workshop explored key issues around the theme of decentralised energy in four sessions.

Session 1: New business models for power

The rapidly falling costs of renewables (especially rooftop PV) and storage have opened up the scope of decentralised/distributed generation at a variety of scales. This provides challenges for the traditional utility model but also many opportunities. In this opening session, some of the world's biggest utilities (ENEL, Iberdrola and ENGIE) faced two small newcomers (Sonnen GmbH and Vivint Solar) to discuss business models for scaling up renewables. Key points from the discussions include:

- Decentralised energy is ubiquitous in parts of the world where the grid is not reliable and where customers are prepared to pay a lot for reliability. For example, India has 90 GW of diesel gen sets. PV can only offer this level of reliability when connected with storage.
- Sonnen's approach in Germany is to digitally connect batteries coupled with PV over unbundled grids. The battery 'swarm' provides a revenue stream as it offers flexibility to grid operators. Meanwhile, Vivint Solar in the US leases solar PV to homeowners at no upfront cost and provides savings over the rates charged by utilities. Both companies have seen rapid growth.
- However, the traditional utilities are also innovating. ENEL Green Power is investing in high volumes of renewables to keep costs down, Iberdrola is installing smart meters in the UK and smart solar in Spain, while Engie is focusing on providing energy services.
- Decentralised and centralised energy solutions are complementary but should all work towards the same goals. Policy and regulatory changes are needed to provide a level playing field. Some of the key issues that need to be addressed include:
 - effective prices signals (e.g. need to get rid of fossil fuel subsidies, shift charges from electricity to other fuels, consider higher fixed charges but need to be aware of fuel poverty impacts)
 - if policy changes, grandfather existing arrangements so as to not endanger ability of investors to raise funds
 - incentivise demand response and storage
 - look at electricity, transport and heat as one system.

Session 2: Drivers for change – the role of cities, industry and smart solutions

Cities and companies have been at the forefront of the shift towards more decentralised energy, with many setting themselves ambitious targets for renewables. This session heard from two cities – Seoul and Stockholm, as well as covering a number of case studies from industry and Hitachi's efforts to develop smart solutions enabling decentralised energy.

- In Seoul, campaigns and activities are underway to increase self-sufficiency in sustainable energy. These include the "One Less Nuclear Power Plant" campaign, where energy efficiency measures should save the equivalent of the output of one nuclear power plant. Incentives are in place to support the uptake of rooftop PV installations. A key success factor

is the engagement of the local population, which has been involved with the campaign from the start, and empowered to launch initiatives.

- Stockholm aims to be fossil fuel free by 2040. Options for achieving this include closing of the remaining coal generation capacity by 2022; increased use of waste heat, biogas and renewables; reduction of fossil plastics in waste incineration; the exploitation of carbon sinks; and a prohibition on fossil fuel sales. The commissioning of the Värtan biofuel CHP plant (230 MWh + 130 MWe) has significantly reduced the fossil fuel content of the city's district heating network.
- Case studies from a new report for IEA-RETD show that in industry, renewables can reduce cost, increase reliability and exploit synergies in the production process. This latter solution, which has most potential, is nonetheless underutilized as companies remain reluctant to interrupt the production process. Moreover, as energy is often not the core business, companies prefer to allocate limited capital means to other investments. The regulatory regime can support investment in renewable technologies by providing guarantees.
- Hitachi shared results of research efforts aimed at co-optimisation of gas, heat, water and electricity flows at district level. The model seeks to optimize overall flows of all utilities, either to minimize total system cost, to limit carbon emissions, or minimize the use of different utilities. In parallel, Hitachi is working to integrate advanced VRE (solar PV) forecasting tools for decentralized generation.
- The European Federation of Local Energy Companies opened the panel discussion with a call to further decentralize initiative and decision-making. Local energy companies are best placed to exploit local resources and garner support from the local community.

Session 3: Electro-mobility, storage and renewables

Electric vehicles and storage can play an important role in facilitating the integration of variable renewable power sources, with options becoming increasingly attractive to consumers at all scales. This session included presentations from Renault and the IEA, with additional perspectives during the panel discussion from the French grid operator RTE, the battery manufacturer Saft and the Italian consultancy CESI.

- For the Renault-Nissan group, electromobility changes the value chain of the car business. EVs are located within an ecosystem of various innovative services, such as smart charging and second-life battery use. There is a clear value to charging at the right time which smart charging systems allow. Renault has recently launched a smart charging pilot project in The Netherlands, in collaboration with a telephone app and local authorities. Batteries are leased, allowing a second use of the battery after its useful EV life to provide ancillary services to electricity markets.
- The IEA's analysis performed for the Electric Vehicle Initiative (EVI), a campaign developed under the Clean Energy Ministerial (CEM), shows that the global EV stock has now surpassed the 2 million mark. More than 80% of the global EV fleet is spread among 5 countries, with China alone representing more than 50%. Projections for the global EV fleet by 2040 range from 60 million (WEO New Policies Scenario), 100 million (in line with the

Paris Agreement) to 140 million (in line with 2-degree scenario). In addition, over 200 million electric 2-wheelers and 173.000 electric buses are on the roads today. PHEV battery costs have come down by 73% in the last 7 years, with a further 58% reduction projected for the coming 7 years.

- The panel discussions reiterated that EV batteries can provide value in the ancillary markets. Demand response options are increasingly important in energy systems. Currently, they are mainly provided by industrial loads but in the future, EV batteries and other storage are likely to become increasingly important. In terms of likely cost reductions, storage may be today where solar PV was 10-15 years ago.

Session 4: Heat and sector coupling

Heat accounts for more than half of final energy consumption and heat provision is by its very nature local and decentralised. However, at present, renewables play a relatively small role in most country's heat supply. This session included presentations from Frankfurt (Main) in Germany and the Danish District Heating Association, with panel contributions from heating equipment manufacturer Vaillant, Euroheat and Power, as well as the IEA Heat Pump Centre.

- Frankfurt has set itself a 50% energy reduction and 100% renewables target by 2050. The city has mapped local capacity and identified a need to be integrated with regional solutions for the remaining demand. The expansion of district heating is a priority but has to be paired with energy efficiency. Biomass needs to be prioritised for industry where there are few alternative options for emission reductions. Greater engagement from both the private sector and consumers are important and the city has set up a free advice centre where consumers can get information on sustainable energy solutions. While Frankfurt is determined to achieve its targets, it also stressed the need for support from the national level as being critical to ensuring success of city-level actions;
- In Denmark, local planning with vertical alignment has been in operation since the 1970s and will continue to play a critical role in the future energy transition. More renewables are enabled by integrated heating solutions – this involves both storage and a greater interaction across energy supply and demand.
- Issues raised during the panel segment include the issue of low energy prices acting as an obstacle to the replacement of inefficient old heating equipment, and the need for combined technology solutions (e.g. including heat pumps). Cities clearly have a major role to play in the transition to decarbonised heating and cooling systems but there is also a need for enabling national frameworks and policies.