Ministerial Roundtable
'Innovation for the Energy Transformation: E-mobility'

Eighth session of the Assembly – 14 January 2018

1. IRENA estimates that, by 2050, the accelerated deployment of renewables and energy efficiency can achieve 90% of the energy-related emission reductions needed to achieve Paris Agreement climate goals. Such a transformation of the energy sector is technically and economically feasible, and leads to additional benefits, including economic growth, job creation, health and welfare, wider access to modern energy and sustainable development.

2. Such energy transformation requires a seven-fold acceleration of renewables deployment compared to recent years. A rapid transition is already occurring in the power sector; today, around a quarter of global power supply originates from renewable sources and this share is rising by about 0.7% per year. This average global growth rate, however, is not evenly distributed across countries, regions or sectors.

3. The Ministerial Roundtable on 'Innovation for the Next Stage of the Power Sector Transformation' at IRENA's sixth Assembly in 2016 stressed that innovation has played, and will continue to play, a critical role in the power sector transformation process. Digitisation, for example, has already become a driver for energy sector innovation. Fostering new business models, greater flexibility in power systems, and closer interaction among all energy market stakeholders, in combination with enabling policy frameworks, digitalisation has the potential to accelerate the energy transition even further.

4. End-use sectors, such as industry, transport and buildings, produce around 60% of all energy sector CO2 emissions, but so far, the deployment rates of low-carbon technologies in these sectors have been too slow to achieve significant reductions. Given this challenge, new approaches are emerging to decarbonize the end-use sectors, as experienced at present in the transport sector through electro-mobility (e-mobility). For certain applications such as delivery vans, an economic case exists today for electromobility. For other applications rapidly falling battery cost will result in an economic case in the near future. E-mobility offers the prospect of entirely new mobility paradigms, as witnessed by the growth of electric two-wheelers in Asia or urban self-driving car services upon demand.

5. E-mobility may significantly contribute in reducing local air and noise pollution. Fossil fuels create air pollution by emitting particulate matter, NO_X, SO_2 and volatile organic compounds (VOCs). IRENA's analysis indicates that if these emissions were valued by their impact on human health and agricultural crops, external global costs from use of fossil fuels in the transport sector would be in the range of USD 460 billion-2400 billion per year, based on 2010 data. Pollution from passengers' transport is more severe in densely populated cities, thus the increasing interest from cities in promoting e-mobility.

6. It is now important to understand the drivers and the impacts of the rapid growth of e-mobility, in order to adapt energy systems to this new paradigm, in particular its link to renewable energy deployment harnessing multiple benefits, including the reduction in air and noise pollution in cities and the decarbonisation of the transport sector.

An emerging transport sector transformation

7. Electric vehicles (EVs) are starting to make inroads in the transport sector. In 2016 alone, around 800,000 electric cars were sold. This represents around 1% of total car sales and a doubling from the previous year. These car sales are complemented by rapid growth in electric buses, electric delivery vans and two-wheelers.

8. In the Netherlands and Norway, on average, one out of every five cars sold is an EV. The total stock of EVs has surpassed the 2 million threshold at the end of 2016. China, Japan and the US account for around two-thirds of the total global EV stock. Countries including China, France, Germany, India and the United Kingdom are now setting electric mobility targets. China has announced an obligatory target of 10 percent EVs in total car sales by 2019, and France and the United Kingdom have announced a ban on the sale of internal combustion engines by 2030. This revolution is driven by rapid technological progress, spurred by cars with a 400-500 km range and faster charging times, and costs that are falling to levels comparable to those of conventional cars. Various manufacturers have announced that they want to focus on electric cars in the coming years.

9. The advent of EVs is going to be a game-changer for renewable power for several reasons. EVs offer a viable opportunity to transform the transport sector and to introduce much higher shares of renewables. Car charging can create significant additional electricity demand, thus creating extra demand for renewable electricity. This offers a promising prospect for decarbonising transportation, while significantly reducing air and noise pollution, energy imports, and providing new technology options to rethink urban mobility.

10. The sheer volume of car batteries that will be added in the coming years has the potential to dwarf any other form of electricity storage. Those car batteries can help in integrating higher shares of variable renewable power by providing additional flexibility to balance supply and demand. The so-called Vehicle-to-Grid (V2G) technology allows car batteries to actively support and interact with renewables-based power systems. With V2G technology, electricity not only flows from the grid to the EVs to charge them, but it can also flow from the EV injecting electricity into the grid. Another option for EVs to interact with power systems is through second-hand car batteries, which are still functional and may warrant their use for stationary applications

11. Importantly, to advance the model of EVs supporting a high integration of variable renewable power, smart charging strategies are essential. If everyone charges in the morning or evening, this will exacerbate system stress. The timing of charging is therefore critical. If this process is managed properly, it can facilitate higher shares of variable renewable power in the generation mix. This has implications for the recharging infrastructure and for the market design. Charging technology should be standardised, easily accessible to users and charging times should continue to be reduced. At this moment, full charging times for an EV may take place overnight, while new technologies are being piloted that can reduce this time to less than 15 minutes. However, these ultrafast charging technologies require high power systems which are expensive and their impact on the power grid or vehicle batteries is not yet clear.

The innovation agenda

12. The MRT will explore the synergies between transport sector electrification and an accelerated renewable energy deployment. E-mobility will impact power supply and demand, while opening new possibilities for scaling-up renewable energy deployment. As such, e-mobility is a development with cross-cutting implications, to be considered by policy-makers from transport, energy and buildings sectors. Furthermore, many of the developments in e-mobility will take place at the state and municipal level, requiring close coordination between local and national policies in this field.

13. In the private sector, different players such as utility companies, oil companies, electronics companies and retailers start to be active in EV recharging. More traditional car manufacturers are entering the EV market accompanied by new entrants such as logistics or battery companies now interested in manufacturing their own EV fleets.

Questions for discussion

- How can the role of renewables in the transport sector through e-mobility be better promoted? How can discussions on the transformation of the energy and the transport sectors be connected to benefit from the potential synergies? What can IRENA do to bring these two debates closer?
- What are the key challenges for deployment of EVs at scale?
- What are today's business models and best practices to deploy EVs to enable more renewables that can be applied elsewhere? What is the role of government in making this energy transformation happen?
- Can big data and artificial intelligence facilitate the interlinkages between EVs and renewables deployment? How can the roll out of the recharging infrastructure that will enable RE integration to be steered?
- How can consumers be engaged in using EVs as service providers for power systems (e.g. price signals, automation, attractive features for their cars as add-ons)?
- Who are the key actors - existing car manufacturers, utilities, ICT companies, others?