IRENA INNOVATION WEEK 2023

Enabling data driven decision making – Mission Innovation's Energy Innovation Metrics Hub

Organised in partnership with

Joint Research Centre
JRC

27th September 13:00 pm to 14:30 pm CEST

#IIW23

IRENA INNOVATION WEEK 2023

Setting the Scene

Eleanor Webster

Head of Mission Innovation Secretariat

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Keynote:Enabling data driven decision making – Mission Innovation Insights Module

Ingrida Murauskaite-Bull

EC JRC Project Officer & MI INSIGHTS Module Manager

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MI Innovation Platform - concept

Consolidation of existing structure

- Enable continuation of successful projects and partnerships
- Provide the ongoing day-to-day running of Mission Innovation

Coordination

- Maximise networks and knowledge-sharing between members
- Enable collaboration easily by connecting ideas to opportunities

Cross-cutting linkages

- Support leadership of Missions and build synergies across activities
- Capture learnings across activities

Flexibility

- Agile integration of new features and future activities
- Easy access/ link for external initiatives (e.g. partners, non-members)

Commitments of membership MI 2.0

- Investment: seeks to sustain, and wherever possible increase investment in clean energy research, development and demonstrations over the second phase.

- National Innovation Pathways (NIPs): describe how they will enhance ambition to pioneer clean energy technologies and/or sectors to meet their climate and energy goals.

- Strengthened Cooperation: accelerate innovation through strengthened international cooperation in areas of mutual interest.

- Active Participation: support the success of Mission Innovation by actively contributing to its governance functions including through high-level participation in the annual Ministerial, supporting the Steering Committee, contributing to workstreams and resourcing the Secretariat.

Insights Module - objectives & activities

Support MI members in their efforts to maximise the efficiency of clean energy innovation policy and programmes by:

1) Creating an online database and dashboard of innovation data and metrics through the **Energy Innovation Metrics Hub**;
2) Supporting **MI Missions** track progress through data-driven KPIs;
3) Supporting the development of the **MI Member Insights Report & National Innovation Pathways**;
4) Organising events and producing case studies on various topics related to clean energy technologies as part of the **Think Tank**.

Planned publications at COP28:

- **Members Insights Report 2022-23** - information on clean energy research, development and demonstration (RD&D) activities covering the previous year (MI Member Survey + IEA Public RD&D data)

The Energy Innovation Metrics Hub

Developing potential inputs by area of expertise:

- Public R&D investments, Venture capital investments in clean tech start-ups *(lead IEA)*
- Private R&D investment in clean energy technologies, Patent indicators *(lead JRC)*
- Standards, Levelized Cost of Electricity, Total Installed Capacity *(lead IRENA)*

The Hub will provide:

Comprehensive coverage

Enhanced data interpretation

Centralised and easy-to-navigate platform

Support for Missions in making informed decisions

Support MI's visibility

The Think Tank

- **Objective:** *To provide a platform for MI Members, Missions and Innovation Communities, and collaborating organisations to share knowledge and facilitate dialogue on topics of interest to members of the MI Community and beyond.*

- Activities will include member/partner-driven workshops, events, case studies, and reports to strengthen the MI Community's knowledge sharing on important clean energy innovation topics.

The Think Tank will provide:

Resolution of common challenges	Strengthened collaboration within MI and with global partners	Increased visibility and outreach

How to Get Involved?

- To assess member interest in contributing to a Think Tank activity, a Call for Expressions of Interest (EOI) with Membership, Missions and ICs, collaborating orgs has been launched, asking two questions:

    1. *Which cross-cutting topics do you see as valuable to discuss with the MI Community, through the MI Think Tank?*

    2. *Would you be willing to contribute to an MI Think Tank event on a specific topic? If so, which topics?*

2023 Call for EOI

By 6 October

MISSION INNOVATION

The Insights Module team:

IRENA
International Renewable Energy Agency

Thank you!

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Tracking Innovation Progress –

Private R&I and patent data and metrics

Dr Aliki Georgakaki

Project Leader, Energy Transition Insights for Policy, EC JRC

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The Joint Research Centre within the Commission

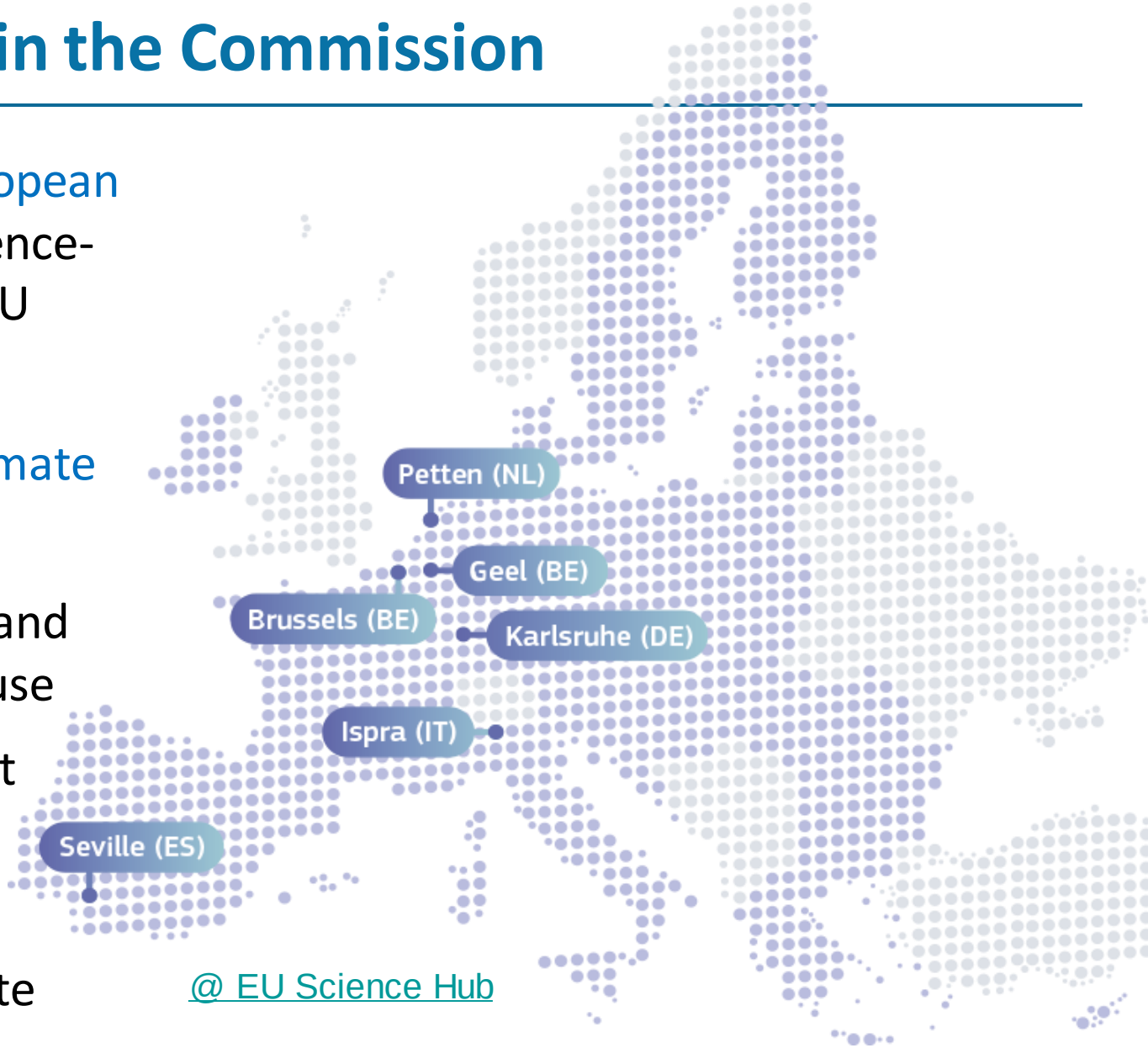
The Joint Research Centre is part of the European Commission; it provides independent, evidence-based knowledge and science, supporting EU policies to positively impact society.

The Directorate for Energy, Mobility and Climate provides support to EU policies on:

Energy – ensuring sustainable, safe, secure and efficient energy production, distribution & use

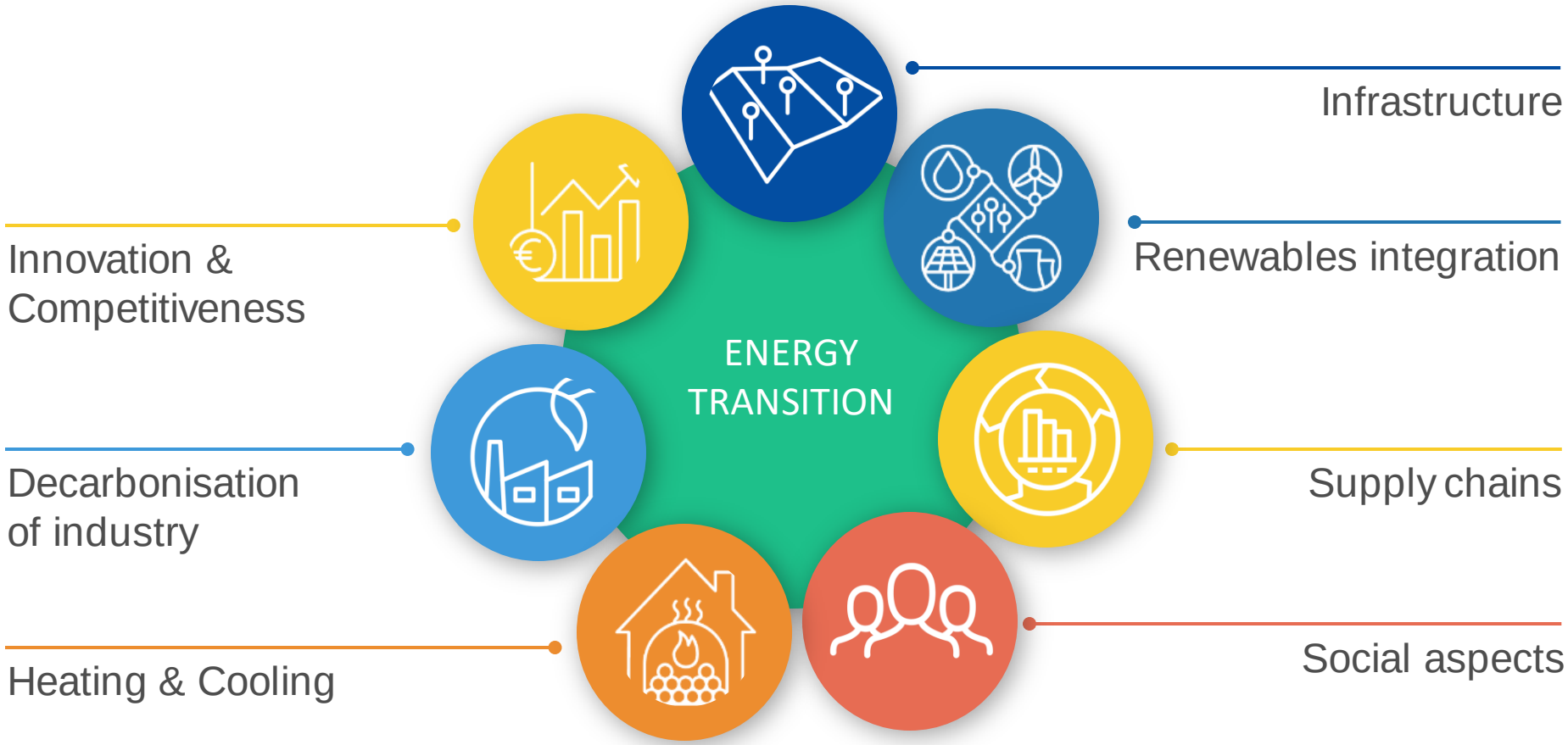
Mobility – fostering sustainable and efficient mobility in Europe

Climate – providing scientific and technical analyses on integrated air quality and climate



@ EU Science Hub

Energy Transition Insights for Policy



Energy Research, Innovation & Competitiveness

Assess progress in Research, Innovation and Competitiveness of climate-neutral energy solutions, through the design and analysis of indicators

Energy Union Governance:

- Competitiveness Progress Report;
- State of the Energy Union Report;
- National Energy and Climate Plans (& Reports)

Strategic Energy Technology Plan

EU Industrial R&D Investment Scoreboard

European Climate Neutral Industry Competitiveness Scoreboard

Mission Innovation

competitiveness indicators
…public & private R&I, venture capital, patenting trends, production and trade, active companies, turnover, employment and skills…

Examples of input to policy support

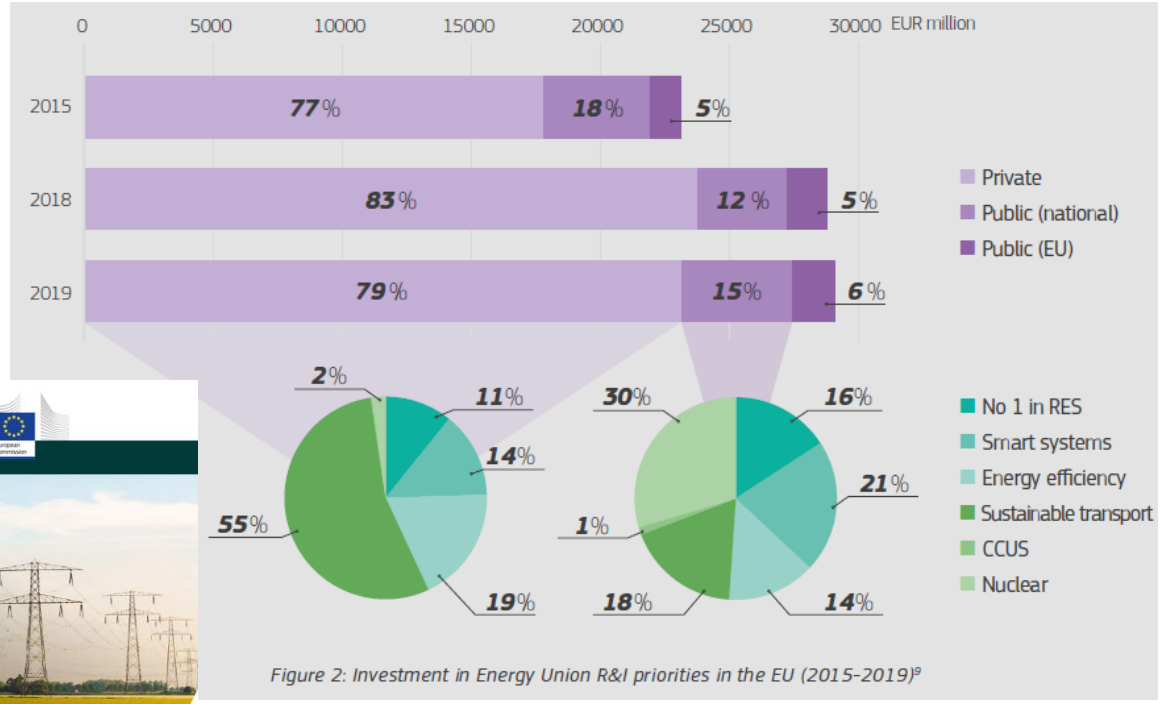
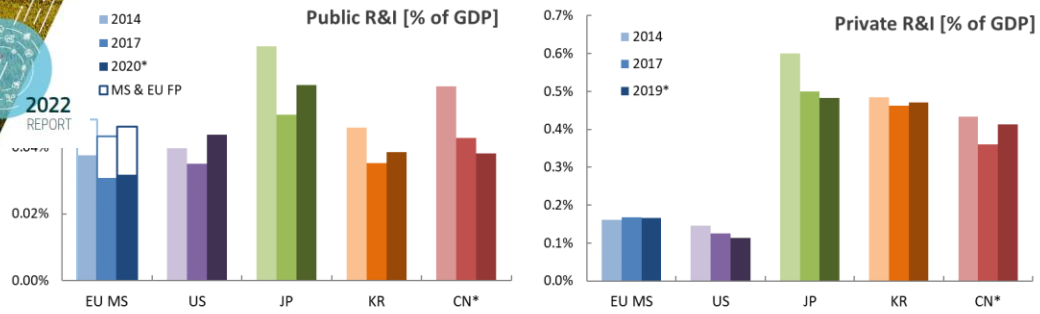
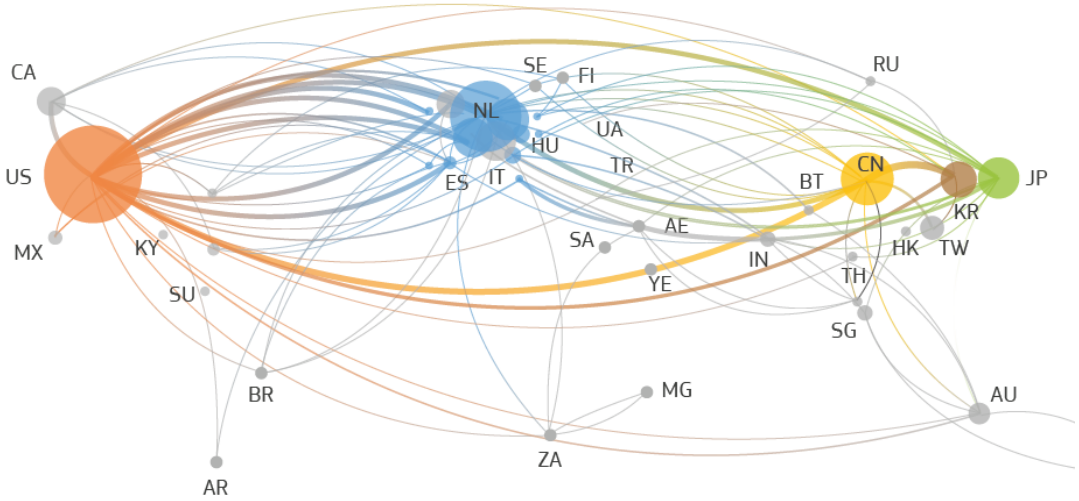


Figure 2: Investment in Energy Union R&I priorities in the EU (2015-2019)[9]

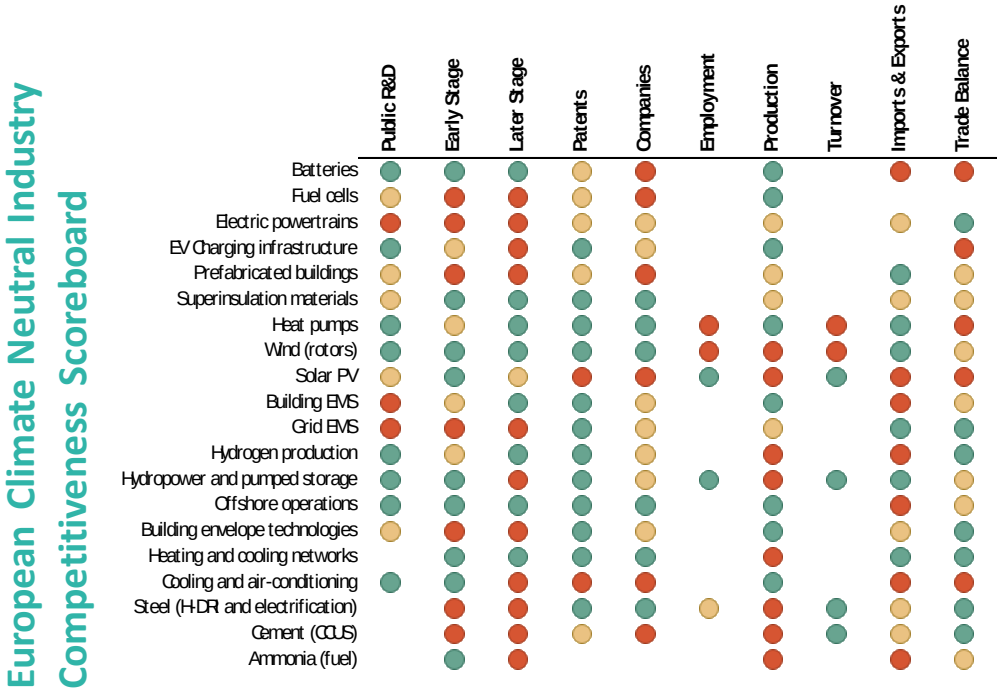


*public R&I data forChina and Italy (in EU total) refer to 2019 ; private R&I data for 2019 are provisional

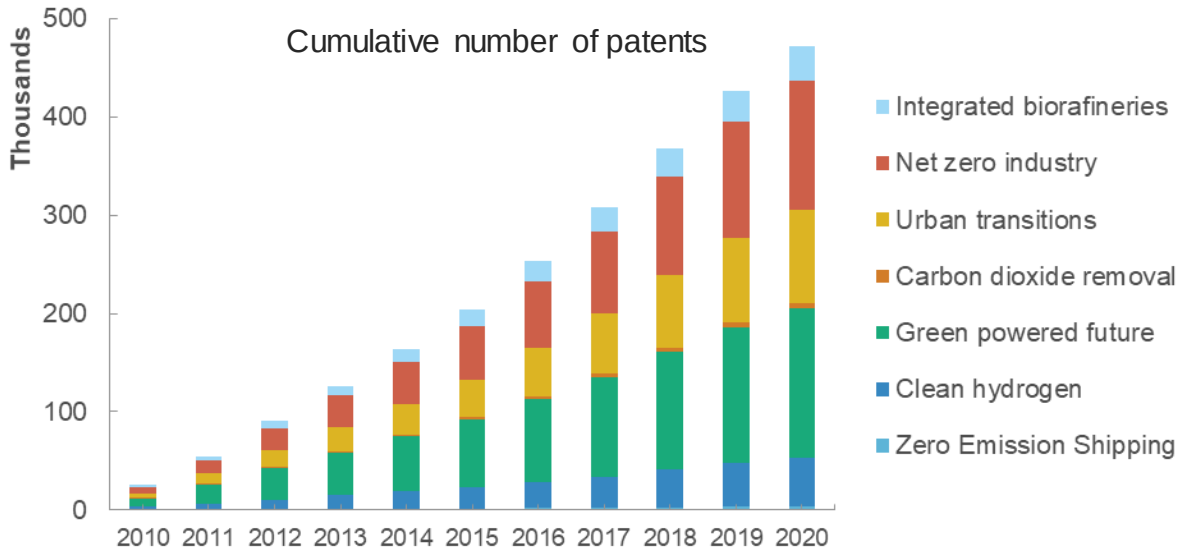
European Commission

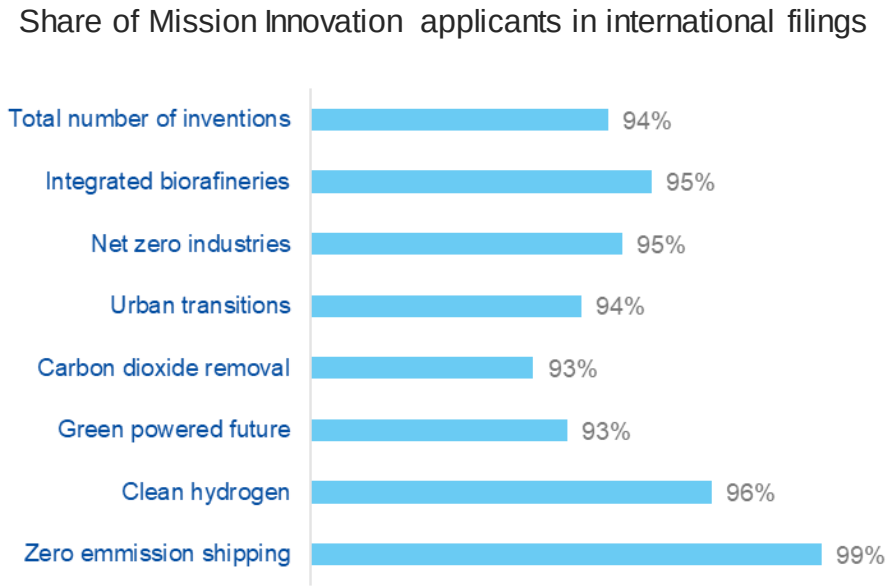


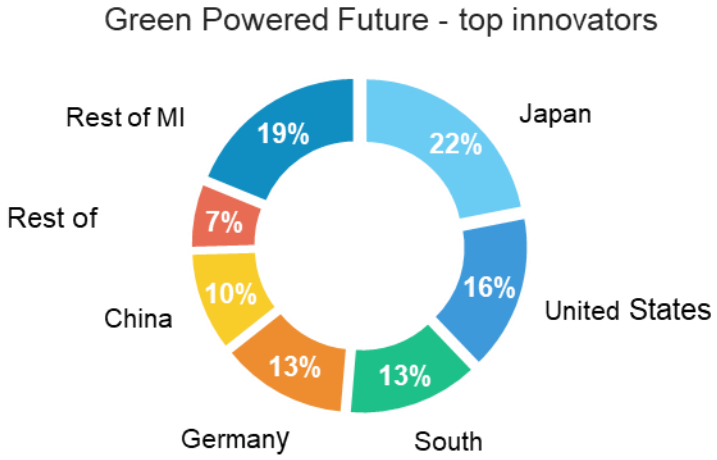
Source: The 2021 EU Industrial R&D Investment *Scoreboard*, European Commission, JRC/DG R&I.



Patenting trends relevant to MI Missions







First look at statistics based on the CPC classification for Climate Change Mitigation Technologies

Some Missions have a much broader scope than others

It is difficult to avoid overlaps – indicators have to be designed accordingly

European Commission

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Source: JRC based on Patstat, preliminary mapping based on the CPC classification of Climate Change Mitigation Technologies, 2010 onwards

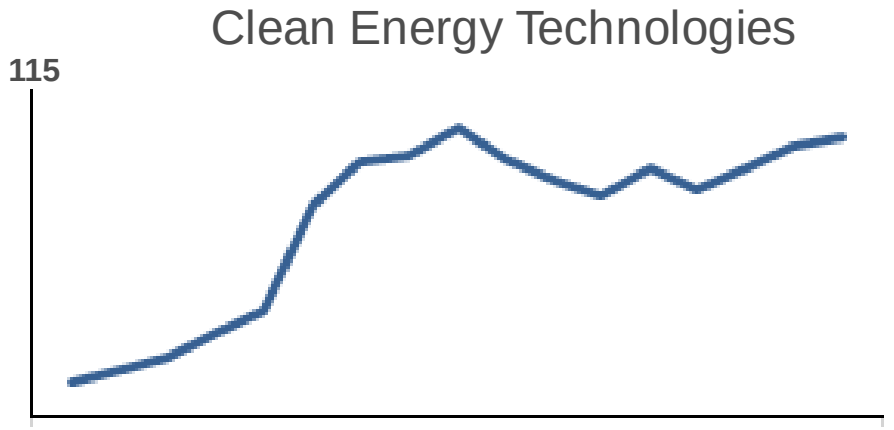
Trends in private R&I investment

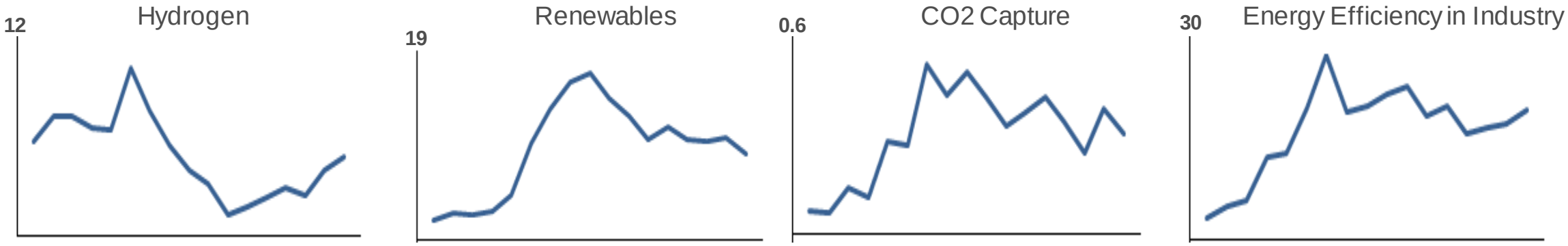
The private sector is by far the largest investor and has a key role in low-carbon energy R&I efforts

We estimate that the private sector accounts for
~ 2/3 of all R&D investment
~ 3/4 of low-carbon R&D investment

More difficult to monitor along MI Mission topics

Trade-off between level of detail and data lag





Source: Indicative JRC estimates, Global annual R&I investment in EUR billion, 2010 - 2019

Next steps on the Energy Innovation Metrics Hub data and metrics

Consult with the Mission Innovation INSIGHTS Module partners
as well as the Mission colleagues and stakeholders and decide on:

- the format and granularity of data and metrics
- the proposed classification of content per topic / Mission
- the (common) presentation and visualisation

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INSIGHTS

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iea

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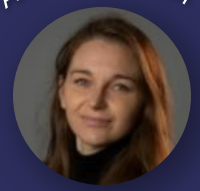
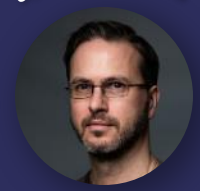

Anna Kuokkanen


Simon Letout


Evdokia Tapoglou

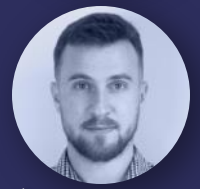

Teodor Kuzov

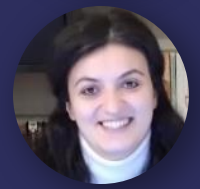

Elisa Boelman


Joris Primavera


Laia Delgado Callico


Ingrida Murauskaite-Bull


Michal Dlugosz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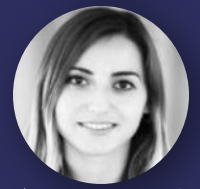
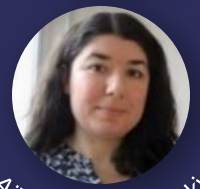

Drilona Shtjefni


Aikaterini Mountraki


Lucie Mc Govern


Aliki Georgakaki

Thank you! Meet the team!

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Tracking Innovation Progress – Costs, standards, and capacity innovation for the energy transition

Francisco Boshell

Head of Innovation and End-use Sector Applications,
IRENA's Innovation and Technology Centre

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IRENA actively works on Innovation Platform

MI INSIGHTS

Strengthening access to robust evidence on Innovation progress to inform effective decision making

- **National Innovation Pathways**
  - Developed by countries
- **Tracking progress of MI Missions**
- **Energy Innovation Metrics Hub**
  - Public R&D investments (IEA)
  - Private R&D investments (JRC)
  - Innovation ecosystem (Patent & publications (JRC), policies, …)
  - **Innovation Impacts (costs, standards, etc.) (IRENA)**
- **Innovation think tank**
  - **IRENA supports**
- **Technical Advisory Group (TAG)**
  - Main expert review body
  - **IRENA is a member**

MI ACCELERATE

On catalyzing collaboration through stronger international innovation networks. Currently 4 initiatives:

1. **Innovation for int. SAF**
   - **Co-leads**: IN, US (+ CN, EU, NL, DK)
   - **Knowledge partner**: **IRENA**
2. **Materials for Energy (M4E)**
   - Co-leads: CAN, DE (+ IN, NO, DK, IT, EU)
3. **Heating & Cooling of Buildings**
   - **Co-leads:** EU, IN, UK (+EU, CAN, FI, NL, SE, UAE, IEA, RMI)

MI COLLABORATE

On working with investors, innovators, and end users to scale emerging solutions

As of Jan 2023, **IRENA as part of MI Secretariat**

INNOVATION WEEK

IRENA's is engaged at all Mission Innovation workstreams

- IRENA is knowledge partner since the launch of MI and active in both workstreams: Missions and Innovation Platform
- IRENA's engagement in the public-private, country-led missions:

GREEN POWERED FUTURE MISSION

- **Co-leads:** CN, IT, UK
- **Core members:** **IRENA**

CARBON DIOXIDE REMOVAL MISSION

- **Co-leads:** US, KSA, CAN
- IRENA's role in discussion

ZERO-EMISSION SHIPPING MISSION

- **Co-leads:** DK, US, NO
- **Knowledge partner:** **IRENA**

URBAN TRANSITIONS MISSION

- **Co-leads:** EU, GCoM
- **Knowledge partner:** **IRENA**

INTEGRATED BIOREFINERIES MISSION

- **Co-leads:** IN, NL
- **Knowledge partner:** **IRENA**

CLEAN HYDROGEN MISSION

- **Co-leads:** AU, CL, EU, UK, US
- **Knowledge partner**: **IRENA**

NET-ZERO INDUSTRIES MISSION

- **Co-leads:** AT and AU
- **Core member:** **IRENA**

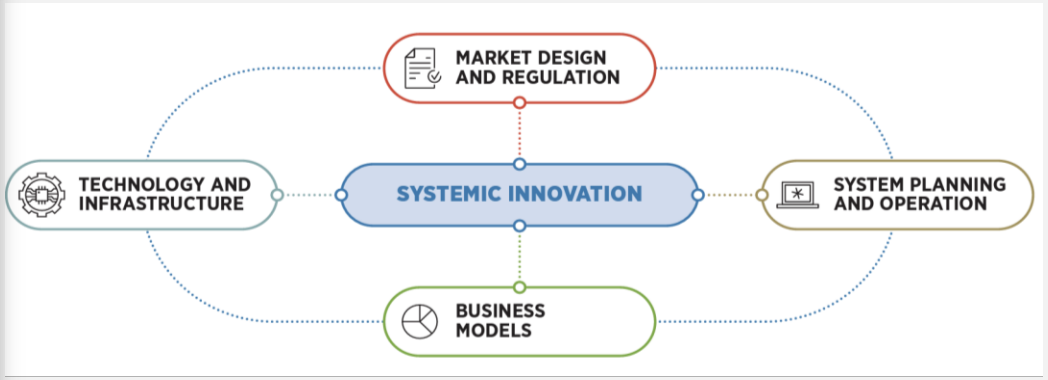
IRENA's Innovation knowledge products

Innovation Outlooks

Technology Briefs (27 published)

INNOVATION KNOWLEDGE

30 Innovation Briefs and Innovation Landscape Report for Smart Electrification



Showcasing the importance of innovation tracking by example: Offshore Wind

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TEIIF – Tracking Energy Innovation Impacts Framework

- Supported by funding from the European Union's Horizon 2020 programme.
- Builds on established IRENA capabilities: global membership, existing costs, performance and patents & standards databases and analytical experience.
- Aims to expand knowledge base by **broadening and deepening existing datasets** on:
  - **Costs, performance and project characteristics**
  - **Patents and standards**
- **Scope**: 6 technologies, 42 countries (MI + EU27), 2010-2019

Innovation Impacts Dashboard

- Supported by funding from the UK Government.
- Linked to the TEIIF project.
- Aims to explore ways to provide enhanced insights by **assessing technology progress through a range of indicators in combination.**
- **30+ indicators** across 6 subcategories and 3 categories.
- **Scope**: global, with a closer look at MI countries, 2010-2019.
- Methodology piloted on **Offshore wind technology.**

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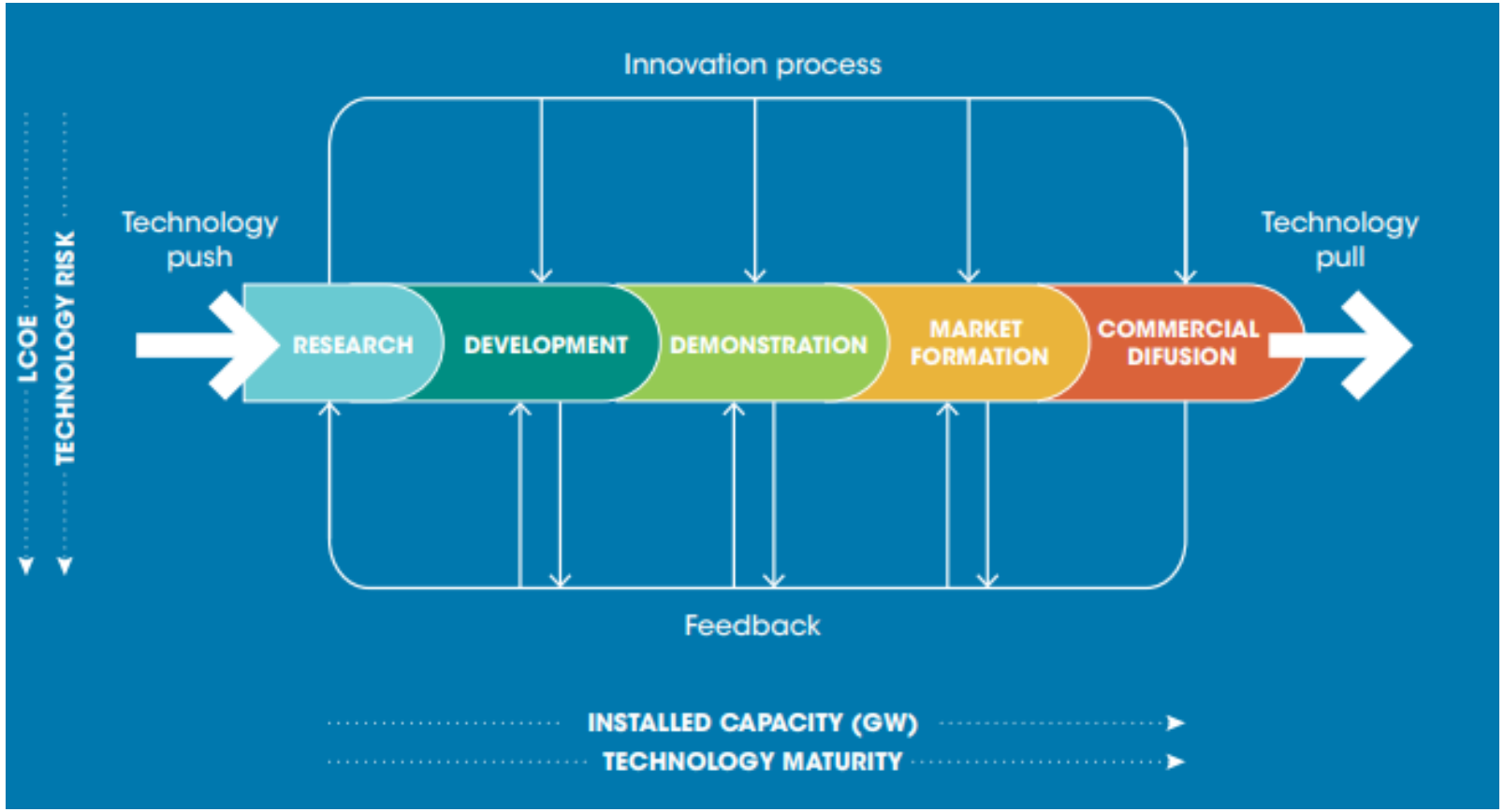
The innovation life cycle:
Innovation processes encompass feedback loops between different stages



30+ Indicators

7 Sub-categories

3 Categories

Innovation ecosystem

1

An active, growing and broadening innovation ecosystem

Technology progress

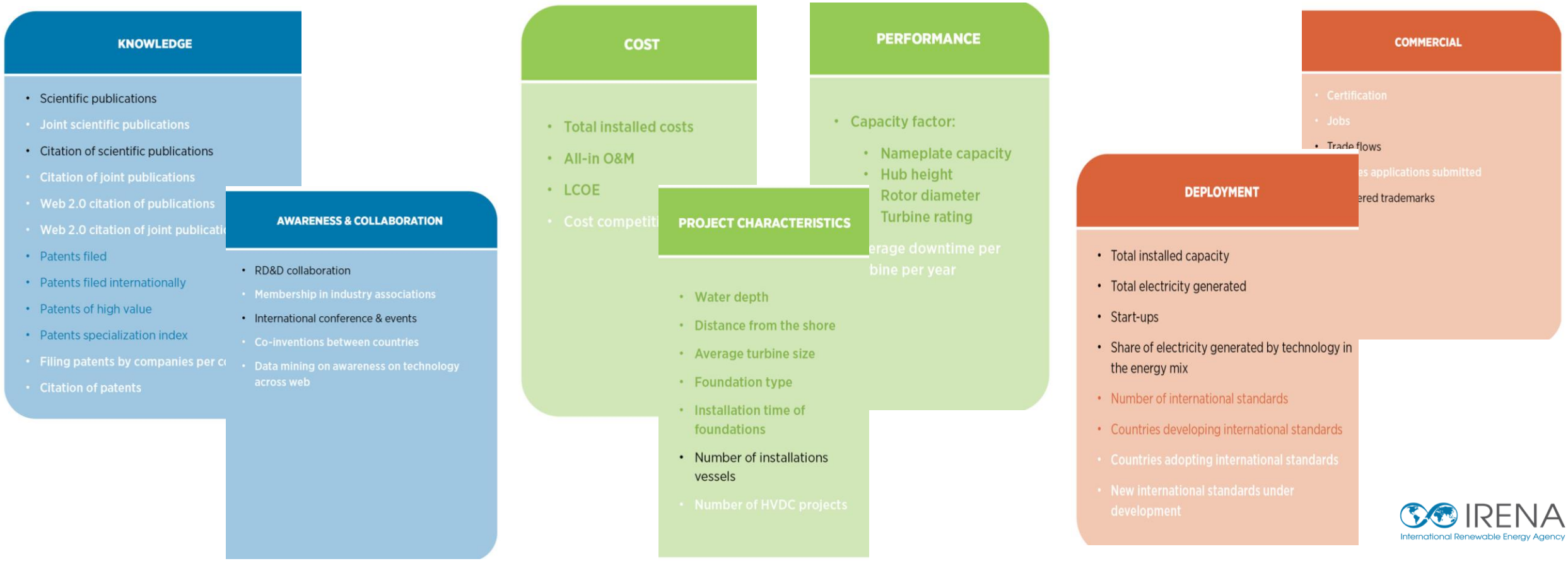
2

Continual improvements in technology in the form of declining costs, improved technology performance and a widening range of solutions

Market formation

3

A growing and broadening market moving towards maturity



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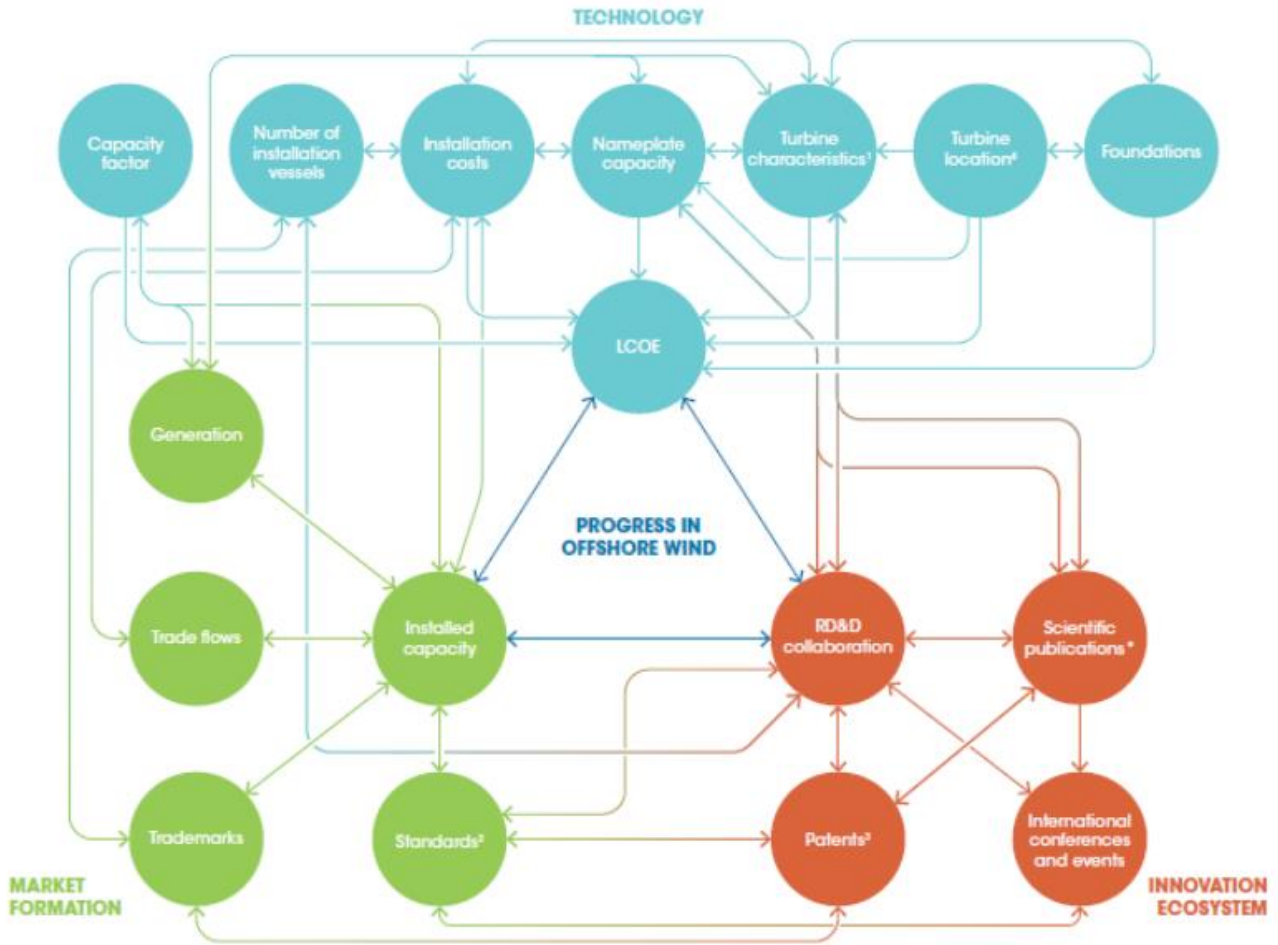
Why indicators linkages matter:



1 Turbine size, hub height, rotar diameter
2 Countries developing and counties adopting standards
3 Patents filed, patents filed internationally, patents of high-value and patents specialization index
4 Distance from shore, water depth

Showcasing the importance of innovation tracking by example: Offshore Wind

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Status of Innovation Ecosystem	Number of Indicators	Knowledge status indicators	Awareness & collaboration indicators
OVERVIEW	8	6	2

Year: All

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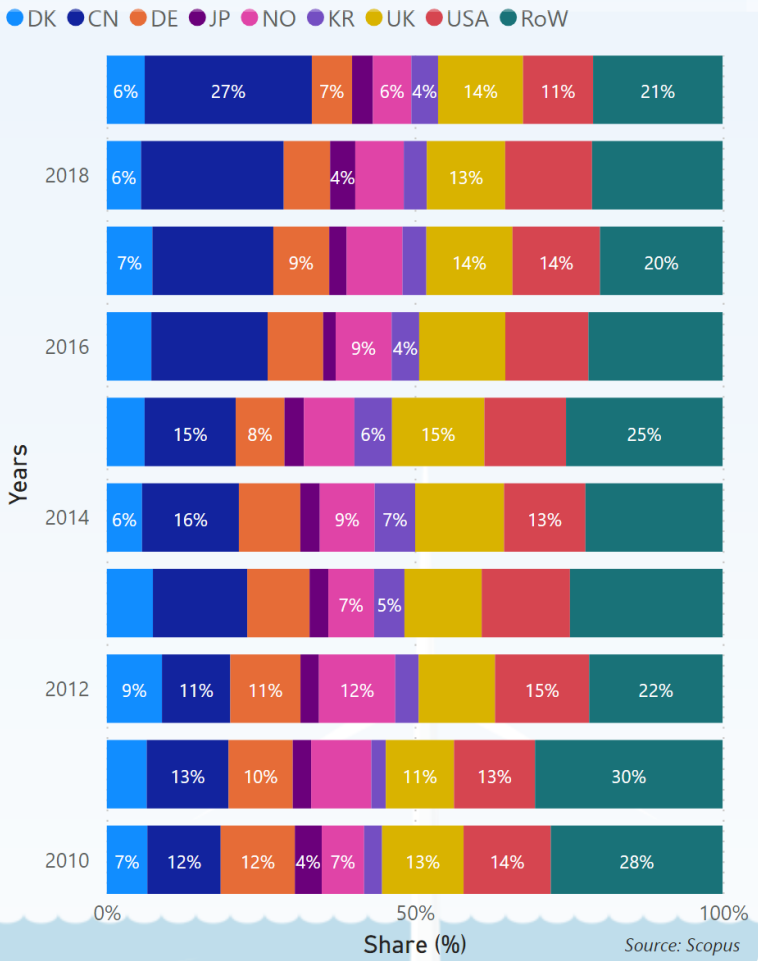
Scientific publications for offshore wind

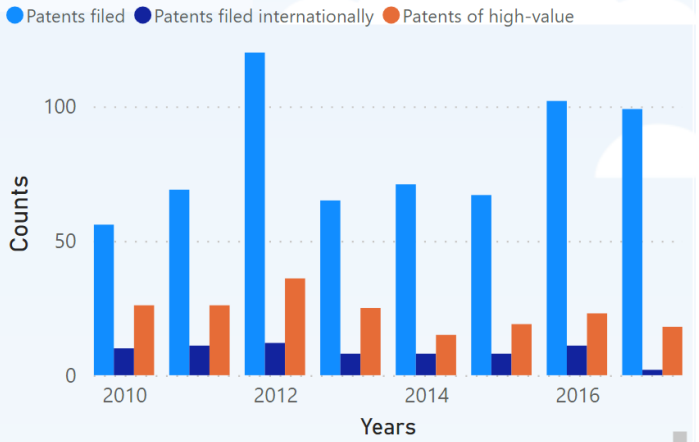
Source: Scopus

Geographical distribution of offshore wind publications



Source: Scopus

Patents for offshore wind

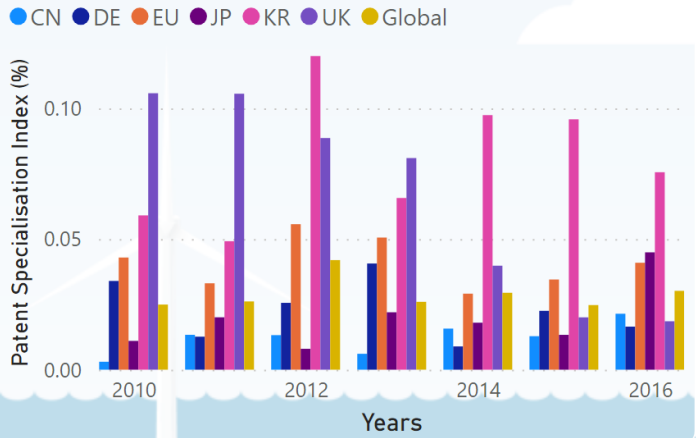


Source: Joint Research Centre (JRC) based on data from the European Patent Office (EPO)

RD&D Collaboration and international conferences & events

Source: IRENA

Patent Specialisation Index*



Source: Joint Research Centre (JRC) based on data from the European Patent Office (EPO)

*Shares of wind towers inventions over the total inventions in wind technology

WEEK

IRENA is contributing to the MI Energy Innovation Metrics Hub with key data on costs, standards and capacity

- A set of indicators mapping the impact or progress of technologies (combination of output, outcome and impact) has been compiled as a potential IRENA input to the planned Mission Innovation Energy Metrics Hub.
- IRENA divided indicators that map progress/impact through 3 broad categories:

1 Innovation ecosystem

An active, growing and broadening innovation ecosystem

2 Technology progress

Continual improvements in technology in the form of declining costs, improved technology performance and a widening range of solutions

3 Market formation

A growing and broadening market moving towards maturity

- First indicators suggested by IRENA for the Energy Innovation Metrics Hub

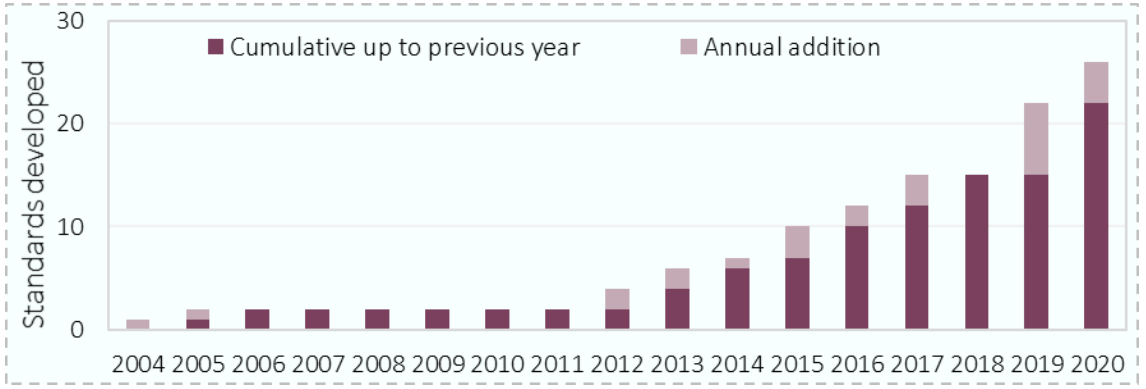
Indicator	Description	Unit	Sub-Indicator
Costs	The total per unit cost (price) of generating electricity accounting for all costs and output over the entire lifetime of a power plant.	USD/kw % USD/kWh	- Global weighted average total installed cost, capacity factor and levelised cost of electricity trends by technology. - Global weighted average LCOEs from newly commissioned, utility-scale renewable power generation technologies - Utility-scale solar PV weighted average cost of electricity in selected countries - The weighted average LCOE of commissioned onshore wind projects in 15 countries
Total Installed Capacity	The sum of maximum electric output that all power generators connected to a national grid can produce under specific conditions.	MW	- Total renewable energy capacity by country by technology - Renewable energy share of electricity capacity
Standards	Standards are repeatable, harmonised, agreed and documented way of doing something. Standards contain technical specifications or other precise criteria designed to be used consistently as a rule, guideline, or definition.	Counts	Can be filtered by: - Technology group - Aspects - Body

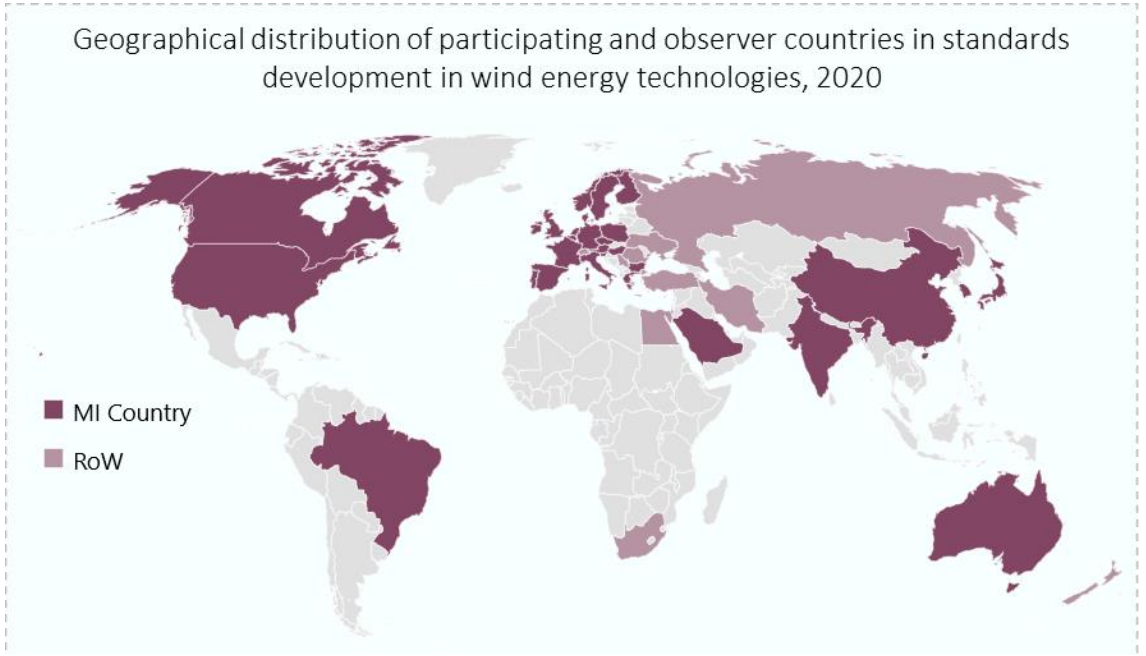
Looking into standards as an innovation indicator for wind

International technical standards are documents that indicate harmonized requirements for the development of a reliable and effective design, the production and the use of goods and services.

Are indicator of technology deployment and readiness to commercialization. They are a strong indicator that innovative technologies are being deployed. Represent an indirect sign of technology progress.

1. Number of international standards
2. New standards under development
3. Countries developing standards
4. Countries adopting standards
5. Normative references





Thank you!

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Tracking Innovation Progress – Public R&D investments and venture capital investments in clean tech start-ups

Suzy Leprince

Energy Data Officer in the Energy Data Centre at the International Energy Agency

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IEA Energy Technology public RD&D Budgets Database

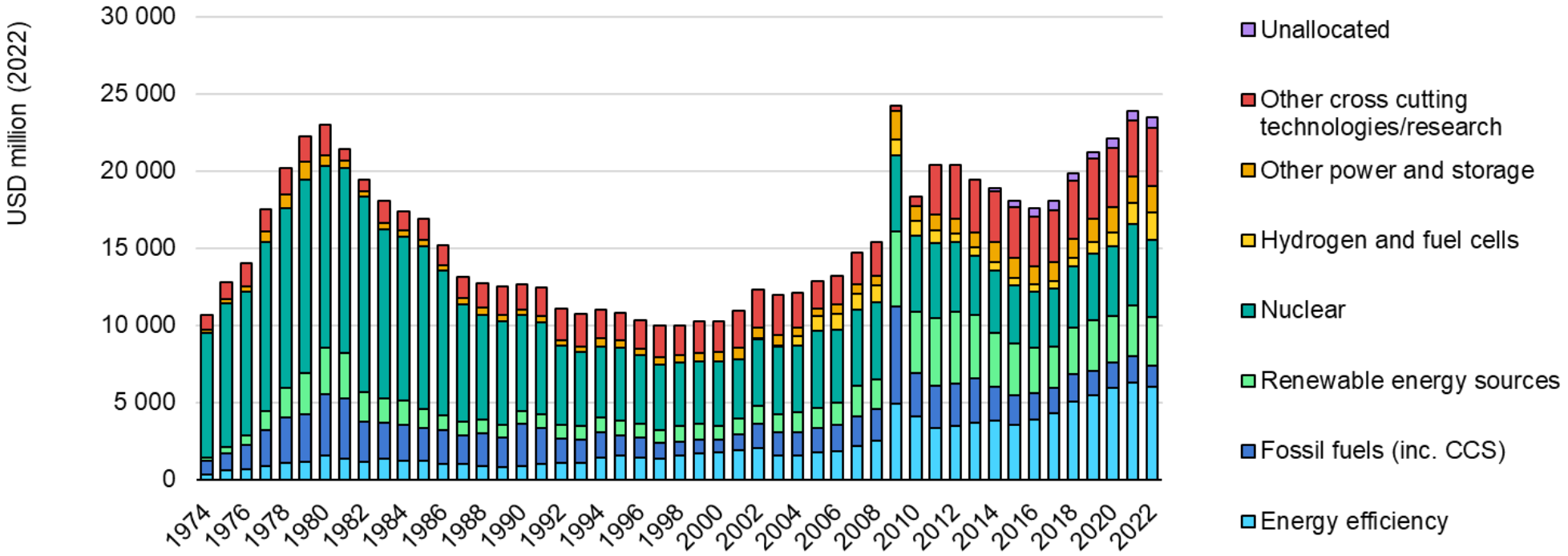
What is in the IEA RD&D database?

Research, development and demonstration budgets data funded by **national governments** and **state-owned enterprises** from **1974 to 2023**, for **184 different technologies**.

Published twice a year in **May** and **October**.

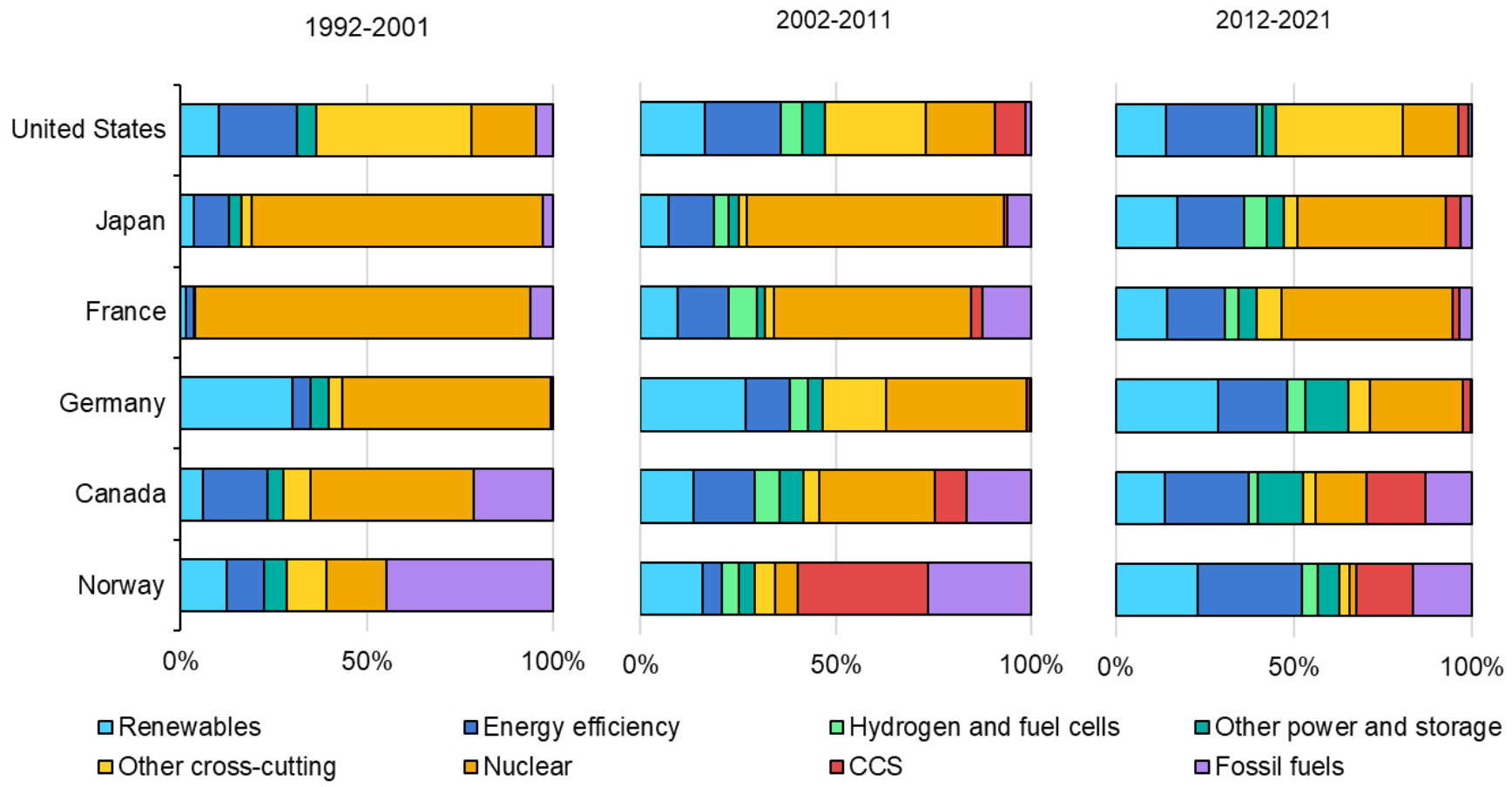
Data submitted by **national administrations** in IEA member countries and beyond.

Collaboration with Mission Innovation through a joint data questionnaire for MI members.



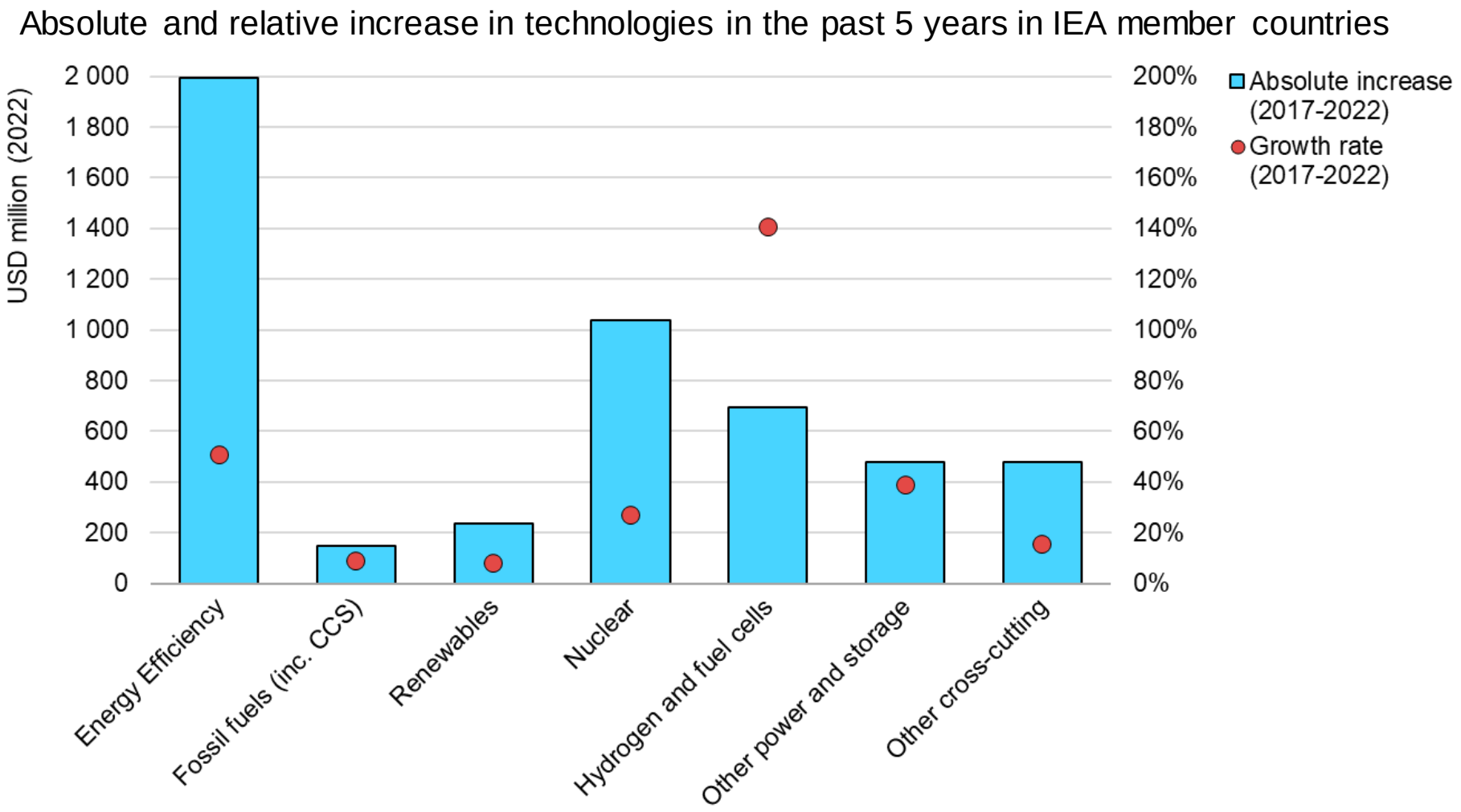
Trends in public energy RD&D budgets

Evolution of the share of each technology categories in the total energy RD&D budgets for selected countries



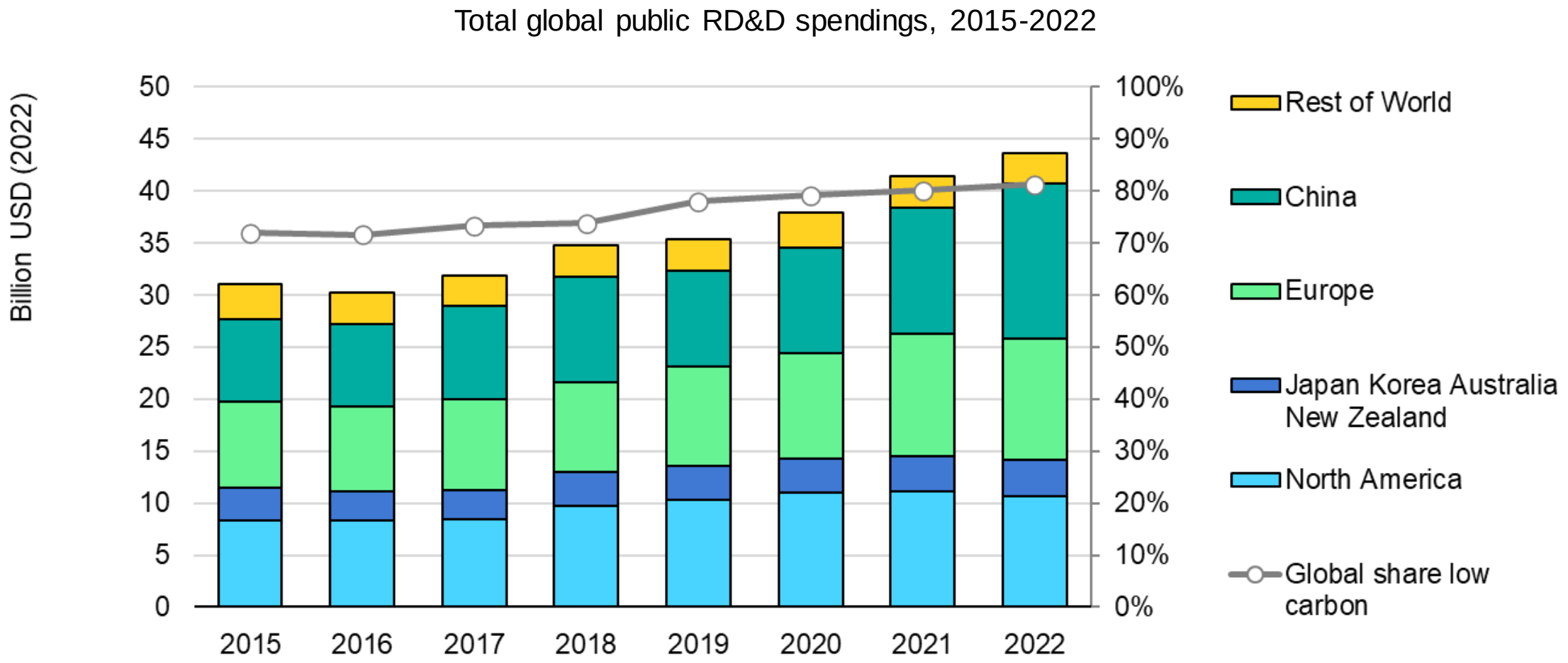
Publicly funded energy RD&D has greatly diversified since the 90s.

Trends in public energy RD&D budgets



In the past 5 years the increase in public RD&D budgets among IEA countries has mainly been driven by energy efficiency but the most rapid increase has been for hydrogen and fuel cells technologies.

Global public energy RD&D spendings

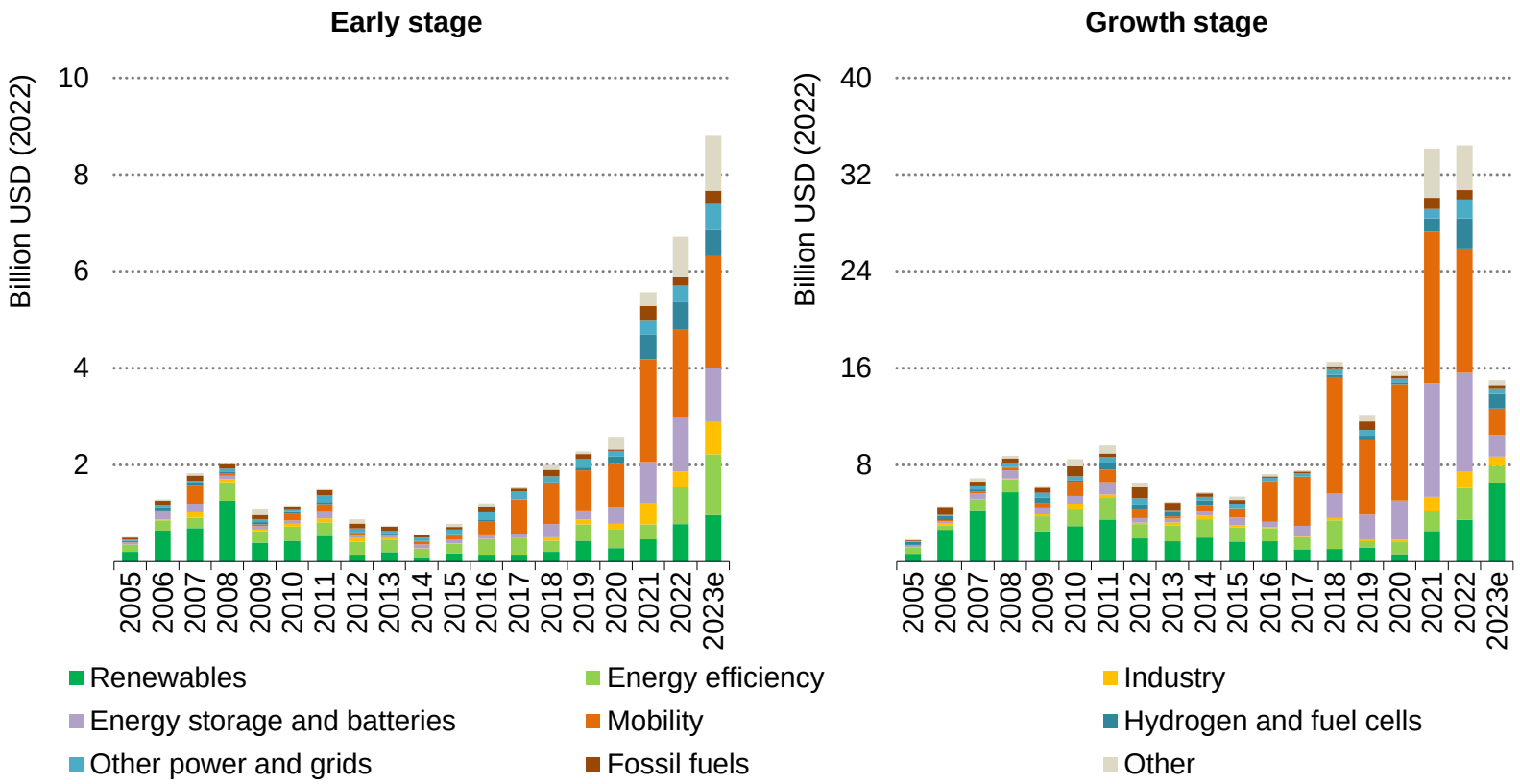


Based on the submissions by countries and internal estimates for other countries, the IEA estimates an increase of 40% between 2015 and 2022, with the share of low carbon growing from 72% to 81%.

Going beyond the database

Early-stage equity funding for energy start-ups is booming

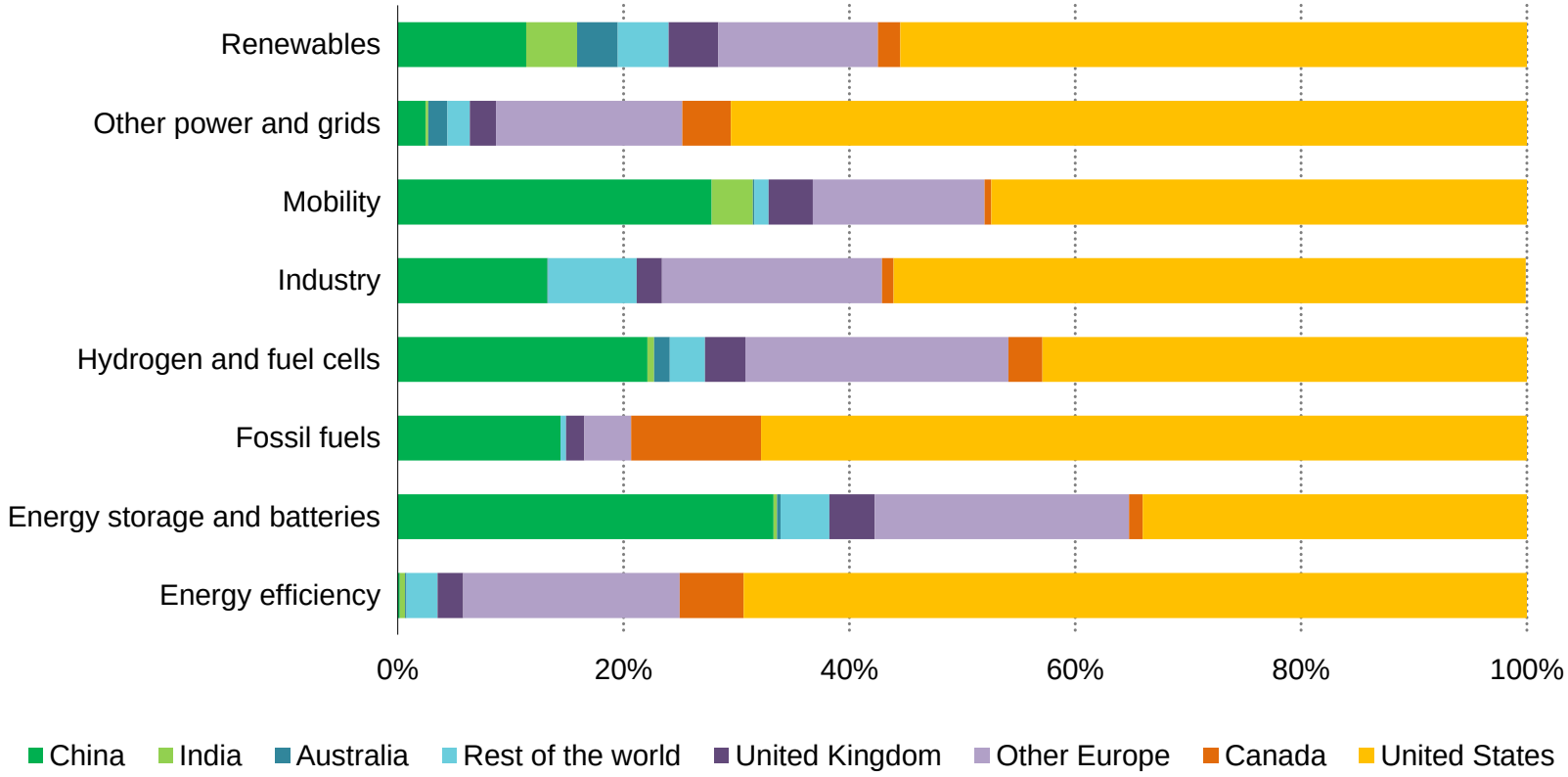
VC investment in energy start-ups, by technology area, for early-stage and growth-stage deals, 2005-2023e



Investment is led by clean mobility and renewables, but prevailing macroeconomic conditions have dented the amount of capital available and 2023 could be leaner for later-stage deals

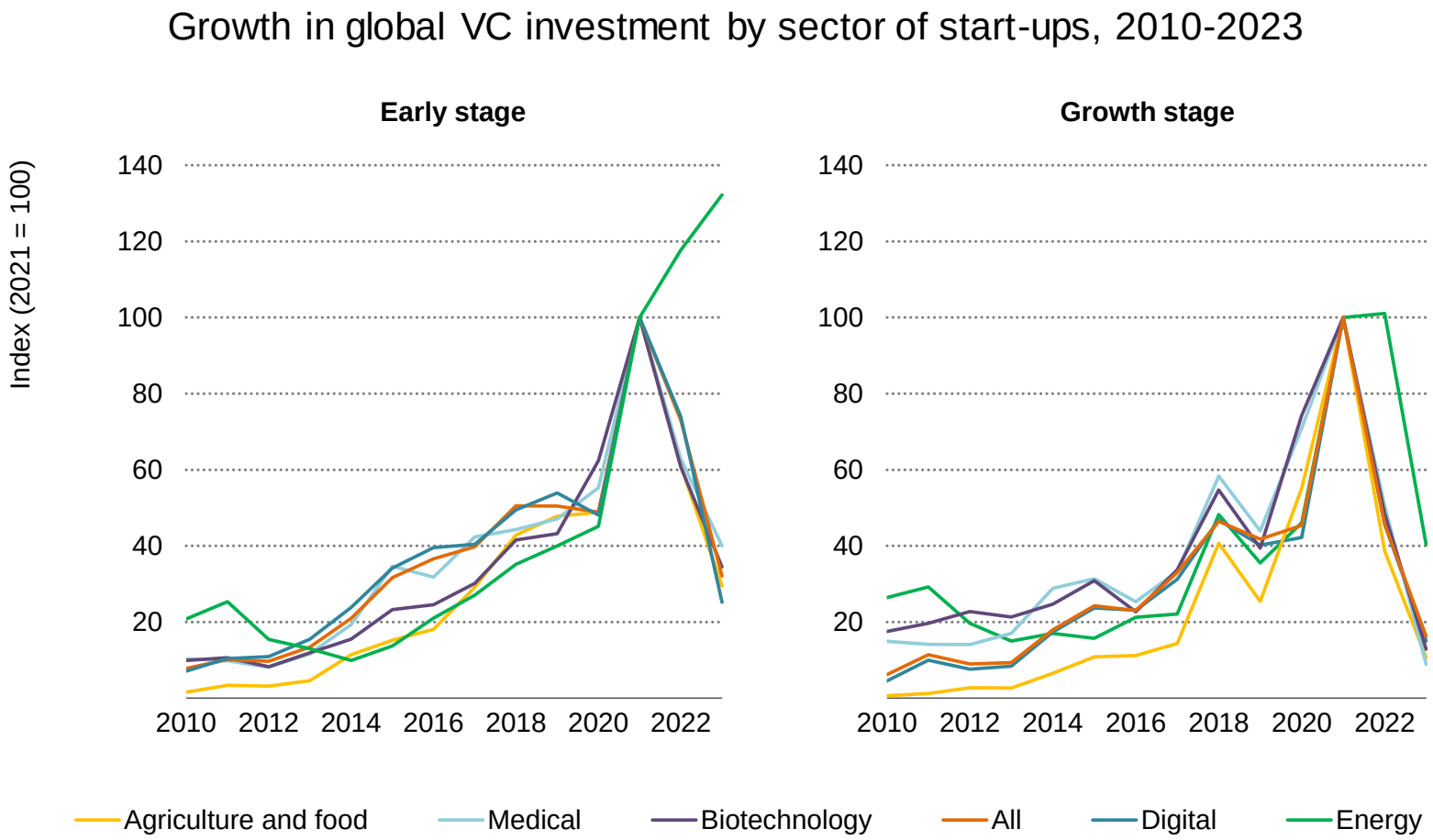
Most VC funding for energy has flowed to US-based start-ups

Early- and growth-stage equity investment in energy start-ups by region and technology area, 2020-2022



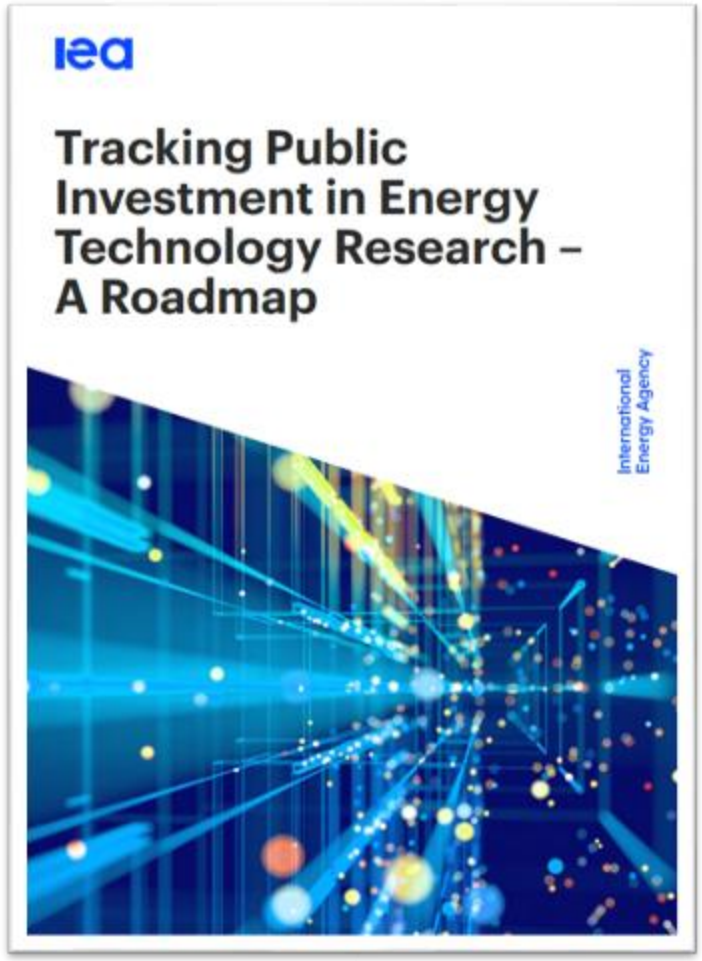
Europe has a strong presence in hydrogen and China active in mobility and batteries, but other emerging market and developing economies account for just 5%

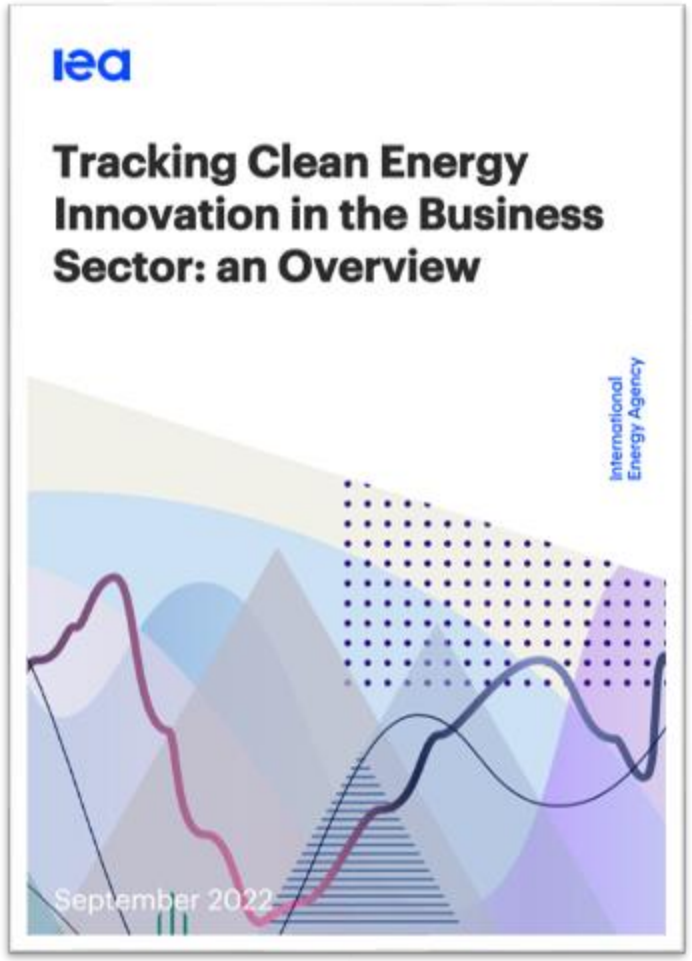
Energy has outperformed other VC segments since 2021



Early-stage equity funding for energy start-ups in particular has experienced impressive growth while VC investment has fallen in general

Roadmaps to collect innovation data





Thank you!

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Gathering Input for Maximizing Impact with the Energy Innovation Metrics Hub

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Block 1: Impact of the Hub on your Work

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Gathering Input for Maximizing Impact with the Energy Innovation Metrics Hub

-

Block 2: Feedback on the Hub's Design

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Closing Remarks

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