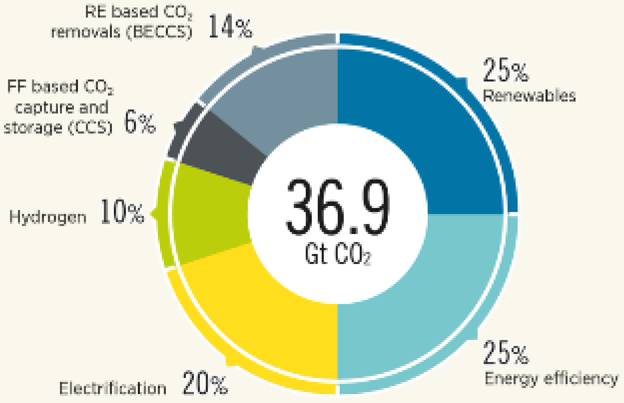
The Next Frontier for Renewable Energy

Gauri Singh
Deputy Director General
International Renewable Energy Agency - IRENA

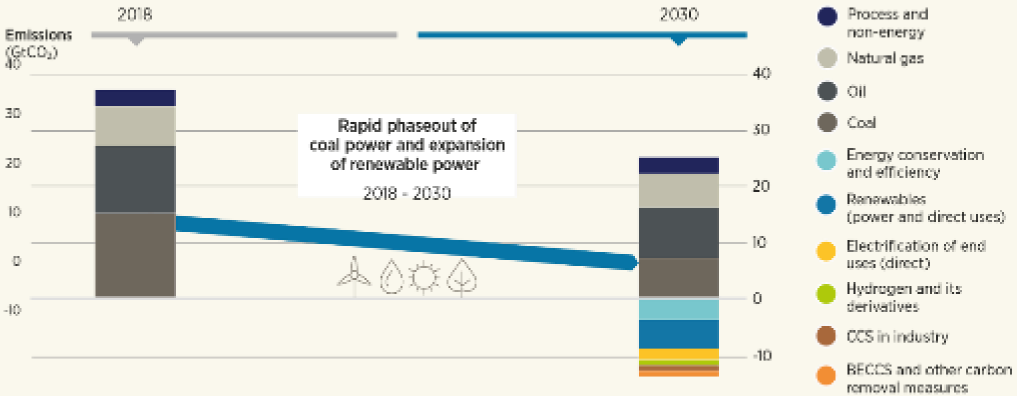
Renewables, efficiency and electrification dominate the energy transition

Reducing emissions by 2050 through six technological avenues



90% of all decarbonisation in 2050 will involve renewable energy through direct supply of low-cost power, efficiency, electrification, bioenergy with CCS and green hydrogen.

Key milestones and actions for rapid emission reductions



- **Ramping up renewables**, together with an aggressive **energy efficiency** strategy, is the most realistic path toward halving of emissions by 2030.
- The **decarbonisation of end-uses** needs to make much faster progress, with many solutions provided through electrification, hydrogen and the direct use of renewables.
- A **comprehensive set of policies** is needed to achieve the necessary levels of deployment by 2030 and maximise benefits.

Community Energy Benefits

Taking place on both large and small scales, a community energy initiative incorporates at least two of the following elements:

Community energy can accelerate renewables deployment in a just and inclusive manner:

- **Socio-economic gain** through investment, job creation and improved welfare
- **Increased energy security** through lower energy costs and greater price certainty
- **Accelerated access to renewable energy** through citizen-driven innovation
- **Broadened participation** in the energy system

Case studies

A number of successful initiatives in Europe demonstrate how community energy can drive the energy transition while delivering multiple benefits locally:

UrStrom

Location/policy environment – UrStrom is driving the local energy transition in Mainz, Germany through democratically planned and owned solar PV projects.

Socio-economic impact – Leading the transport revolution, UrStrom has launched an e-car service and helped establish national and European organisations focused on e-mobility.

Som Energia

Location/policy environment – Initiatives like Generation kWh highlight how Som Energia has overcome policy barriers by developing innovative ways for its members to finance renewable energy projects.

Ownership and governance – Spain's largest non-profit renewable energy co-operative, Som Energia now supplies 125 000 customers with renewable electricity.

Enercoop

Location/policy environment – Enercoop is France's largest 100% renewable energy supplier in a country that derives 10% of its electricity from renewable sources.

Ownership and governance – Enercoop's decentralised approach to organisation enables it to work on energy issues at a local level. It now has over 55 000 members in 11 co-operatives operating across France.

Ideal Storage for GW-Scale Solar – Large-Scale Pumped Hydro

Selection of storage technology depends on the service they can provide

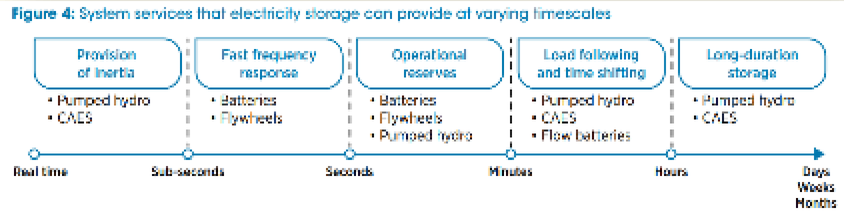
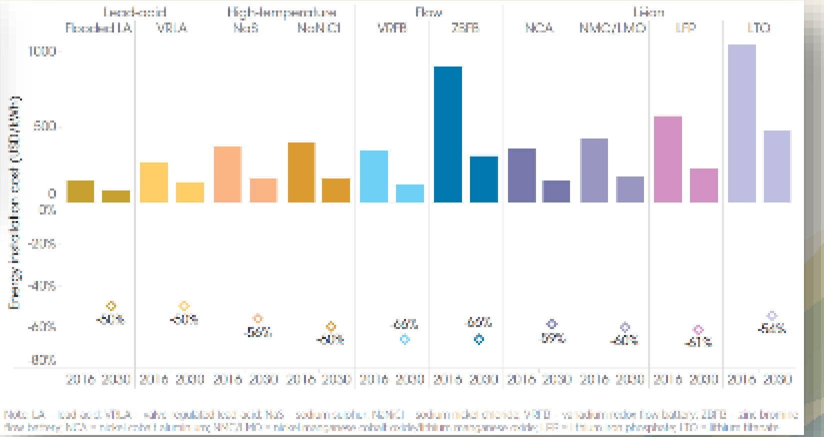


Figure 4: System services that electricity storage can provide at varying timescales

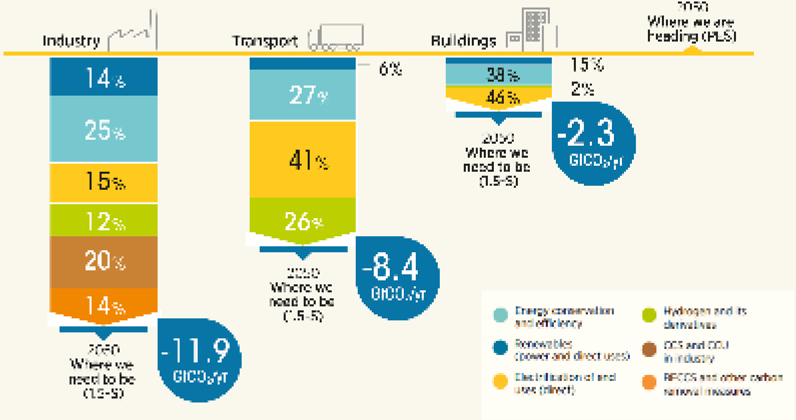
- Different storage technologies for different power system services. **No one size fits all** – fast response services, energy arbitrage, long term duration, e-mobility
- Pumped hydro continues to dominate global market with **> 90% of energy storage installed capacity**
- On battery chemistry - lithium-ion cell price has a **98% dropped between 1991-2018** driven by e-mobility reaching around 100 USD/kWh
- For **long duration** storage [> 8h] with solar – **CSP + molten salt** is at the moment the commercial solution

Expected that all battery chemistries will reduce cost > 50% between 2016 and 2030



Sources: https://irena.org/-/media/Files/IRENA/Agency/Publication/2020/Mar/IRENA_storage_valuation_2020.pdf and https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Mar/IRENA_Tech_Innovation_Indicators_2022_.pdf

The Hydrogen factor

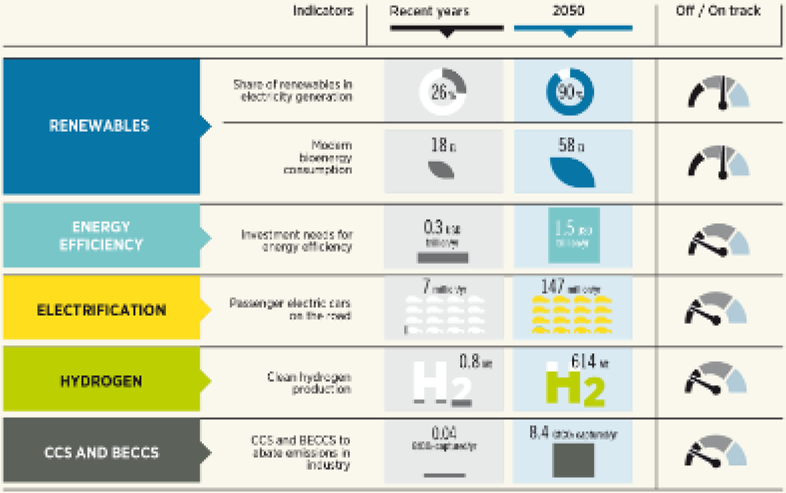


Hydrogen has a role in **reducing emissions** from HTDS of aviation, heavy transport and heavy industry
Nearly 70% hydrogen will be green hydrogen from renewable energy.

45 countries with a published hydrogen strategy or drafting it (June 2022)

More is needed to develop Green Hydrogen

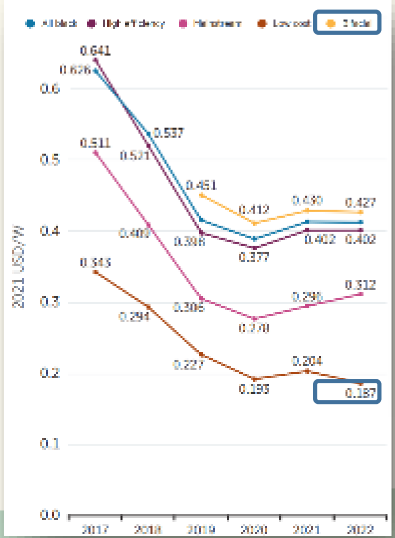
Tracking progress of key energy system components



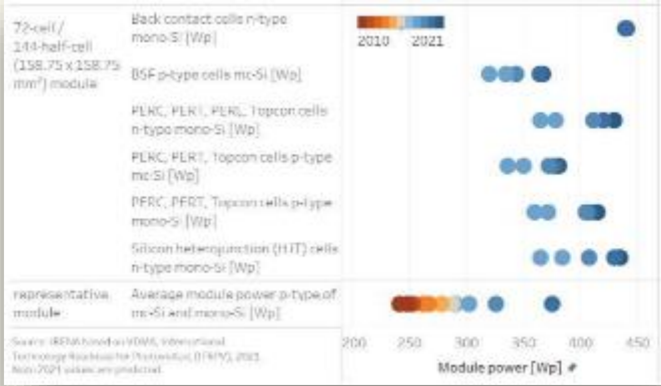
- **Create demand** for green hydrogen
- **Finance and build** renewable electricity
- **Speed up ramp up of electrolyser manufacturing**
- **Reduce the cost** of electrolysers (40% cheaper in the short-term (2030) and up to 80% longer term) to make competitive with fossil fuels
- **Collaborate** to establish harmonised international hydrogen **certifications and standards** for hydrogen trade

Latest Advancements in Solar Energy

Average yearly module prices by technology sold in Europe



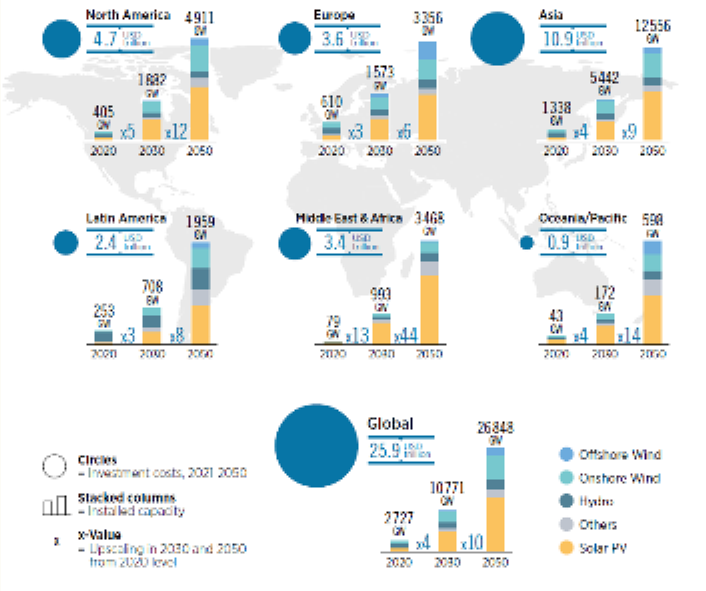
Evolution of solar PV module power



Sources: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Jul/IRENA_Renewable_Power_Generation_Costs_2021.pdf and https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Mar/IRENA_Tech_Innovation_Indicators_2022_.pdf

- Utility-scale solar PV **capacity factors (CF)** continue to rise; supported by technology improvements including an increased use of **trackers and bifacial** modules
- At module design level, most efficiency improvements are due to natural evolution in **enhanced cell architecture**
- Cell technology development also has positive impact to **increasing module power outputs**
- One among these developments is **half -cell** designs **to reduce current losses** in the string and improving performance

What is the future of Renewable Technologies for the Region?



Middle east and Africa	Cumulative Installed Capacity in the 1.5°C Scenario (GW)	
	2020	**2050**
Solar PV	169	1520
Hydro	189	307
Onshore Wind	193	673
Offshore Wind	25	640
Others*	34	216

**Others include bioenergy, geothermal, CSP, and ocean energy*

- Middle east and Africa regions should strongly focus on **solar PV projects**, as they will require **70 GW of yearly installations** in this decade to reach 1.5^{0}C target
- **Onshore wind** installations should scale to 3 times which necessitates more than **8 GW of annual** installation this decade. In addition, **off-shore wind** installations should also grow **significantly**
- **Hydropower** needs an annual installation of **3 GW till 2030** and a **pipeline of projects** be created in this decade to ramp up installations in later decades

Thank you

IRENA
International Renewable Energy Agency

Gauri Singh