

## IRENA INNOVATION DAY: TURKEY

### SUMMARY OF KEY INSIGHTS FROM THE DISCUSSIONS

#### EVENT OVERVIEW

Building on IRENA's biennial Innovation Weeks, **IRENA Innovation Days** are taking place in different countries and regions around the world aiming to connect national, regional and international innovators and policy makers to share their experiences and showcase emerging innovations to inspire broader and faster uptake of variable renewable energy to help deliver a renewable-powered future.

3 sessions

15 expert speakers

Over 180  
participants

Over 10 countries  
including Turkey

On **27 November 2019**, over 180 delegates from the International Renewable Energy Agency's (IRENA's) member countries gathered in **Ankara, Turkey** for the **third IRENA Innovation Day**, which was organized jointly with [SHURA Energy Transition Centre](#) and received support from the Ministry of Energy and Natural Resources of Turkey. Discussions drew upon the experiences of governments and innovative companies across Turkey and further afield, as well as upon global insights captured in IRENA's 2019 reports [Innovation landscape for a renewable-powered future](#) and [Innovation Outlook: Smart charging for electric vehicles](#).

#### SUMMARY OF KEY INSIGHTS

Countries, including Turkey, are facing similar challenges when integrating higher shares of variable renewable energy into their power systems and increasingly into their end-use sectors. Innovative solutions addressing these challenges are enabled by technology innovations. Discussions across sessions considered that impactful solutions would require a **systemic approach** that is broader than technology and **combines technology innovations with innovations in business models, market design and system operation**. Whilst discussions acknowledged optimal combination of innovations is **country-specific**, speakers recognised **common challenges** intrinsic to the power systems globally:

- » a **greater need for flexibility** of generation, transmission, demand-side resources as well as system operations to maintain the balance between generation and load uncertainty; and
- » a **greater need for new business models** to seize new opportunities for various actors.

Discussions then aimed to ensure attendees acquired a better understanding of what is happening, what is possible and what needs to be explored further. Panels showcased examples of innovations that are being explored in Turkey and are helping to address system's needs while highlighting some innovative solutions from around the world that could be valuable to Turkey; and jointly identified and discussed gaps and opportunities in a new energy landscape.

#### SESSION 1: DIGITAL SOLUTIONS FOR ENGAGED CONSUMERS

Discussions explored how digitalisation-enabled business models engage consumers and in turn allow integration of higher shares of variable renewables, whilst providing flexibility to the power system. The panel was **moderated by Dr Dolf Gielen**, IRENA's Director of Innovation and Technology Centre, whilst the scene was set by Martina Lyons, IRENA's consultant. The following **panellists** joined the discussion:

- Mr Can Arslan, Energy Web Foundation Ambassador, Foton Co-Founder
- Mr Roda Kum, Senior Sales Manager for Grid Solutions Services MENAT, GE Renewable Energy
- Mr Servet Akgün, Co-Founder and Managing Partner, Pure Energy
- Mr Ulrich Haberland, Head of Product Development in Germany, Statkraft

### Highlights from the discussion:

- » **Digitalisation, decentralisation and electrification**, innovation trends accelerating power sector transformation, **allow new flexibility sources**. In traditional centralised power systems flexibility was provided on the supply side. To allow higher penetration of variable renewable energy, additional sources of flexibility are increasingly needed to ensure stability of the power system.
- » **Distributed Energy Resources (DERs) offer additional flexibility potential on the local and transmission level**. DERs enable deployment of variable renewable energy into the system and can provide flexibility and other services through demand-response, storage or sector coupling. But their potential is far from fully tapped and requires innovative approaches, including coupling DERs with digital technologies to help boost the efficiency and resiliency of power systems.
- » **Put industrial, commercial and residential consumers' engagement in the centre**. To motivate consumers so they adapt their consumption to the grid needs and offer their flexibility services, it is important to remove barriers, create price signals strong enough to shift their consumption patterns, educate, inform and empower them. In an effort to increase consumers' literacy, Turkey has launched a series of educative videos to inform stakeholders and share best practices. For example, in the US in places such as industrial zones, simple microgrid applications with large consumers with different generation and consumption profiles are able to reduce their costs significantly without being affected by the grid through synergies with distributed electricity generation facilities.
- » **Digital technologies are key enablers to facilitate physical integration of DERs and increase consumers' engagement**. To maximise their effectiveness, digital technologies need to be implemented together, as they support the system in different ways.
  - **Internet of Things and Artificial Intelligence** allow more data to be collected and intelligently analysed, which in turn yields meaningful results and enables systems to operate more efficiently. **Smart meters** are digital systems that provide information in addition to pricing services. Using such data allows the consumption of electricity to be shifted to a different time or to react to the electricity price signal, while helping consumers to become an active participant and relaxing the electricity grid.
  - **Blockchain** enables transactions between parties without intermediaries in a low-cost way, maintains privacy and security of data and transactions, and allows for a greater transparency. Its current contribution is mostly in the field of traceability and peer-to-peer trading but is increasingly focusing on **smart meters**. Its disruptive potential is however only in the beginning to be fully understood.
- » **Aggregation unlocks the potential of individual DERs to provide grid services**. Aggregators capture flexibility from many small-size DERs. Also referred to as Virtual Power Plants (VPP), they are a new business model seen by some as 'Utility 2.0', flexible, yet intermittent generation and flexible consumption that is aggregated in a digital way and extract connectivity through market operation. While regulations are crucial for the full development of new business models, VPPs have been implemented in Turkey despite a lack of regulation. They have been enabled by sharing experience and best practices that allow replicability of solutions in different country-contexts.
- » **Find a balance between market forces and enabling regulatory frameworks**. While overarching areas are important to be regulated (e.g. carbon price), regulation of small areas (e.g. parameters of technology) hampers innovation and progress. Stakeholders expect regulation to set clear goals that aim to optimise the use of power and flexibility of power, while making electricity cheaper and affordable. Design and implementation of regulations should be complemented by a clear and effective communication campaign targeting all stakeholders.

**SESSION 2: ELECTRIFICATION OF TRANSPORT SECTOR**

Discussions explored the potential of electromobility to unleash synergies between clean transport and renewable electricity and examined a role of smart charging to enable integration of renewables into the power systems and unlock flexibility. The panel was **moderated by Dr Oguz Can**, Director of Department of Energy Efficiency and Environment at the Ministry of Energy and Natural Resources of Turkey, whilst the scene was set by Dr Dolf Gielen, IRENA's Director of Innovation and Technology Centre. The following **panellists** joined the discussion:

- Mr Cem Bahar, Managing Director, E-ŞARJ
- Dr Gökhan Demirci, R&D Director, Aspilsan
- Mr Halil Oruç, Expert, Ministry of Energy and Natural Resources of Turkey
- Dr Julia Hildermeier, EU Programme Associate, Regulatory Assistance Project

**Highlights from the discussion:**

- » **Electrification of transport is becoming a widespread trend.** China, US and Norway are leading with the largest number of electric vehicles (EVs) on the roads. To enable higher penetration of EVs into the market, countries are introducing various incentives including taxation or subsidies, as well as finance neutral instruments such as bonus miles, reduced parking fees, specially-dedicated lanes.
- » **Cities are major laboratories for successful e-mobility policies.** This requires a holistic approach that tackles air pollution, whilst coupling transport policies with grid planning. It includes setting ambitious targets, deploying vast infrastructure, planning beyond EVs and integrating other transport modes, such as public transport.
- » **Smart pricing, smart technologies and smart infrastructure are three areas of opportunities to be addressed jointly.** All countries, including those that are not yet frontrunners in EVs, should start planning for e-mobility now to unleash synergies between transport and power sectors.
- » **Smart pricing should reflect both costs of production and costs of delivery of electricity to the EV.** With more variable renewable energy in the power systems, only more dynamic, granular and complex tariff designs allow solar and wind energy to be used efficiently. Smart pricing, such as time-of-use tariffs, helps consumers to shift charging to cheaper and less constraint periods, brings real financial benefits to consumers and proves that consumers do respond to price signals. With cost reflective network tariffs, oftentimes fix and high and in Europe amounting to 30% of the bill, consumers can be further incentivised to shift their charging patterns, which in turn supports real-time balancing of the grid and helps to flatten peak demand.
- » **Price signals are as important for consumers as for charging point operators.** Price signals play role in motivating charging point operators to develop new business models to offer new types of services, while ensuring the network works smoothly.
- » **Smart charging is key for optimal utilisation of grid flexibility.** In recent years, smart charging applications in Germany brought significant reductions in electricity grid investments. Although smart charging is difficult to apply at public charging points, to date these applications have been implemented in 90% of homes and businesses globally.
- » **Installation of public charging points should consider using existing infrastructure.** Examples of a utilisation of street light poles as chargers in the UK have impacted positively both their roll-out and need for investment. While Turkey does not have yet any incentives for EVs purchase in place, their priority is on installing public charging points (e.g. underground garages) by 2021 in the Black Sea and the eastern part of the country.
- » **Greater interoperability facilitates a steady growth in EV adoption.** The EU is currently reviewing its two basic access mechanisms to charging: 1) contract with a service supplier and 2) an (ad-hoc) charging at any point across the EU. Revisions identified lacking interoperability as a key barrier for e-mobility market roll-out, particularly for the ad-hoc access that requires to be simple and consumer friendly, also in terms of payment.

- » **Battery technology development should be accelerated.** Despite a recent shift towards the EV grid integration to benefits consumers, grid and the environment, global discourse should equally focus on incentivising battery development across value chain. A strategic cooperation in the field of battery technology development for the transport use has been launched in Turkey between Aspilsan and TUBITAK. The production is lithium-ion oriented leveraging local raw materials use.

### SESSION 3: DSO 2.0

Discussions explored future business models and innovative solutions for DSOs in the evolving power system model characterized by increased integration of variable renewable energy resources and scaled-up deployment scaled-up of distributed energy resources. The session was **moderated by Mr Philipp Godron**, Senior Associate from Agora Energiewend with Dr Değer Saygın, SHURA Energy Transition Center's Director setting the scene. The following **panellists** joined the discussion:

- Dr Hülya Akinç, R&D Manager, DSO Başkent Elektrik A.Ş.
- Mr Mustafa Yavuzdemir, Energy Expert, Energy Market Regulatory Authority
- Mr Oytun Alıcı, Coordinator, Association of Distribution System Operators
- Mr Ozan Korkmaz, Partner, Aplus Enerji

#### Highlights from the discussion:

- » **Decentralisation, digitalisation and electrification**, innovation trends driving the power sector transition, **creates a new environment for distribution system operators (DSOs)** to harness opportunities from existing and newly connected distributed energy resources at distribution level.
- » **Digital technologies open new opportunities and revenue streams for DSOs.** The application of digital monitoring and control technologies create opportunities for DSOs to grow their businesses beyond traditional energy sales, by developing and providing new services to consumers, whilst helping them understands implications of bidirectional monetary and energy flows.
- » **Roles of DSOs are shifting in today's energy system.** DSOs need to cope with changes emerging from increased production from variable renewable energy, effective integration of EVs and demand-side flexibility. DSOs in their new roles are increasingly required to optimise local consumption and generation and act as neutral market providers and facilitators in the development, management and operation of networks. DSOs need to actively seek new incentives and business models to manage peak load, grid voltage or network congestion.
- » **Coordination between DSOs and TSOs is key to utilise flexibility-based solutions effectively.** This need is driven by changing roles and location of distributed energy resources (DERs) within transmission and distribution networks. DSOs and TSOs need to put in place a right coordination mechanism and exchange appropriate data and information to ensure a more efficient and flexible power system. There are several ongoing projects between Turkish and European DSOs, TSOs and other actors that are exploring news roles for DSOs and these coordination schemes with TSOs in country-specific contexts, with regulators comprehending new areas to ensure such coordination is beneficial for the market and consumers.
- » **Long-term vision of DSOs increases confidence in investments and public awareness.** Association of all 21 DSOs in Turkey has developed a comprehensive report on DSOs visions and objectives until 2035 that covers smart grids, including smart meters, infrastructure, cybersecurity, estimation of investment needs, EV charging, among others. The report emphasises a need to determine network flexibility planning by performing cost-benefit analysis between 2020 and 2025. It sees current market design as an incentivising tool, but its design needs to encourage innovation.
- » **Consumers and their expectation as DSOs' principal focus area.** To further incentivise consumers, it is important to first understand current factors of consumers' disengagement (including system's complexity, lack of trust, etc.) and a mismatch between expectations of their potential gains and those available on the market.

## CONCLUSIONS

Driven by the energy security, new business opportunities and new employment prospects, Turkey has been focusing on utilising more of its abundant local renewable energy resources, particularly variable wind and solar, which creates pressure on the flexibility of the power system to maintain balance between uncertain supply and demand at all times. Policy makers are catching up with trends in the neighbouring Europe and are frequently working under the EU umbrella on projects of common interests. However, more needs to be done. Particularly, in addition to the supply side, discussions recognised that flexibility sources need to be tapped also on the demand side provided by distributed energy resources (DERs) particularly demand-response, storage and sector coupling.

It was also recognised across sessions, that changes are being driven largely from bottom up by companies including start-ups that see a business potential in the energy transition, proximity to the European electricity market, etc. They are being inspired and are consequently adapting and deploying innovations, including enabling technologies (digital technologies, storage, EV smart charging) and business models (aggregators). They oftentimes act regardless of a missing or insufficient regulatory framework and seek to design business models, set an example and encourage innovative behaviour from other innovators, policy makers, regulator, TSO and DSOs to develop enabling market design (time of use tariffs, or other dynamic pricing) or system operation (coordination between TSO and DSO).

To build a market that is coherent, well-functioning and inclusive, discussions emphasised that **firstly** Turkey needs to ensure that **smart and clean infrastructure is in place**. This includes grid infrastructure (transmission lines, superconductors, etc.) but also smart meters, energy storage and EVs charging stations (incl. smart charging – public and private) enabled by digital technologies and market design. **Secondly**, identified **innovative solutions** need to be **interoperable and straightforward to implement and use** by various actors. This would include various business models, such as aggregators enabled by digital technologies. **Lastly**, Turkey needs to **design and implement supportive policy and legal framework** and **engage and empower consumers** to ensure they have the choice and can become active energy market players.

In addition, participants emphasised the importance of organising these types of events to create an opportunity for a diverse group of innovators and policy makers to **gather, discuss** challenges, **share** insights into the deployment of various innovative solutions but also **explore partnerships and collaborations** between national and international, private and public stakeholders to allow higher integration of variable renewables and distributed energy resources, enable consumers' engagement and seek ways to unleash synergies between power and end-use sectors.

To conclude, energy transition is happening in Turkey, but more needs to be done. One of the challenges and equally an opportunity is to use considerable flexibility offered on the demand side.