

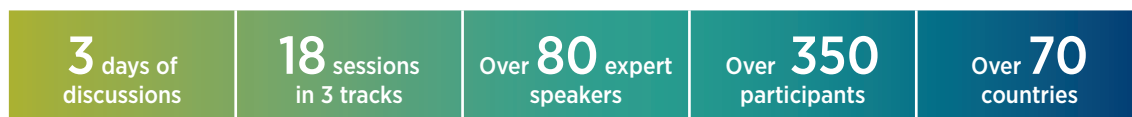
INNOVATION WEEK 2018 SUMMARY: KEY INSIGHTS, IMPLICATIONS AND NEXT STEPS

1. Event overview

A transformation of energy systems is underway worldwide, setting the course towards a more inclusive, secure, accessible, low-carbon and sustainable future. Renewable power, particularly from the variable renewable energy (VRE) sources of solar and wind, is central to that change.

Progress is being made, costs have fallen, and solutions are emerging. However, to ensure secure energy access and to tackle climate change, the pace needs to be far quicker. Delivering a renewable-powered future will require the cost-effective integration and expanded use of high shares of variable renewable energy.

IRENA Innovation Week 2018 (IIW18) was convened to explore some of the solutions needed to achieve this.



On 5-7 September 2018, delegates from more than 70 member countries of the International Renewable Energy Agency (IRENA) gathered in Bonn, Germany, for IRENA's second Innovation Week. The diverse group of over 350 experts and decision makers from the public and private sectors met for three days, aiming to: showcase examples of innovative solutions from around the world; deepen their mutual understanding of the opportunities and challenges; and explore how to accelerate and broaden the uptake of solutions and so benefit many more countries.

Discussions focused on the latest developments in **enabling technologies, business models, system operation** and **market design** that are:

- » Enabling much **higher deployment** of variable renewable energy sources, such as solar and wind;
- » Increasing the **flexibility of power systems** to integrate variable renewable generation at lower costs than present options;
- » Supporting the **increased electrification** in the end-use sectors of transport, industry and buildings, powered by renewable electricity.

The presentations and discussion confirmed huge progress during the two years since the first IRENA Innovation Week. Yet significant challenges remain.

The event was informed by past and ongoing IRENA analysis and built on the success and insights from IRENA's first Innovation Week in 2016. Speakers and delegates came together for 12 sessions (spanning **Markets and Citizens**, **Digitalisation and Decentralisation**, and **Electrification** tracks), plus five plenary discussions. In addition, an interactive Global Innovation Showcase highlighted the work of 15 award-winning small and medium-sized enterprises.

Through the efforts of hundreds of pioneering companies, supported by far-sighted governments, many of the innovative solutions required for a renewable-powered future are already available. As IIW18 underlined, the challenge (and opportunity) now is to accelerate and broaden the uptake of those solutions, so that all countries can reliably integrate high shares of renewables into their energy systems.

2. Summary of key insights and implications

The key insights and priorities for action from IIW18 discussions are summarised below. These points are expanded on in Annex A and B of the on-line version of this report, and in a series of Session Summary Reports. Those documents together with videos of all sessions and the slides presented are available on the IRENA Innovation Week website (<http://innovationweek.irena.org>).

	Insight		Challenge	Implications
1	Many renewable energy integration solutions are already available, and pioneers are showing what can be achieved.	Many of the solutions we need (for the cost-effective integration of renewable power and the electrification of end-use sectors) exist, and a globally diverse range of countries and companies are leading the way, pioneering innovative solutions and demonstrating their potential...	... <i>but</i> , to date, relatively few solutions are being widely deployed, and, where deployed, they are not being utilised to their full potential. A big gap remains between the front-runners and the trailing pack in the adoption of innovative solutions. Many decision makers are uncertain about the right solutions for their applications.	<ul style="list-style-type: none"> » Uptake needs to be accelerated and broadened to many more countries and companies. » Many more countries and companies can take confidence and inspiration and learn from the experiences of pioneer adopters. » Learning should be more widely shared. Insights from trials and pilots should be more fully and systematically captured and more widely disseminated.
2	Considered, clever and flexible market design is essential to foster innovation.	Some energy markets and regulations are showing how markets can carefully and cleverly be adapted to reflect the needs of power systems with higher shares of VRE and to respond to the trends of digitalisation, decentralisation and electrification...	... <i>but</i> , in many countries policy makers and regulators are still unclear on the consequences of the shift towards VRE and are concerned about the implications for security and reliability of supply. Existing regulations are often a barrier to the piloting and adoption of innovative solutions.	<ul style="list-style-type: none"> » Governments and regulators need to work with industry to create safe and secure opportunities for innovations to be trialed and, if successful, adopted. » More sharing of experiences and lessons learned is needed to give confidence to regulators on what can be done and how to do it.

3	<p>Innovation has the most impact when it reflects the needs and wishes of consumers and communities.</p>	<p>Increased decentralisation of energy resources, increased local ownership and increased awareness of the environmental implications of energy production is changing the ways that people engage with the energy system. Consumers and communities must be involved with and benefit from the transition...</p>	<p>... <i>but</i>, there is only a limited understanding of how end-users will interact with the energy system, and current operating models do not fully reflect the needs of citizens or the potential role of active consumers.</p>	<ul style="list-style-type: none"> » Governments and companies need to gather better insights into consumers' needs and expectations and their willingness to adopt innovations, and should tailor solutions accordingly. » Some consumers are likely willing to play an active role in the energy system, but the benefits must be clear and automation is needed to make responses simple.
4	<p>Digitalisation can enable smarter, better-connected, more reliable and ultimately lower-cost energy systems.</p>	<p>Digital innovations (such as artificial intelligence, the Internet of Things, blockchain, etc.) are starting to significantly impact power systems in many different ways, with applications in supply, system operation and demand being piloted by both start-ups and established energy companies...</p>	<p>... <i>but</i>, that disruptive potential is only beginning to be understood and is far from being fully exploited. The implications for established models and actors and the risks are not yet fully understood.</p>	<ul style="list-style-type: none"> » Technologies exist, but smart applications are still limited. Energy systems should make far more use of the "smartness" that digital innovations enable. » Many more pilots and deployments of digital-enabled solutions are needed in a wider range of circumstances.
5	<p>Renewable energy-supplied electrification will be the primary route for decarbonising transport, buildings and industrial energy use, if done intelligently, while also providing greater flexibility for the integration of solar and wind power.</p>	<p>Driven by the increasing affordability of renewable electricity and by falling costs for end-use technologies such as electric vehicles, coupled with the need to decarbonise end-use sectors, electrification will rapidly grow to dominate transport, buildings and industrial energy use. These new uses can provide great flexibility to the power system and support the integration of high shares of variable renewables...</p>	<p>... <i>but</i>, that trend will create both new supply challenges and new flexibility options. Unless carefully and intelligently managed, power systems risk being disrupted or costs risk rising significantly.</p>	<ul style="list-style-type: none"> » More analysis and pilot programmes are needed to better understand the potential of electrification for each sector and the infrastructure consequences. » Electrification strategies must be planned carefully and delivered intelligently, with close connections to strategies for the accelerated roll-out of renewable energy and consideration of wider societal changes.

3. Next steps for IRENA

The richness of discussions and feedback from many participants demonstrated the value of IIW18 in bringing together a diverse group to explore and share insights into the many common challenges and opportunities of innovative solutions for renewable power integration. While the event showcased a great deal of progress, much more can and should be done.

IRENA's innovation programme aims to support countries in accessing the information and learning that they need to support innovation in their country and to apply innovations in their energy systems. IRENA will use the insights gained from this event, alongside insights from other related activities, in upcoming events and reports. In particular, IRENA will:

- » Utilise its convening forums to disseminate insights from the IIW18 discussions and explore implications. For example, a Ministerial-CEO roundtable discussion on the disruptive impacts of innovation in renewable-powered energy systems is to be held at the IRENA Assembly in January 2019.
- » Publish a detailed analysis of the Innovation landscape for the integration of variable renewable energy during the coming period. That project should help decision makers navigate key choices to be made to foster innovation and provide a thorough overview of the innovations and solutions emerging around the world. A clear, easily navigable framework is intended to show how the many emerging innovations relate to each other and to the energy system, and which innovations could be relevant to different system needs.
- » Explore further opportunities to convene its membership and the private sector, including co-organising national or regional Innovation Days in 2019 and 2020 and convening a third IRENA Innovation Week (tentatively) planned for mid-2021.

IRENA will also explore additional ways to further support these objectives. For example, IRENA will consult with its members on mechanisms for strengthening the gathering and sharing of insights from pilots and pioneering deployments.

For further information on the insights from this report, to provide comments or feedback, or to express interest in engaging with IRENA's follow-on activities, please contact the Innovation Week team at IRENA: innovationweek@irena.org

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