

European Space Agency – Space for green growth and clean energy The Impact of Regulation and Policy on the Clean Energy Sector

The Energy Transition Globally in Power and End-Use Sectors requires Smart Regulation

Dr Roland Roesch; Deputy Director IRENA Innovation and Technology Center, 14 th September 2020

Overview IRENA

MANDATE

To promote the widespread adoption and sustainable use of **all forms of renewable energy** worldwide

OBJECTIVE

To serve as a **network hub**, an **advisory resource** and an **authoritative**, **unified**, **global voice** for renewable energy

SCOPE

All renewable energy sources produced in a sustainable manner



Wind - The strong business case: falling costs



IRENA costing database of 15,000 large scale RE power projects and 1.5 million rooftop PV systems

Covering half of all existing and planned RE capacity

Cost reductions continue in key renewable power technologies



In most parts of the world today, **renewables have become the lowest-cost source of new power generation.**

Cost reductions will continue over the next decade falling between 25% and almost 60%.

The bulk of emission reductions: renewable and efficiency

To achieve the Transforming Energy Scenario, energy-related CO₂ emissions need to fall by 3.8% per year on average until 2050. Annual energy-related CO₂ emissions would need to decline by 70% below today's level by 2050. **Over half of the necessary** reductions come from renewables and one quarter from energy efficiency measures. When including **direct and indirect** electrification (such as green hydrogen and technologies like EVs), the total reductions increase to over 90% of what is required.



Energy-related CO2 emissions, 2010-2050

Transforming Power and End-Use



Power systems flexibility propelled by three trends



Decentralisation –supply side. Wind and PV is largely centralised today but distributed generation - notably rooftop PV, ~ 1% of all electricity generation today – is growing, bringing new flexibility opportunities at demand side

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- II. Electrification –demand side. It plays in two ways, may decarbonise end-use sectors through renewable electricity and, if done in a smart way, become a flexibility source to integrate more renewables in power systems
- III. Digitalisation –system integration. Covert data into value by optimising complex systems with more actors involved, many small generation units and new type of loads





Emerging innovations for wind and solar PV integration



COIRENA

INNOVATION LANDSCAPE FOR A RENEWABLE-POWERED FUTURE: SOLUTIONS TO INTEGRATE VARIABLE RENEWABLES



Innovation Landscape Report

•	ENABLING TECHNOLOGIES		BUSINESS MODELS		MARKET DESIGN		SYSTEM OPERATION	
1 2	Utility-scale batteries Behind-the-meter batteries	12 13 14 15 16	Aggregators Peer-to-peer electricity trading	17	 17 Increasing time granularity in electricity markets 18 Increasing space granularity in electricity markets 19 Innovative ancillary services 20 Re-designing capacity markets 	25 26	Future role of distribution system operators Co-operation between transmission and distribution system operators	
3	Electric-vehicle smart charging		Energy-as-a-service Community-ownership	18				
5	power-to-heat Renewable power-to-hydrogen		Pay-as-you-go models	19 20		27	Advanced forecasting of variable renewable power generation	
6 7	Internet of things Artificial intelligence and big data Blockchain				 21 Regional markets 22 Time-of-use tariffs 23 Market integration of distributed energy 	28	Innovative operation of pumped hydropower	
8						29	Virtual power lines	
9 10	Renewable mini-grids Supergrids				24 Net billing schemes	30	Dynamic line rating	

CEER **Council of Europea** Energy Regulators

Source: IRENA (2019), Innovation landscape for a renewable-powered future: Solutions to integrate variable renewables

power plants

Flexibility in conventional

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1. 'Internet of Things' - applications for RE power systems >> DATA COLLECTION AND TRANSFER





Increased power sector complexity requires a combination of digital innovations



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New Responsibilities for Regulators









IRENA VIRTUAL EDITION

Renewable solutions for transport and industry

5 - 8 October

https://www.irena.org/events/2020/Oct/IRENA-Innovation-Week-2020