Energy Technology Perspectives 2015:
Mobilising Innovation to Accelerate Climate Action

ELERING SMART GRID CONFERENCE

Tallinn, 15 October 2015

Jean-François Gagné
Energy Technology Policy Division,
International Energy Agency

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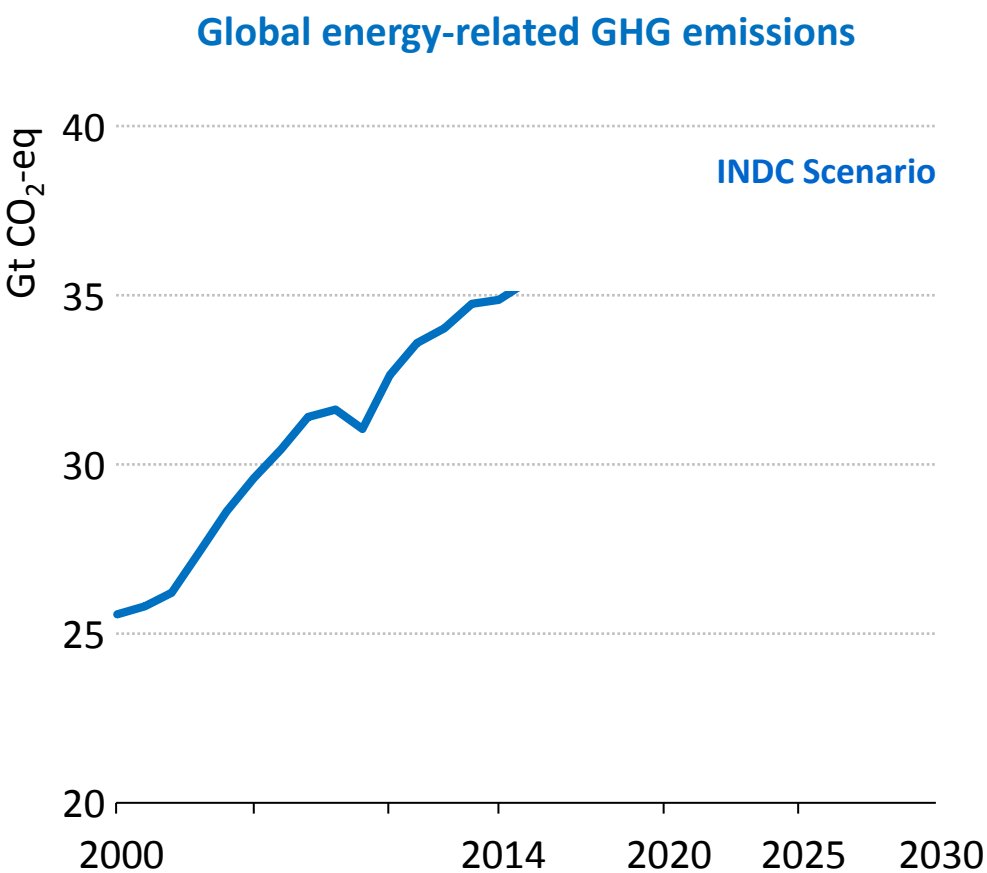
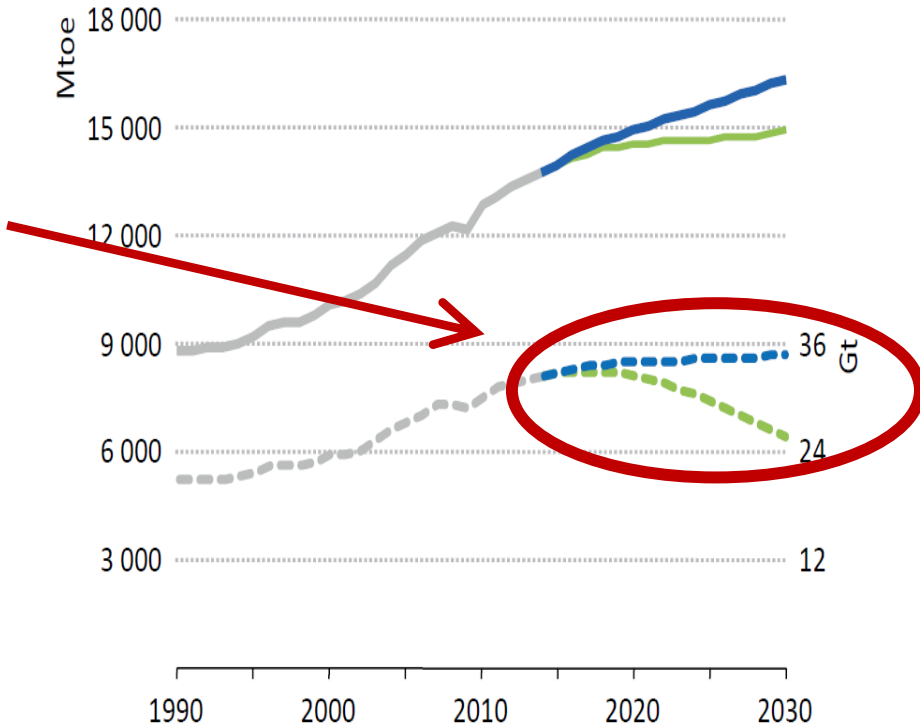
National pledges build towards a global agreement

WEO Special Report on Energy & Climate Change





Note: Mtoe = million tonnes of oil equivalent; Gt = gigatonnes.

Primary energy demand:
- INDC Scenario
- 450 Scenario

CO_2 emissions (right axis):
- INDC Scenario
- 450 Scenario

Energy Innovation is crucial to a sustainable energy transition

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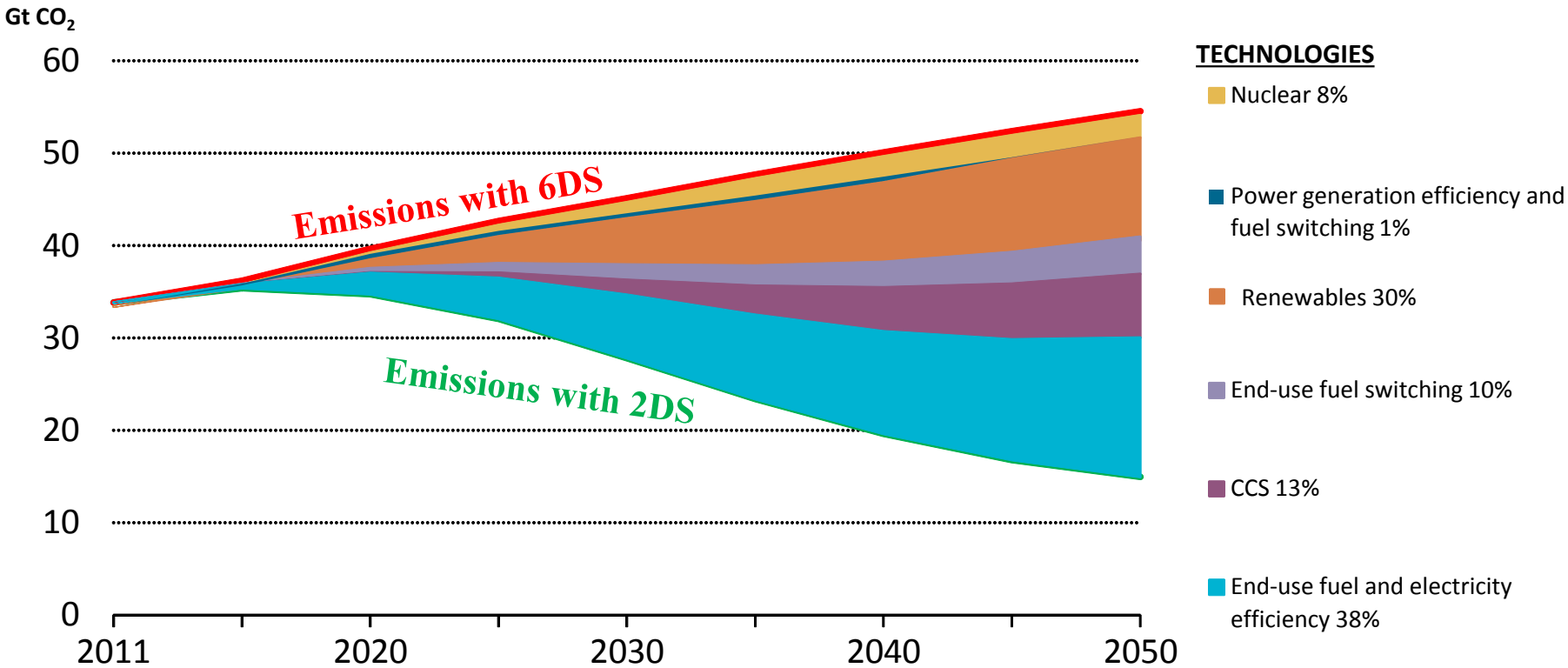
Contribution of technology area to global cumulative CO2 reductions



Energy innovation has already yielded solutions, but needs support and guidance to deliver on its promises

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Clean energy is not ramping up fast enough - Despite some progress

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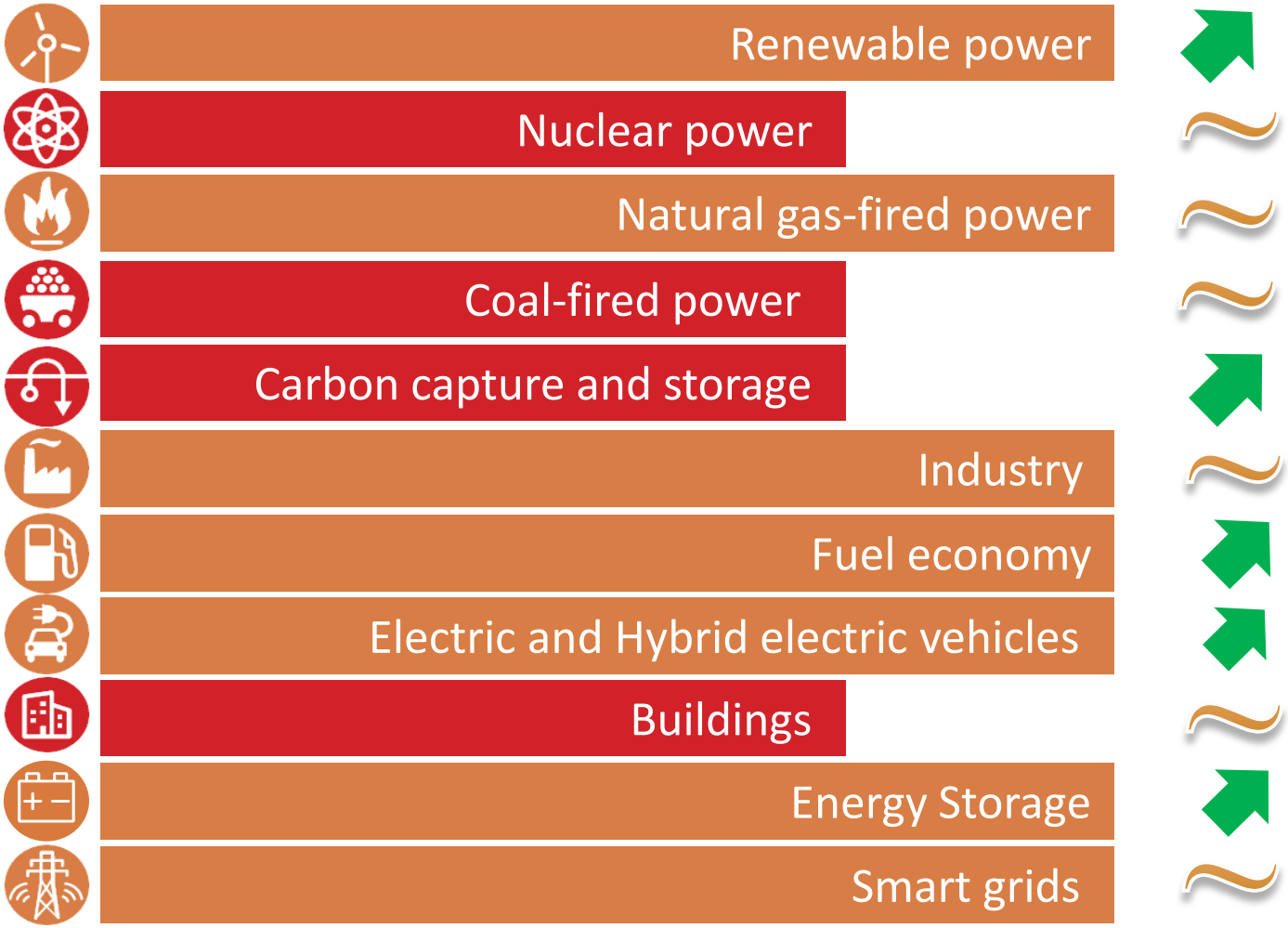

Evidence shows that despite continued progress in many areas, for the first time none of the technologies are in line with 2DS goals

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Technology innovation is making renewable energy markets viable

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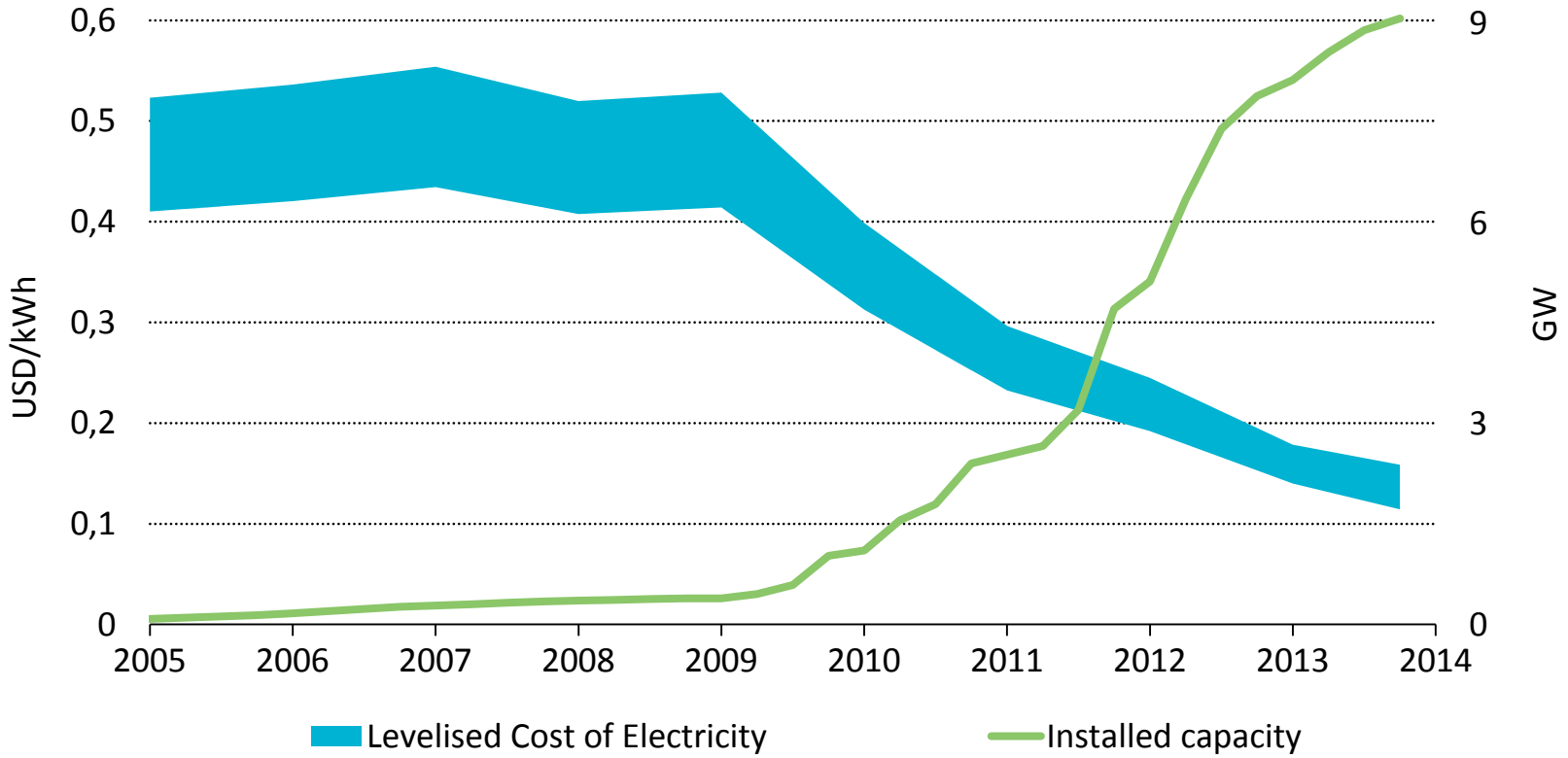
Cost of electricity generated and utility-scale PV capacity installations in Germany



Thanks to 40 years of innovation efforts, solar PV generation is an increasingly cost competitive option

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Innovation has also helped improve energy efficient technologies

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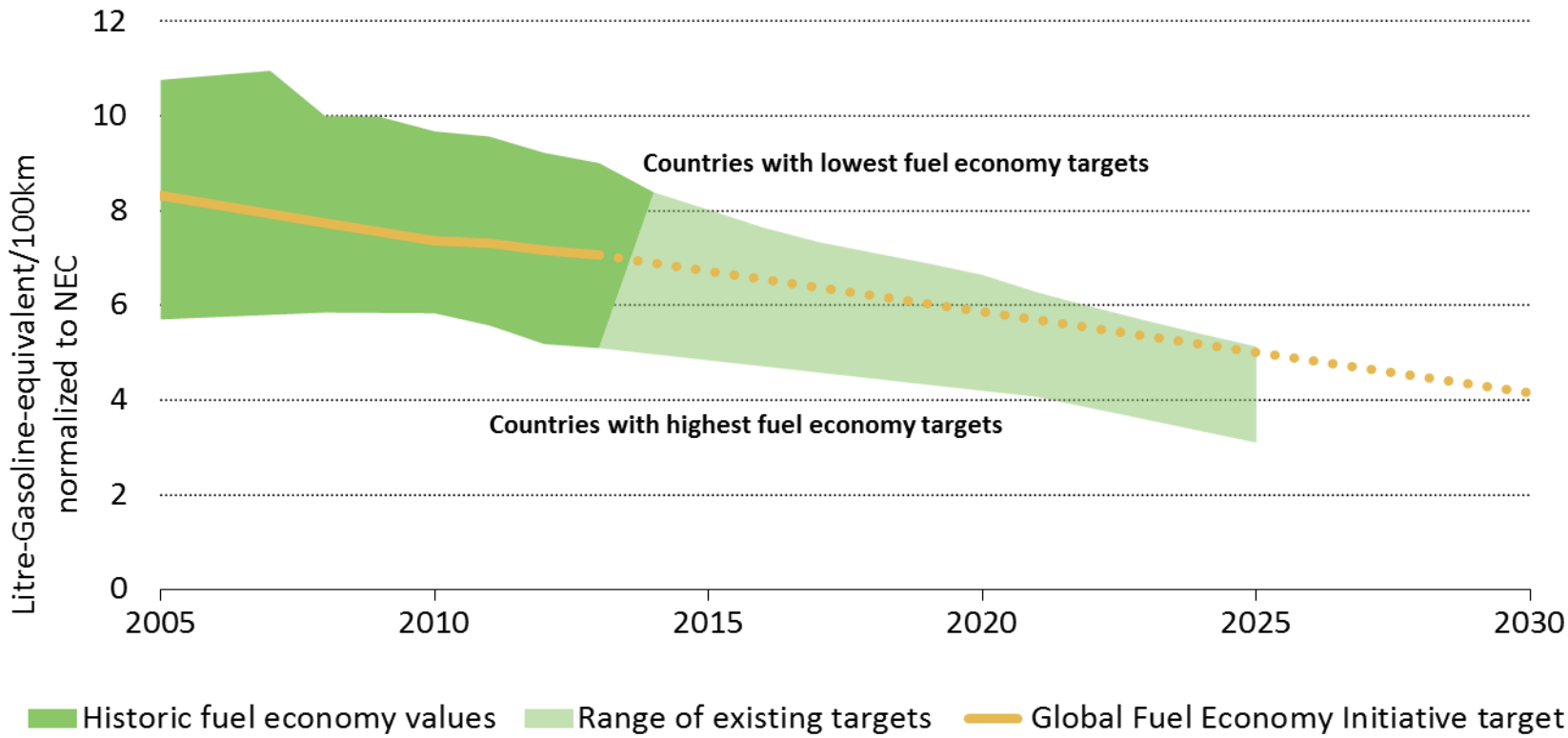
Average new Light-duty vehicle fuel economy evolution by country, 2005 to 2013



Fuel economy is improving as policy increasingly drives the deployment of more efficient vehicle technologies

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Focus is needed on systems integration innovations

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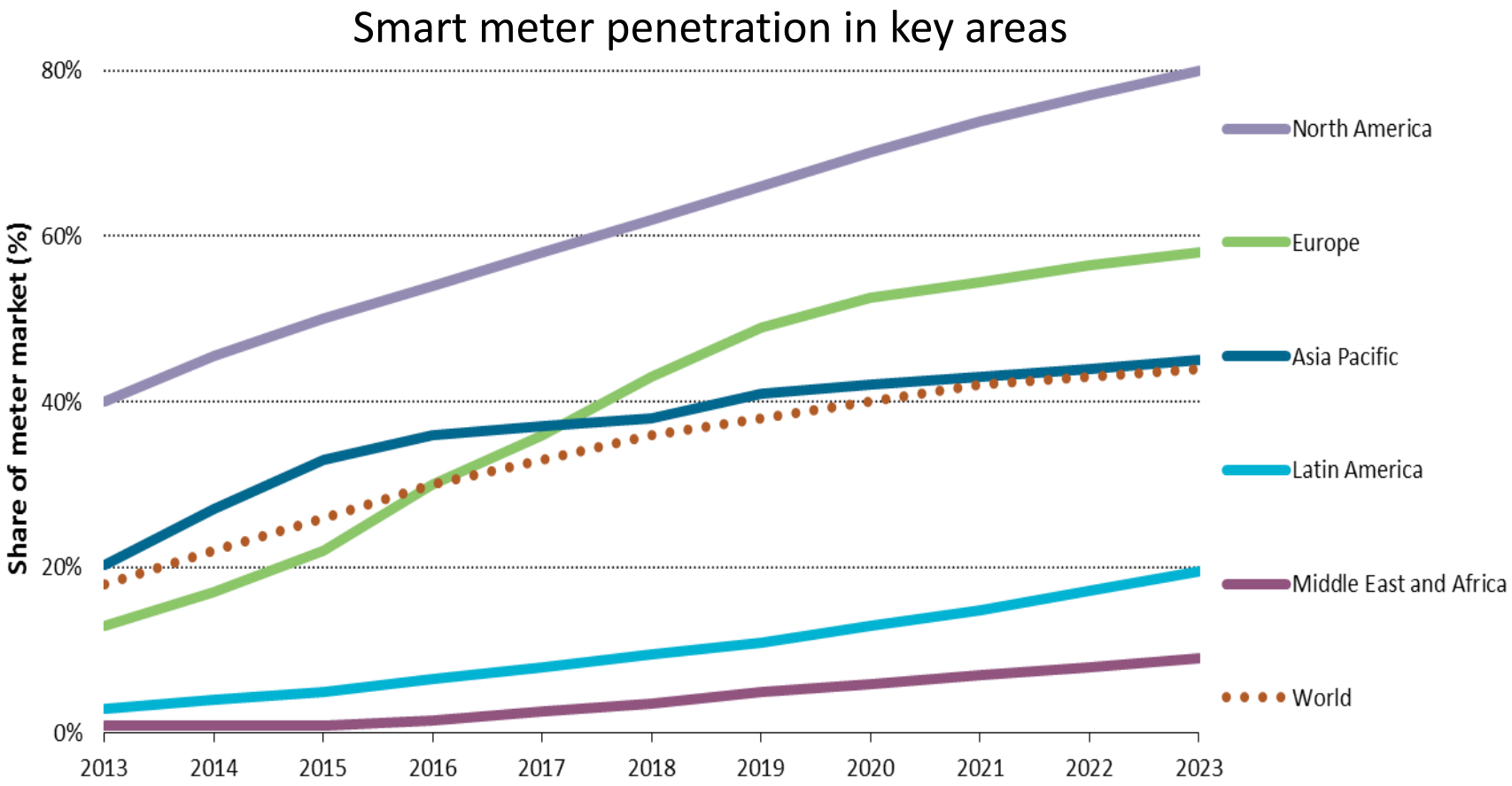

Data availability currently precludes a complete picture of smart grid deployment.

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Having the right information can help stimulate support

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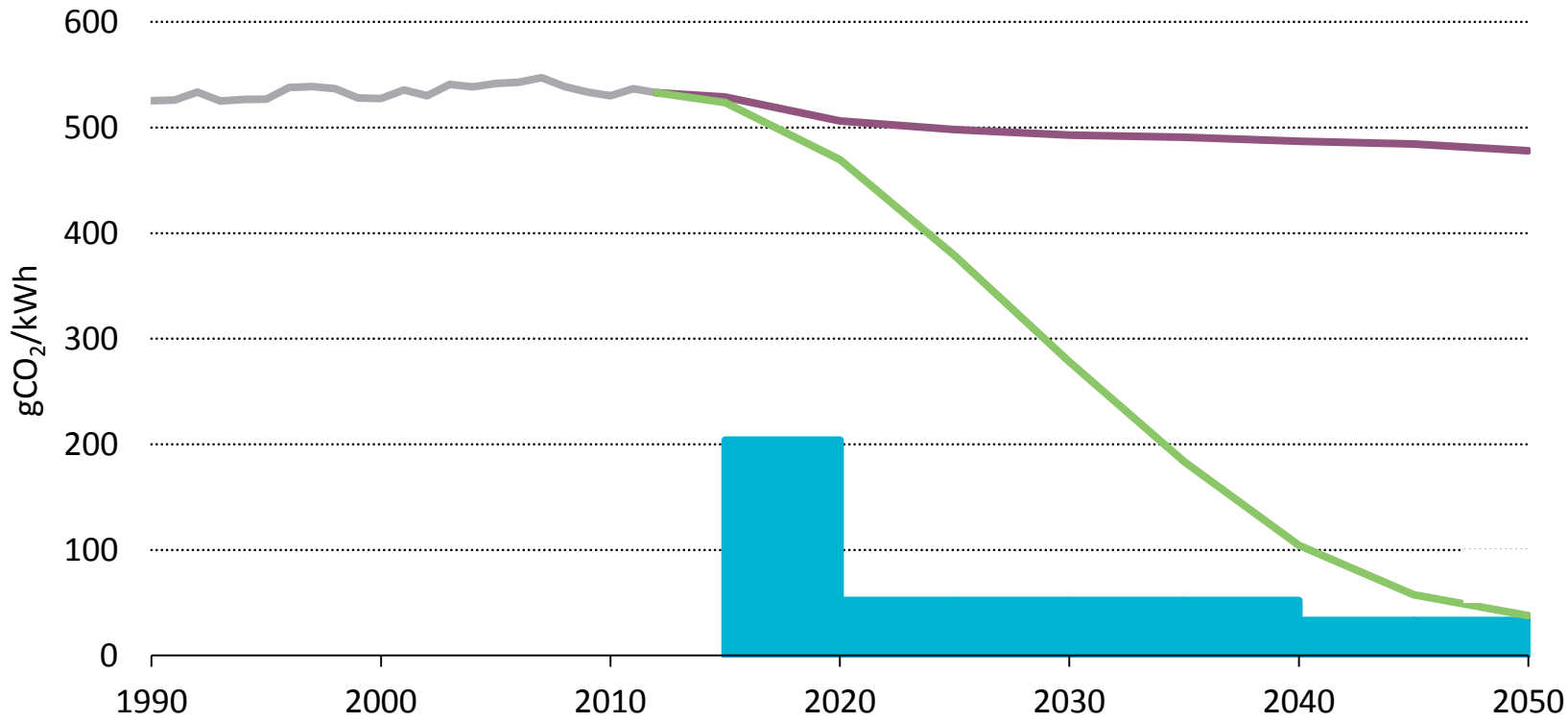
Global fleet average and new-build plants emissions intensity of power generation in IEA scenarios



Developing a richer set of data and tracking the right metrics can focalise actions and enhance ambitions

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Energy RD&D funding now targets the right issues, but is not enough

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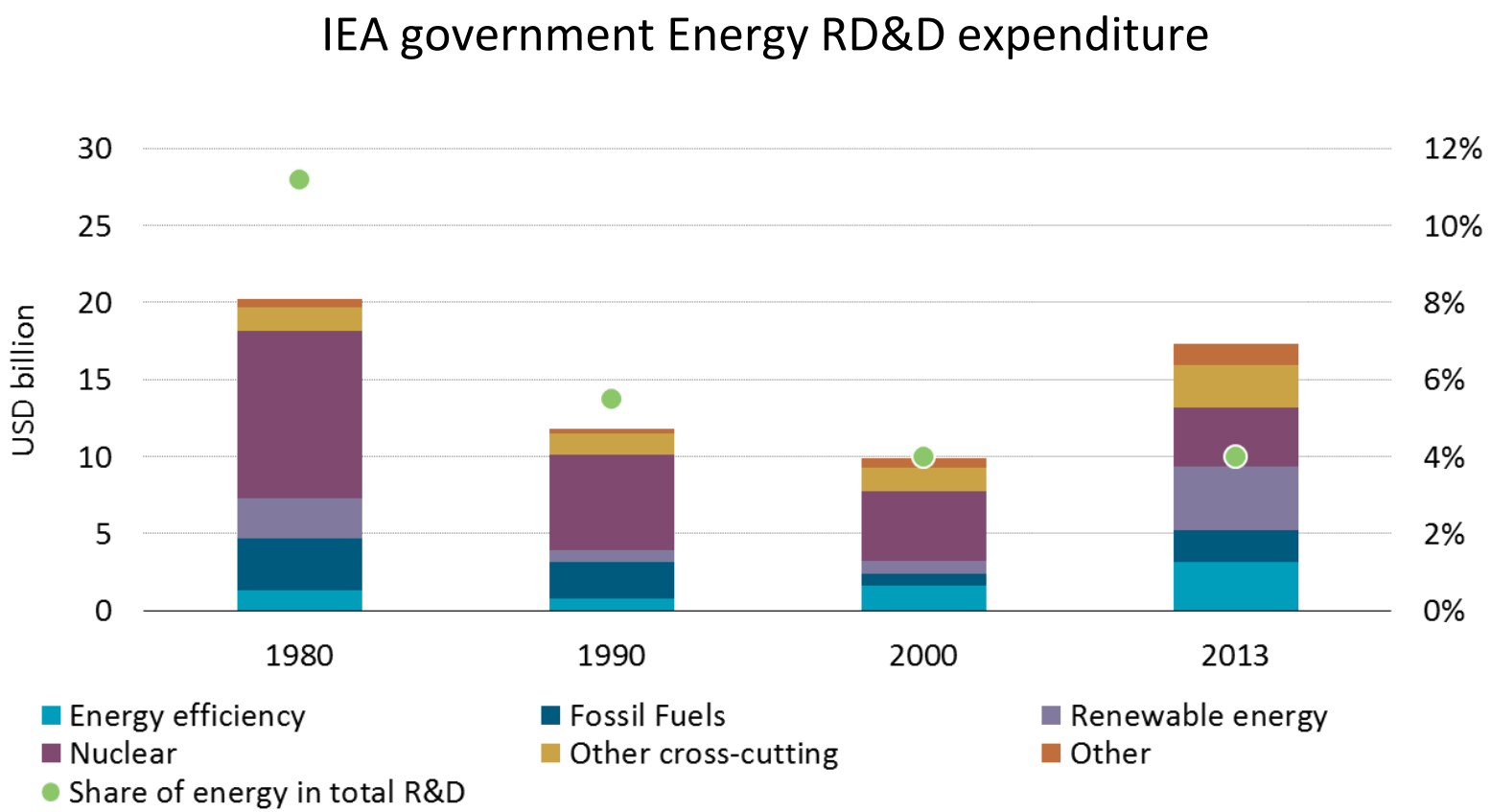

Energy RD&D spending should reflect the importance of energy technology in meeting climate objectives

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Supporting Energy Innovation: The right policy at the right time

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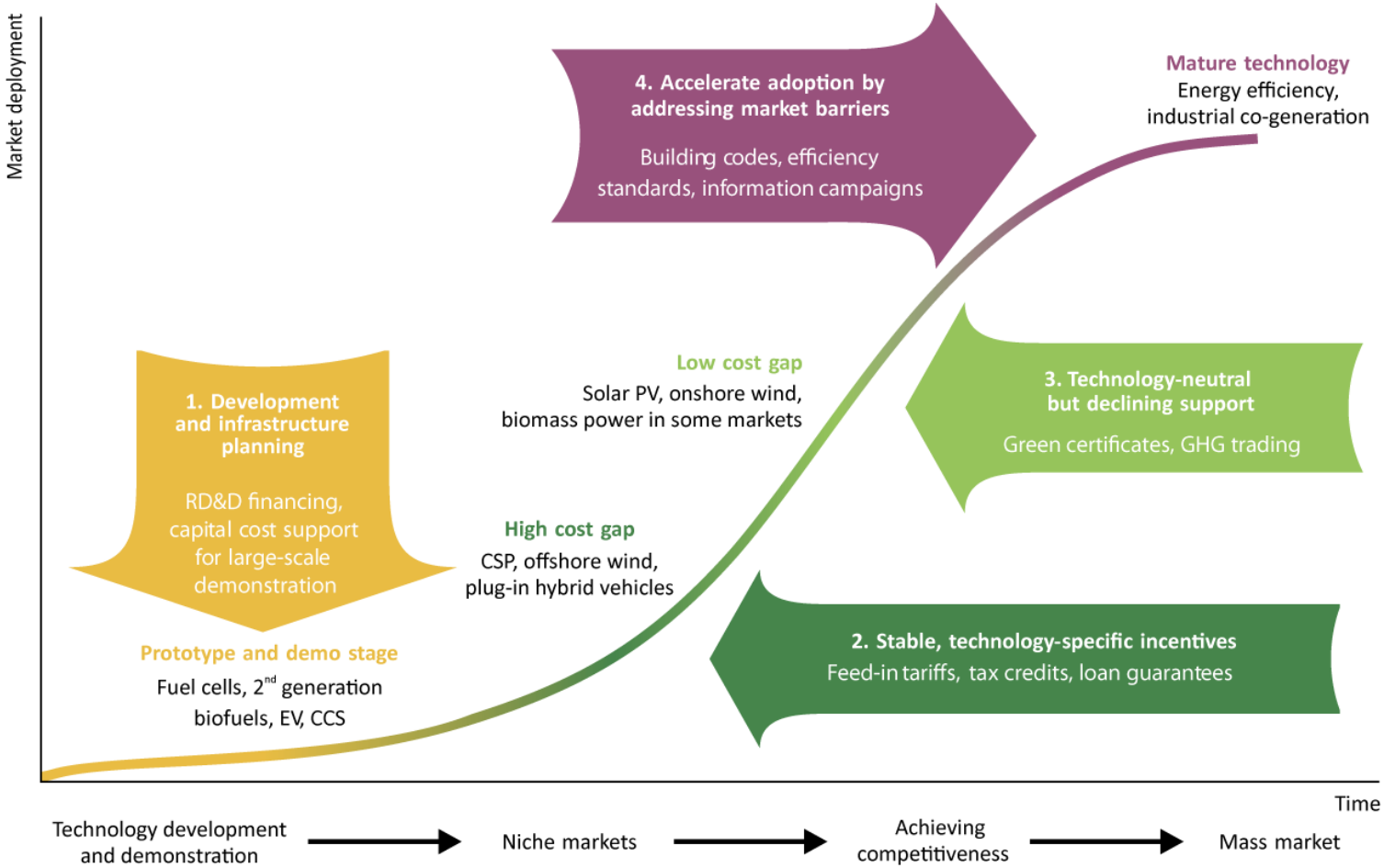

The right support depends on the maturity of the technology and the degree of market uptake

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Early stage support is key to improve future technology competitiveness

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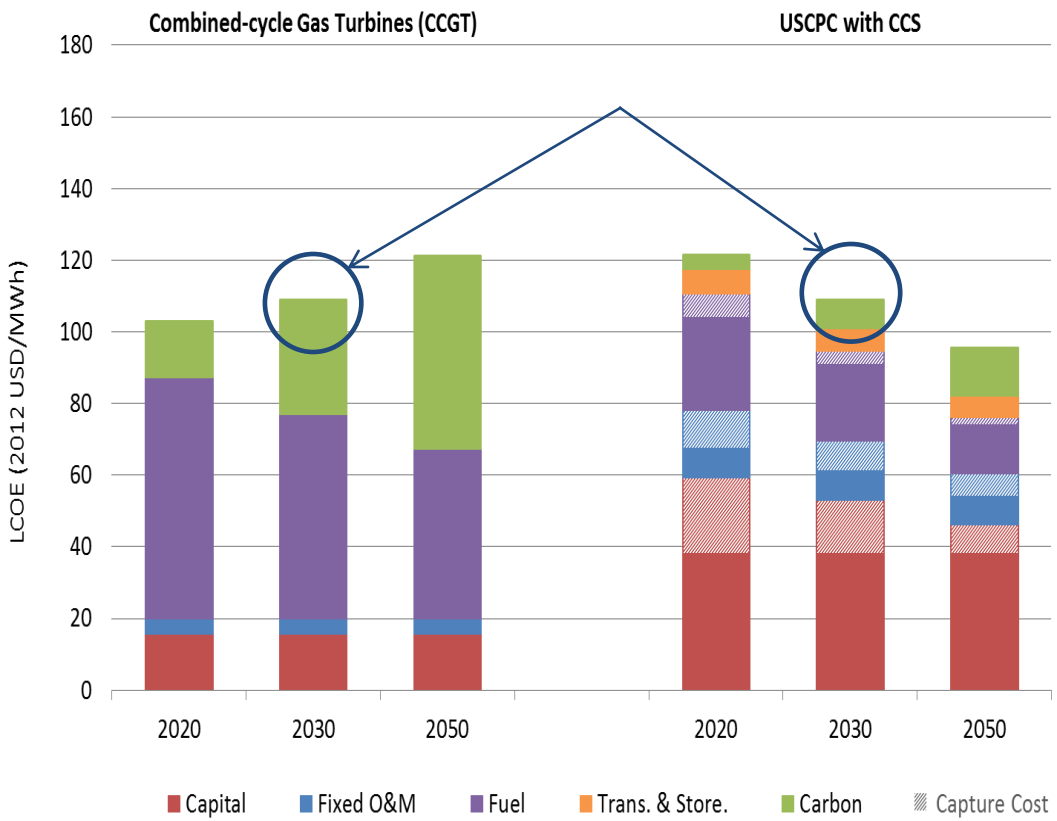
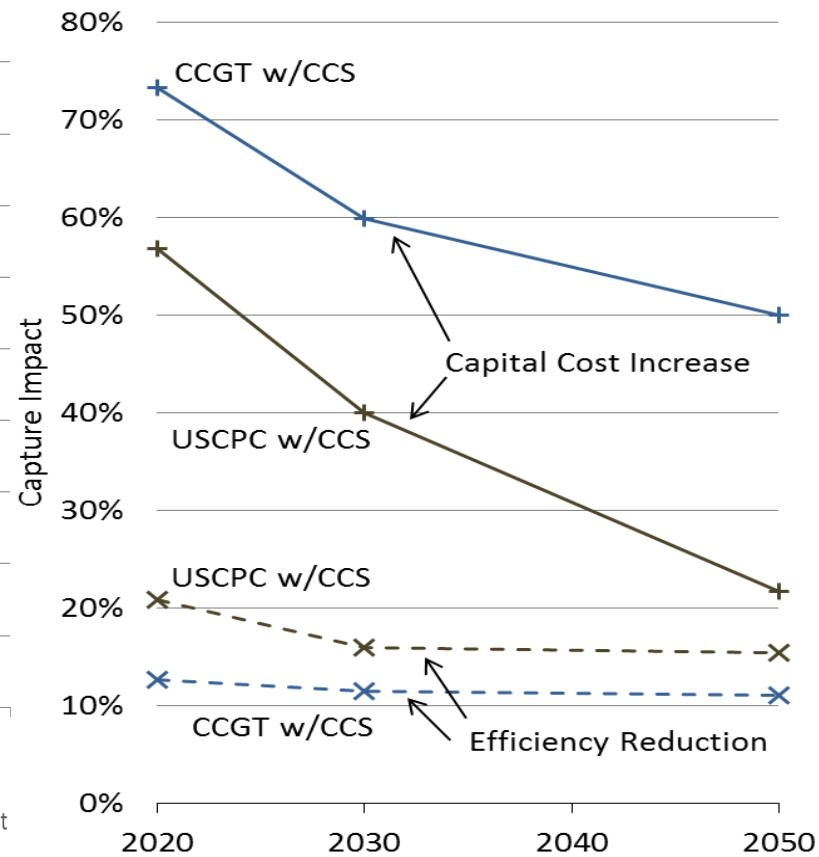
Projected Levelised Cost of Electricity of coal power generation in Asia



Assumptions on Capture Cost and Performance in the 2DS



Aggressive cost reductions are needed in the near term to make these projections a reality

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Deployment at scale needs support addressing market uptake barriers

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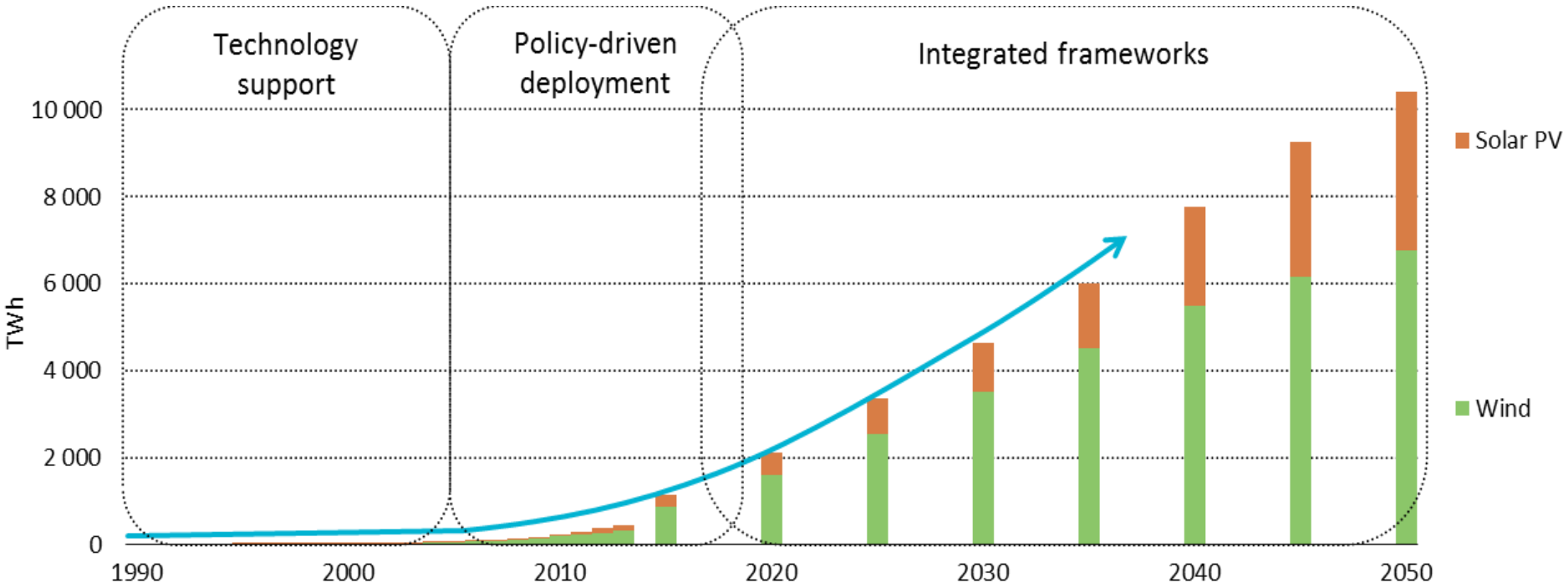
Projections of wind and solar PV generation



Wind and solar PV support needs to move from strictly incentives to integrated and well-designed market, policy and regulatory frameworks

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Innovation is essential for sustainable growth in the industrial sector

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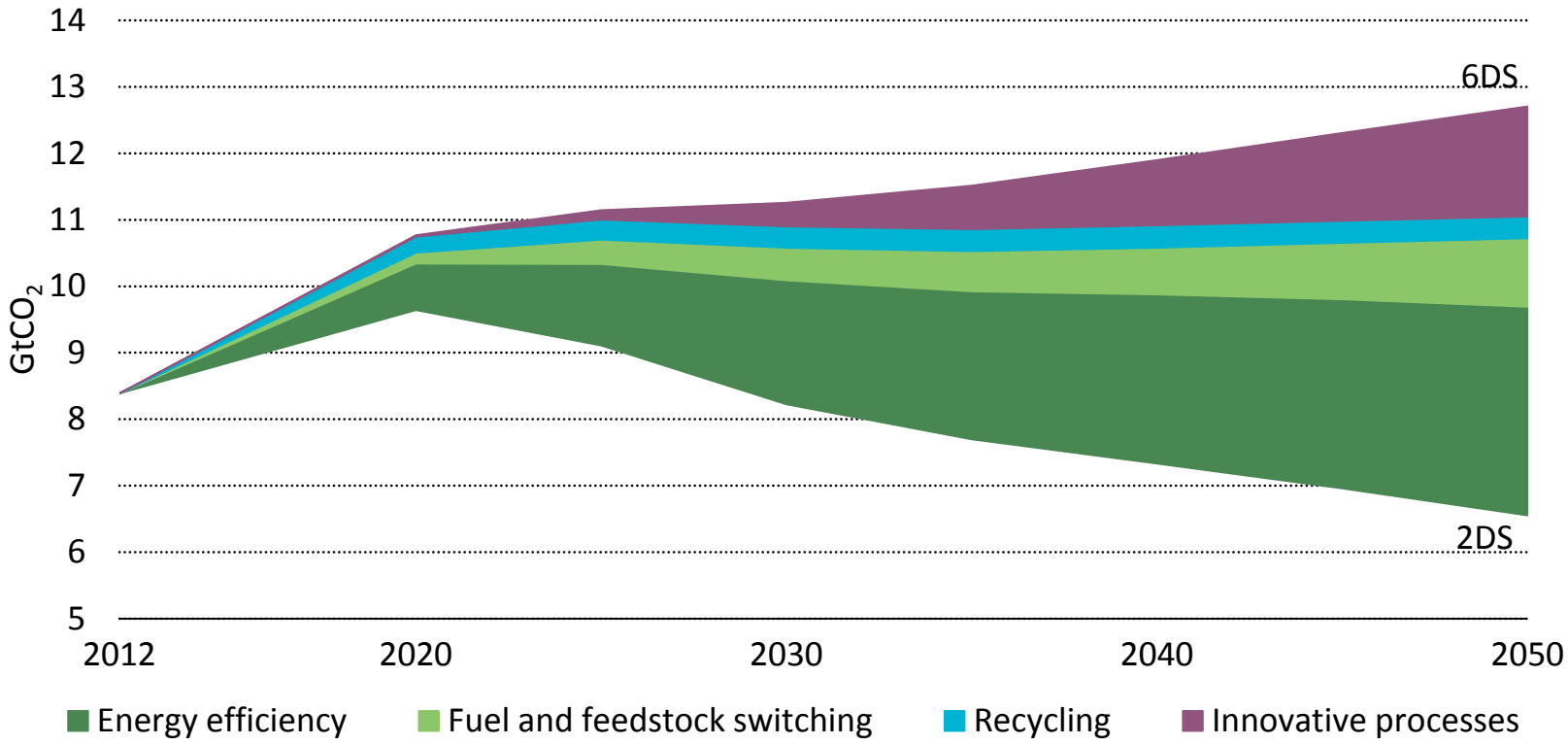
Annual energy-related direct CO2 Emissions in the industrial sector in the 2DS



Public and private entities need to work together to align innovation goals and achieve multiple benefits

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Innovation in a diverse world: no "one-size fits all" solution

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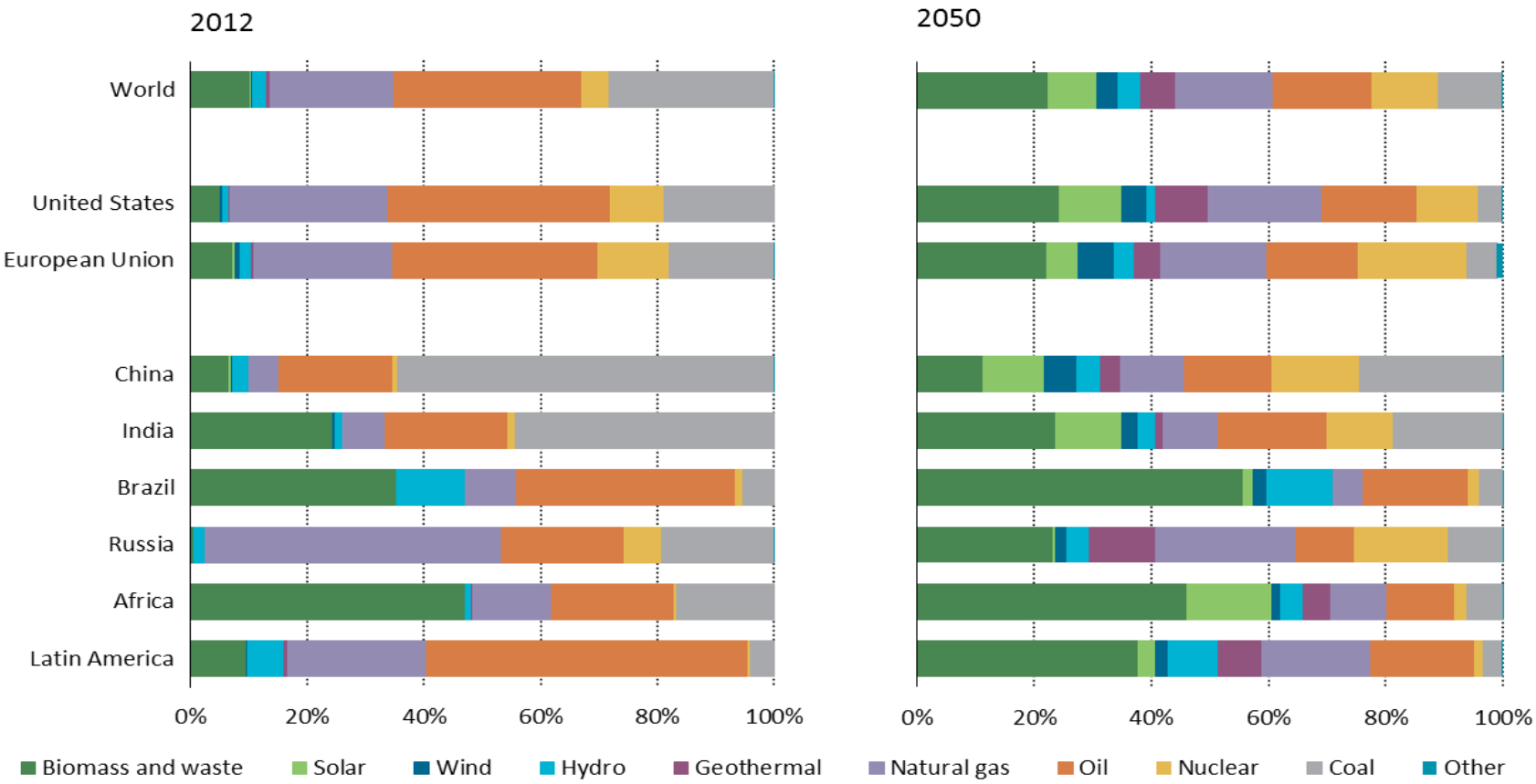
Different regions have differing technology shares today and in 2050-2DS



Source: ETP 2015

National circumstances and resources will drive different technology portfolios and pathways

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Local innovation cultures provide the frameworks to identify priorities

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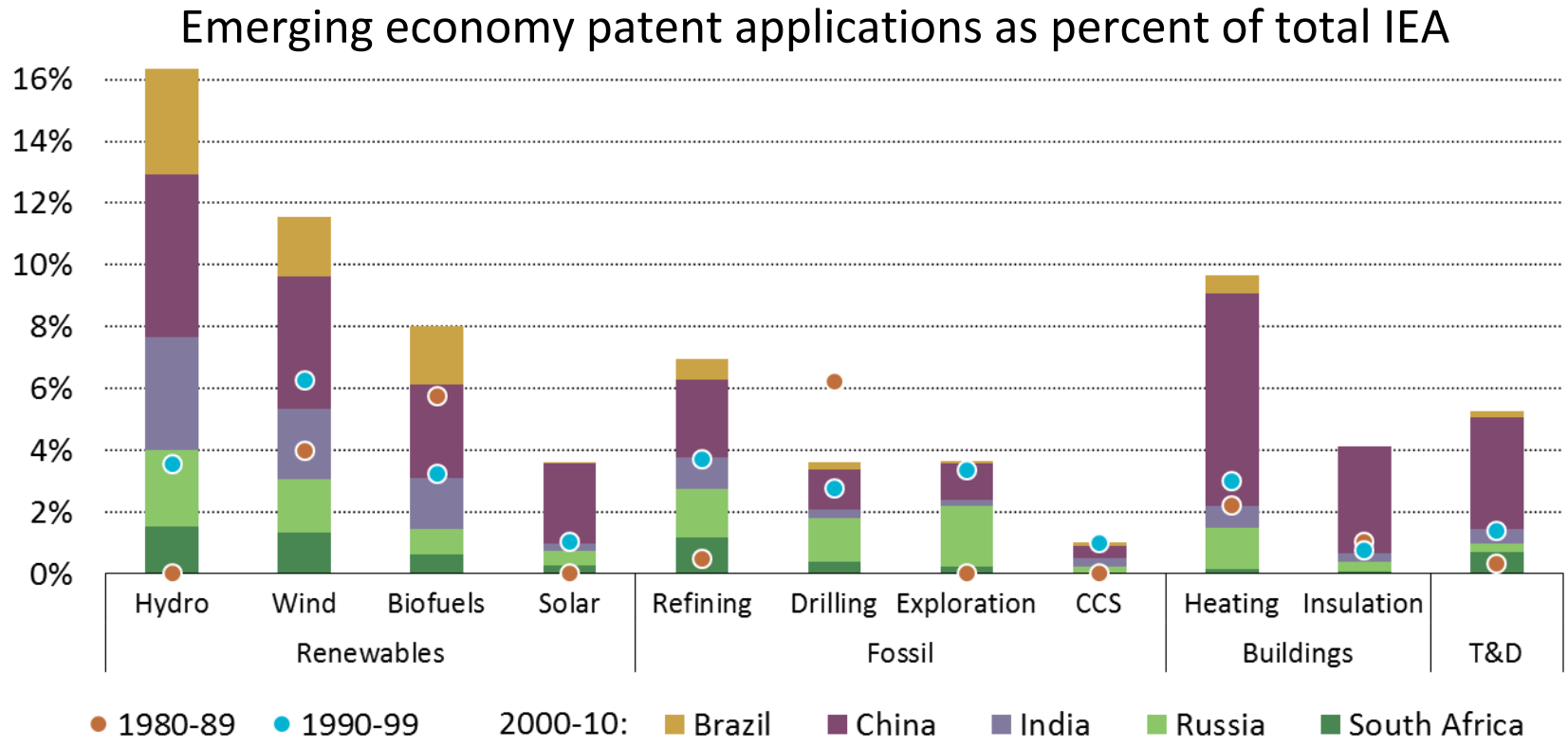

Evaluating challenges and opportunities is essential to supporting innovation where it has the most impact

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China is taking action to reap the benefits of a strong innovation system

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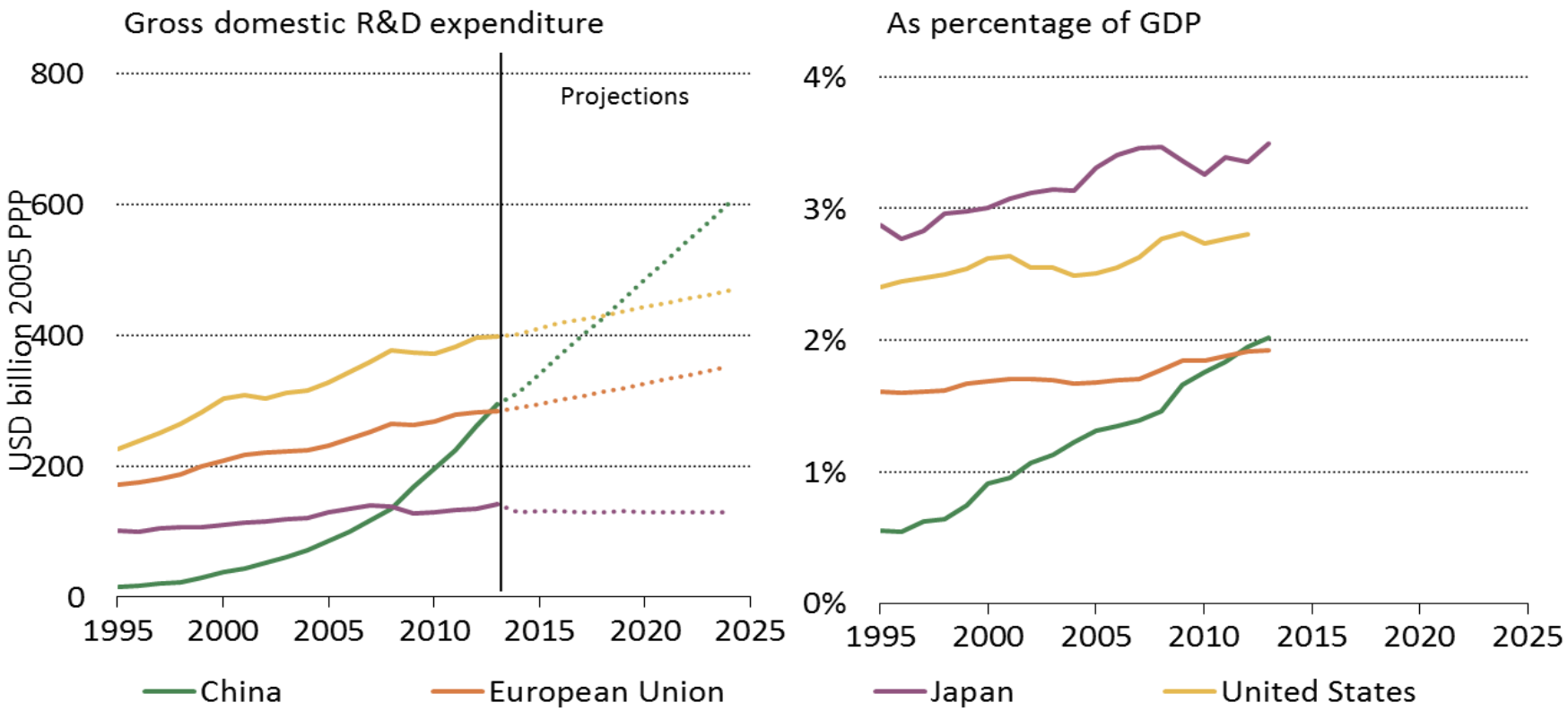
China's total R&D spending and OECD projections



China is poised to become the global leader in R&D spending by 2019.

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Better understanding innovation can increase confidence in its outcomes

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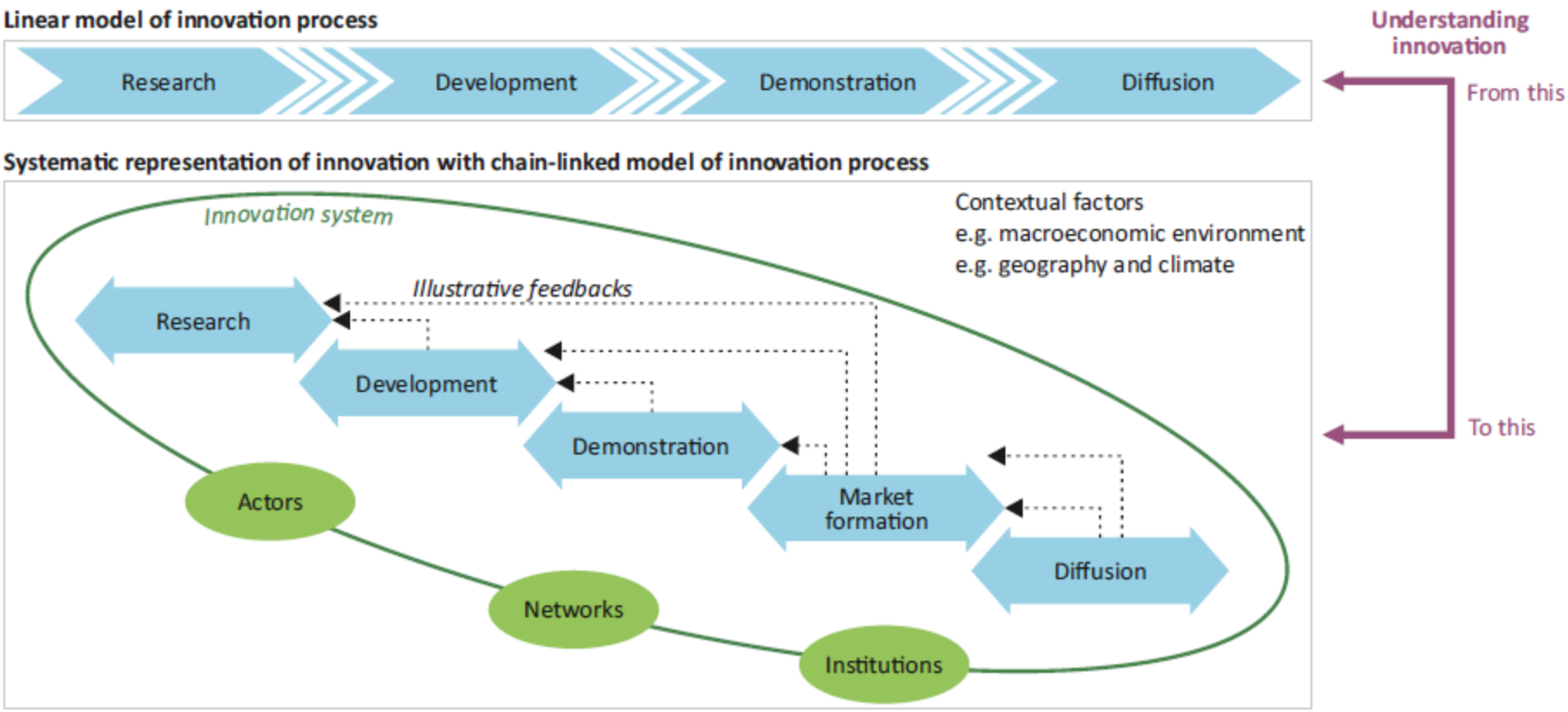

In order to accelerate technological progress in low-carbon technologies, innovation policies should be systemic

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Systems thinking and integration

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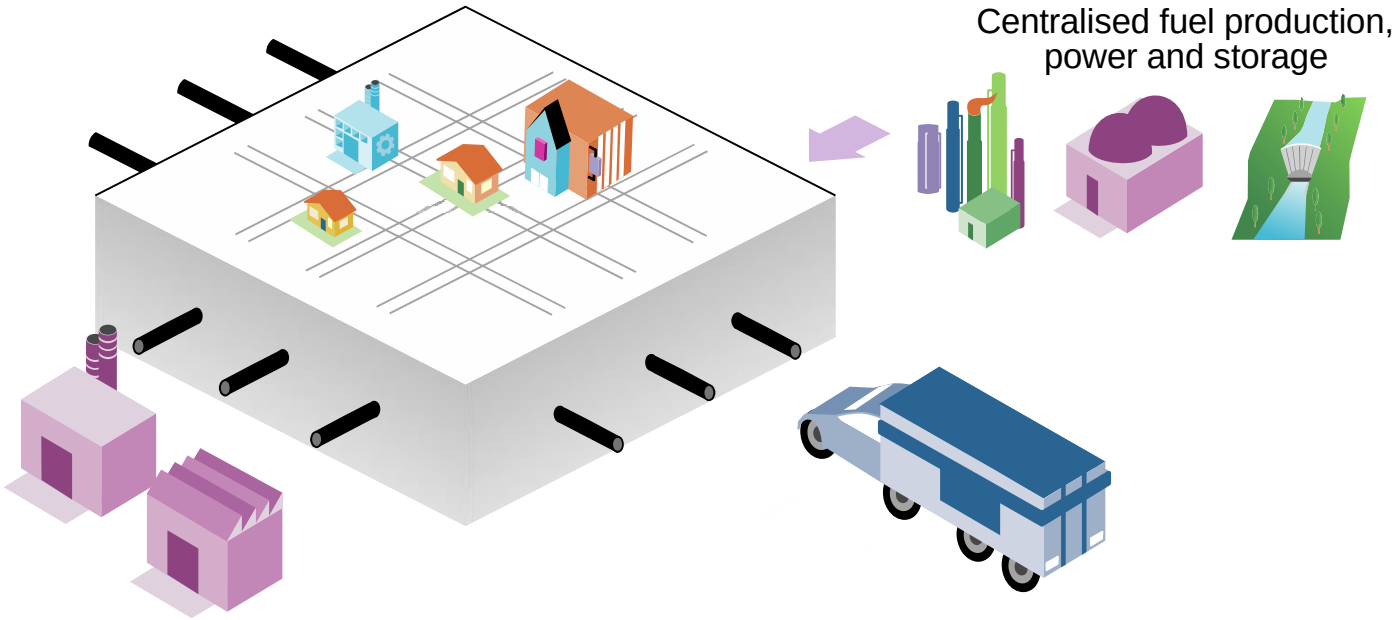

Today's energy system paradigm is based on a unidirectional <u>energy</u> delivery philosophy

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Systems thinking and integration

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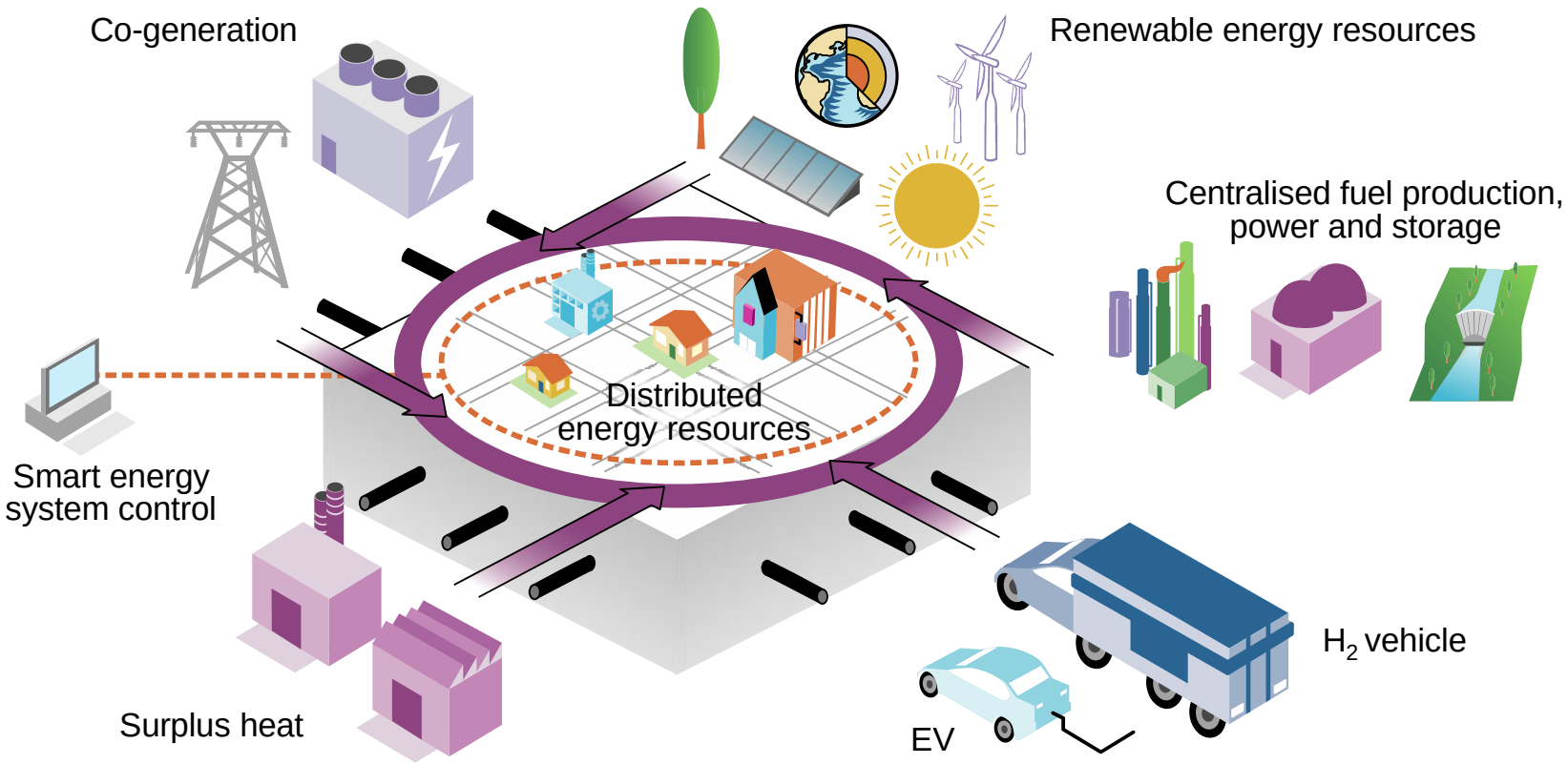

A sustainable energy system is smarter, multidirectional and integrated - requiring long-term planning for services delivery

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IEA Energy Technology Activities

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- Where do we need to go?
- Where are we today?
- How do we get there?

ETP publication programme

ETP 2015

ETP 2014	ETP 2015	ETP 2016	ETP 2017
Part 1. Setting the Scene			
Global Outlook, Tracking Clean Energy Progress			
Part 2. Driving the Change (Thematic Focus) *			
Harnessing Electricity's Potential	Mobilising Innovation to Accelerate Climate Action	Building Urban Energy Systems	TBD • Securing sustainable resources • Investing in sustainable infrastructure
Partner Country			
India	China	Mexico	TBD (Indonesia)

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IEA Technology Roadmaps

Mapping where we need to go …

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2009 **2010** **2011** **2012** **2013** **2014** **2015**

2016

Smart Grids Update

https://www.iea.org/roadmaps/

Low-Carbon Technology Roadmaps

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… By building consensus among all stakeholders

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- Goal to achieve
- Milestones to be met
- Gaps to be filled
- Actions to overcome gaps and barriers
- What and when things need to be achieved

A New Cycle of Roadmaps: Building on existing foundations

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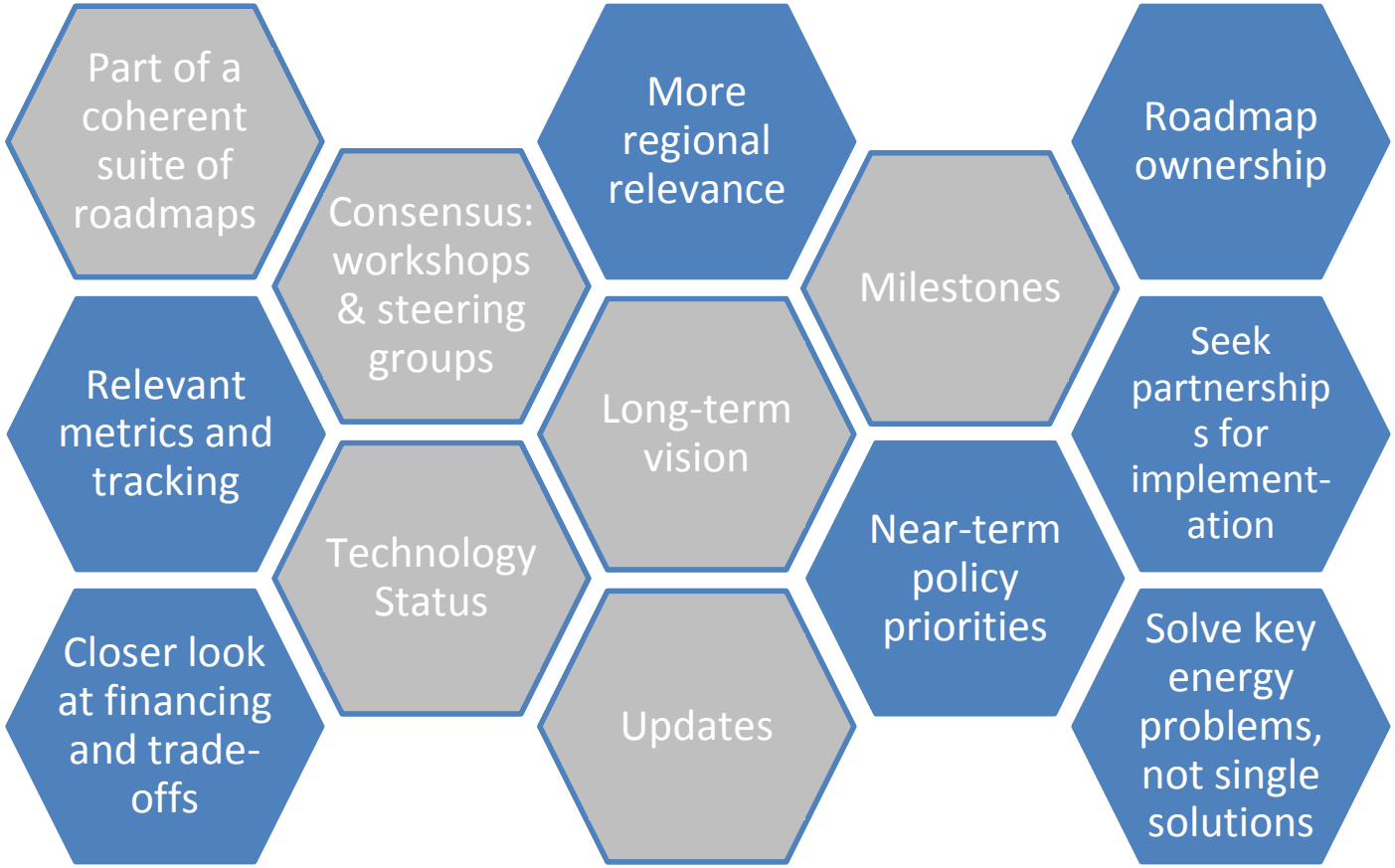

Updating Knowledge: Smart Energy Systems roadmap

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	SMART TRANSMISSION	SMART DISTRIBUTION	SMART CONSUMPTION
CURRENT OPPORTUNITEIS AND CHALLENGES	Ageing transmission infrastructure in OECD countries	Integration of distributed power, renewables, local storage	Smart meter deployment, big data
	Need for large-scale transmission infrastructure in fast-growing economies	Micro-grids for energy security	Electrification of transport and heat, demand response, power-to-X
FUTURE TECHNOLOGY VISION	Vision for High voltage AC/DC interconnections in different contexts	Vision for changing role of distribution network owners and operators	Vision for integration of end consumption in energy systems
ENERGY TECHNOLOGY NETWORK	ISGAN; HTS	ISGAN; PVPS	ISGAN; DSM; HEV

Low-Carbon Technology Roadmaps

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New Roadmaps: keeping the inherently collaborative nature

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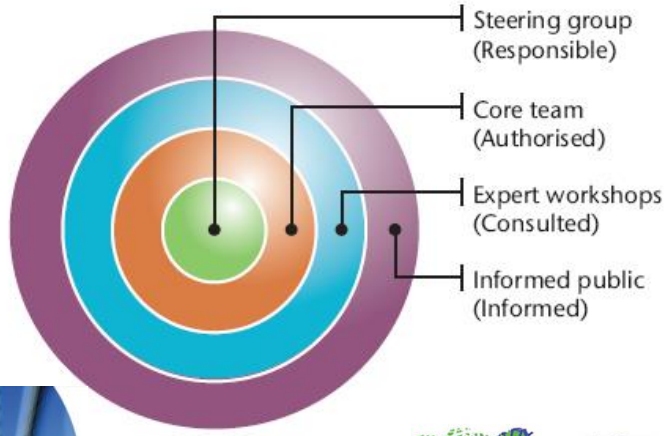


21st Century POWER PARTNERSHIP
Accelerating the transformation of power systems

LCTPi Led by wbcsd

Electric Vehicles Initiative

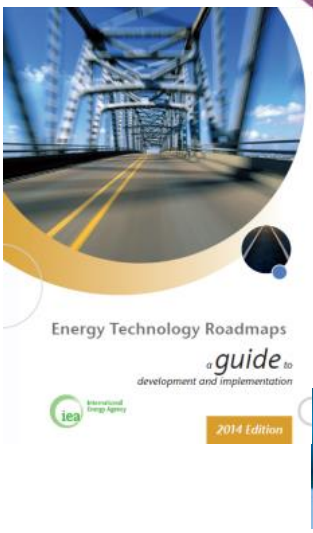
国家电网公司 STATE GRID CORPORATION OF CHINA

SIEMENS

ISGAN international smart grid action network

eurelectric ELECTRICITY FOR EUROPE

ABB



IEA INTERNATIONAL ENERGY AGENCY HYBRID & ELECTRIC VEHICLE IMPLEMENTING AGREEMENT

ieadsm energy efficiency

IEA-PVPS

iea INTERNATIONAL LOW-CARBON ENERGY TECHNOLOGY PLATFORM

ECES

SUPER CONDUCTIVITY International Energy Agency

Low-Carbon Technology Roadmaps

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Multilateral Collaboration: The IEA Energy Technology Network

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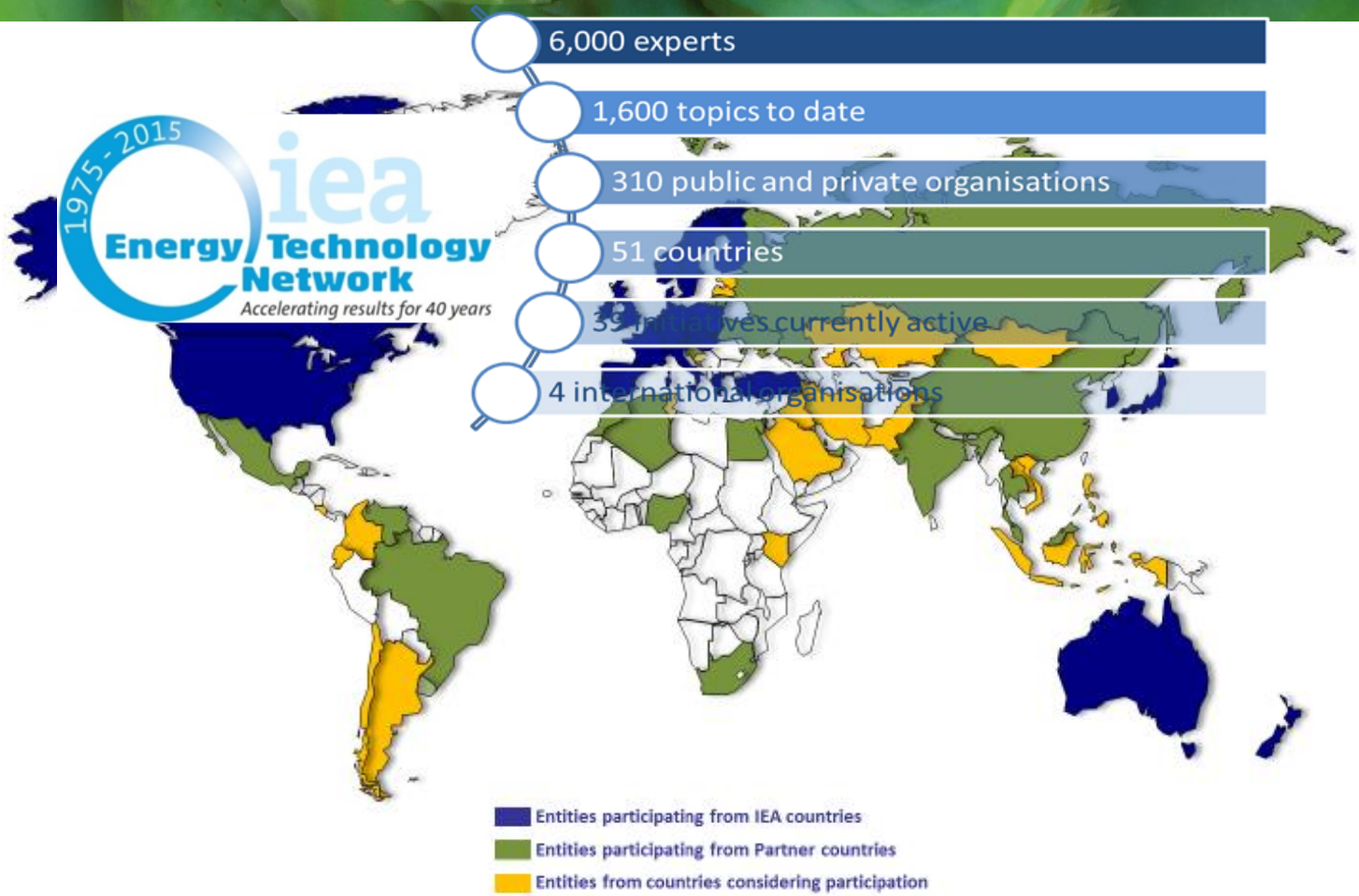

Thank you

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Explore the data behind *ETP*

www.iea.org/etp

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