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Transforming the energy sector – transforming the economy

The importance of Global Innovation and Collaboration

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IEA supports the energy transition

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IEA: the global energy authority

- **Part of the OECD family**
- **Founded in 1974 to co-ordinate a response to oil supply disruptions**
- **2015: IEA Modernisation grounded on three main pillars**
  - global energy security
  - energy cooperation and global dialogue
  - **promoting an environmentally sustainable energy future**

- **Build on a decade of analysis on what we need to do to keep temperature increase below 2°C**
- **Now developing analysis on faster and deeper energy-sector decarbonisation**

Context

- First clear signs of decoupling of CO_2 emissions and GDP
  - *Global energy-related CO2 emissions flattened in 2015 after their slowest historical increase in 2014 , despite growing GDP*
  - *Renewable power capacity at record high with over 150 GW installed in 2015*
- COP21 provided a historic push for clean energy
  - *Start of a new era of collaboration: Country-based approaches preferred to top-down regulation*
  - *New goals put forward – going beyond what everyone already considered challenging when our first ETP was released in 2006*
- Growing recognition that greater innovation is essential to meet ambitious climate goals

Energy Innovation is crucial to a sustainable energy transition

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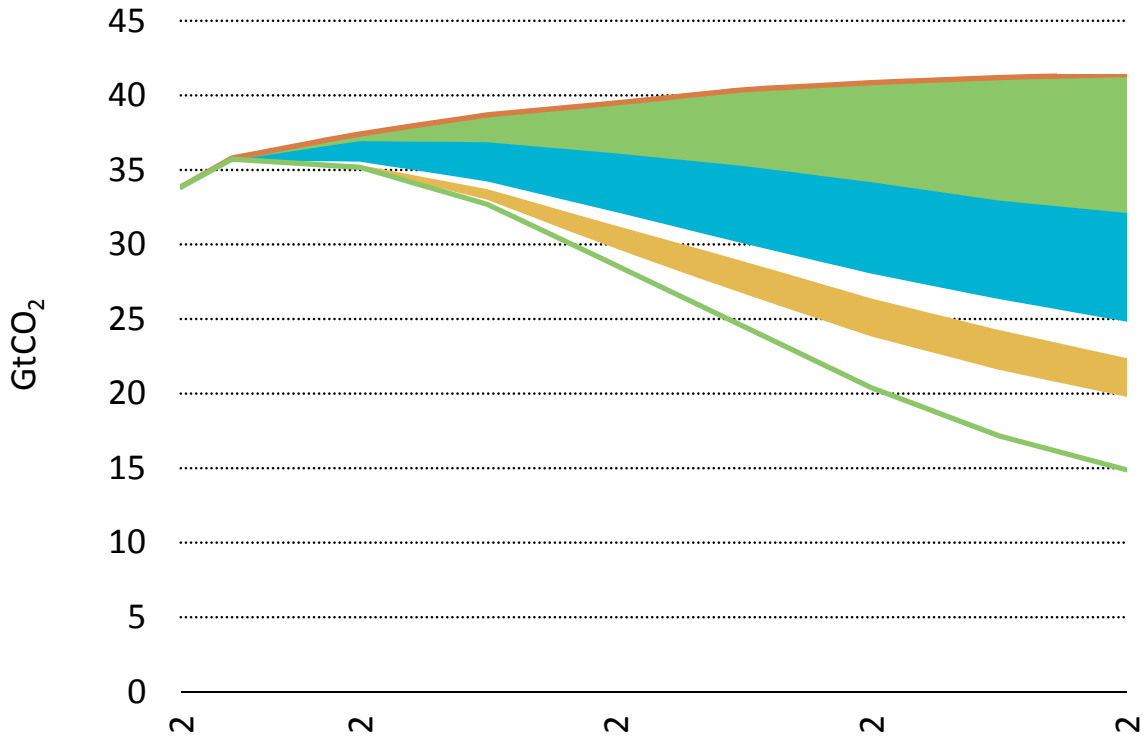
Contribution of technology area to global cumulative CO_2 reductions



Energy innovation has already yielded solutions,

ETP 2016

Energy Innovation is crucial to a sustainable energy transition

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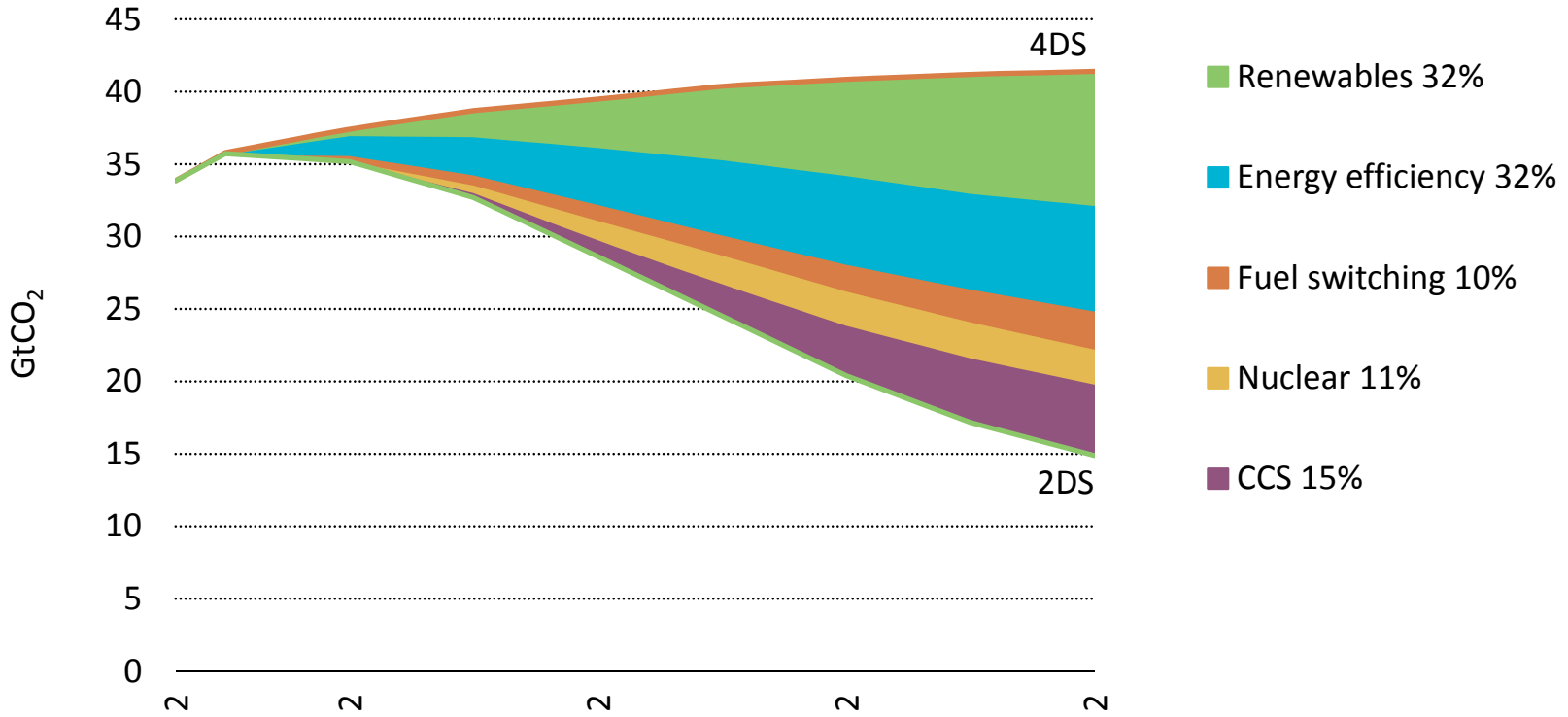
Contribution of technology area to global cumulative CO_2 reductions



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

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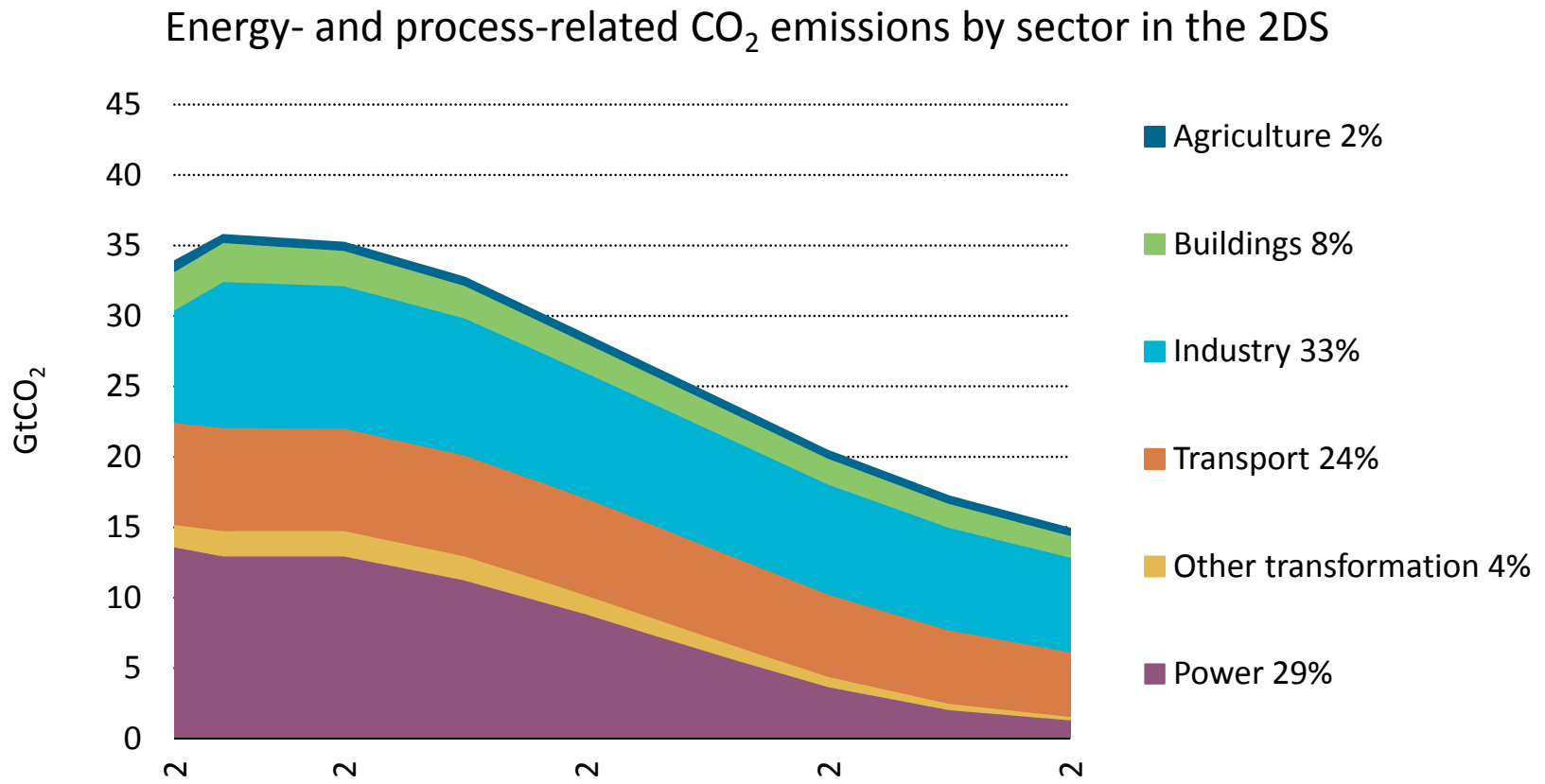
And the challenge increases to get from 2 degrees to "well below" 2 degrees



Industry and transport account for 75% of the remaining emissions in the 2DS in 2050.

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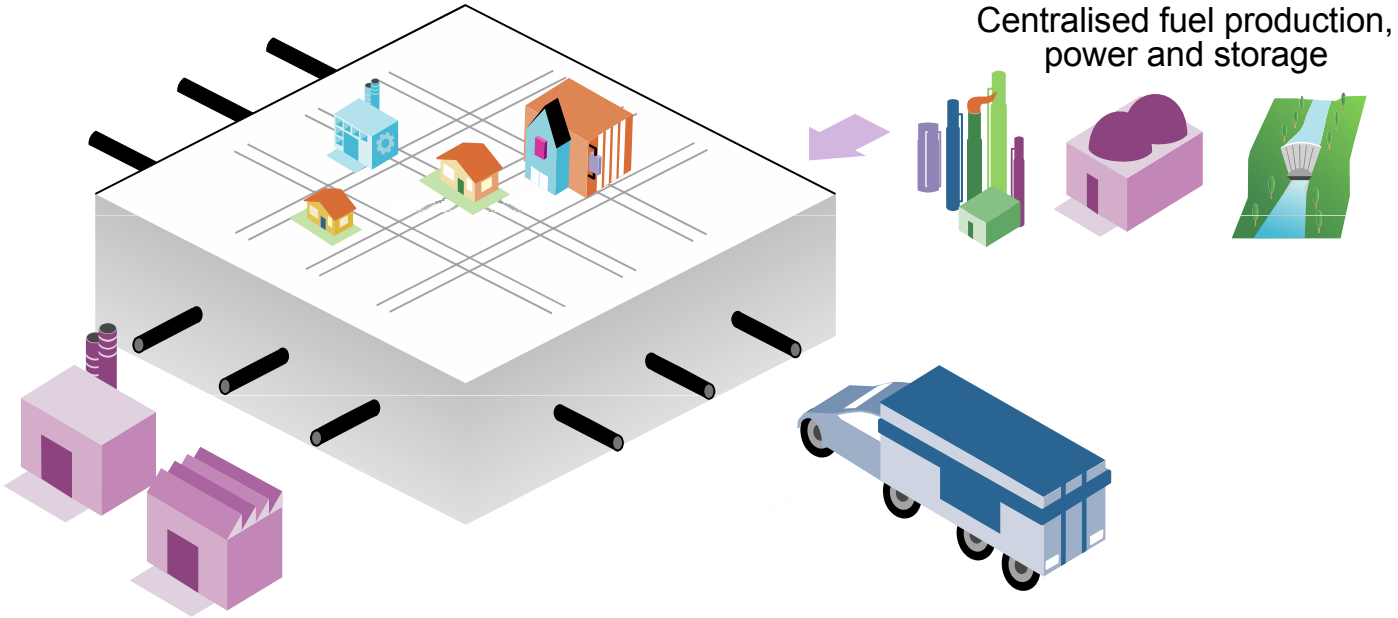
Systems thinking and integration



Today's energy system paradigm is based on a unidirectional energy delivery philosophy

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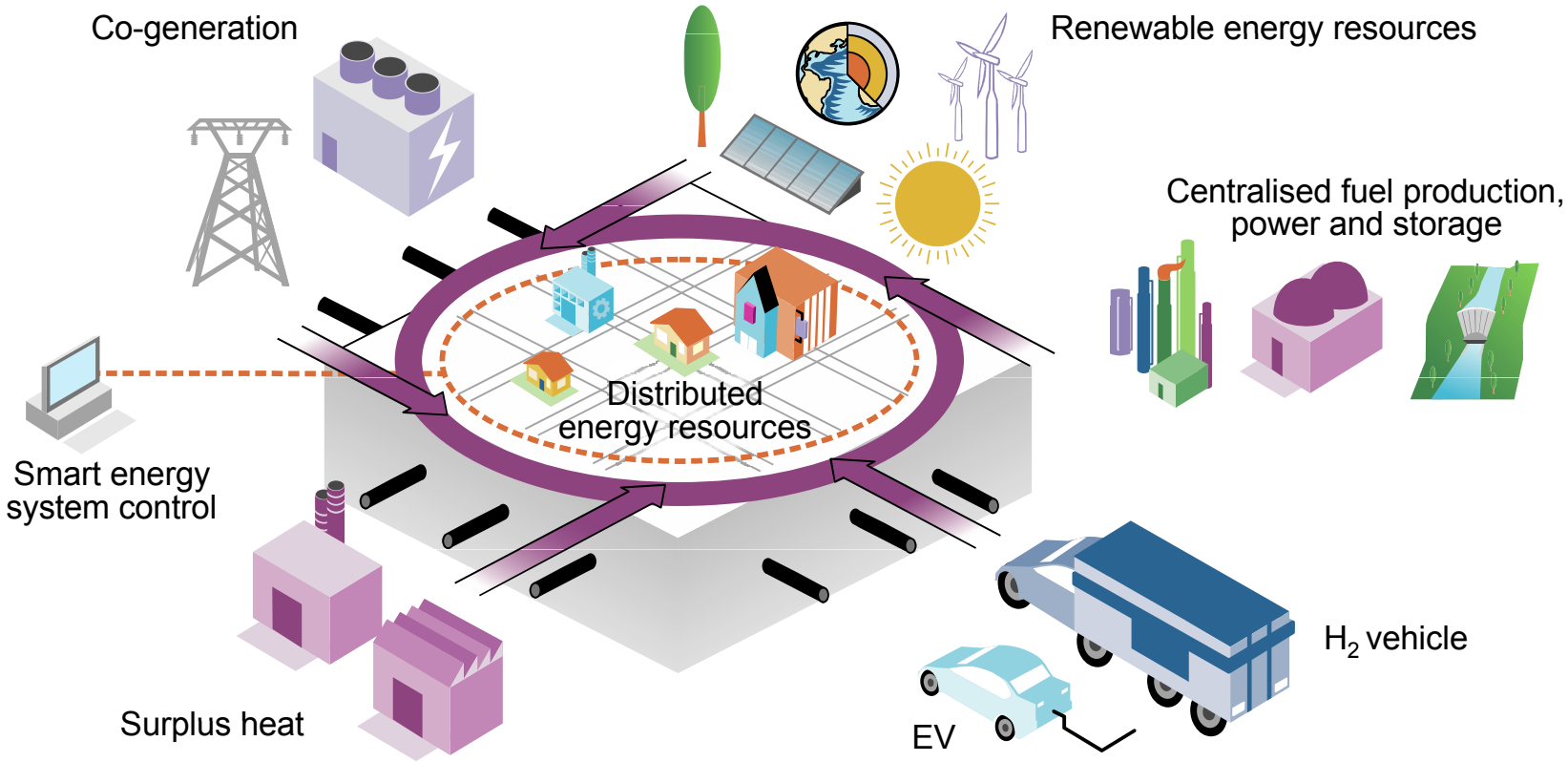
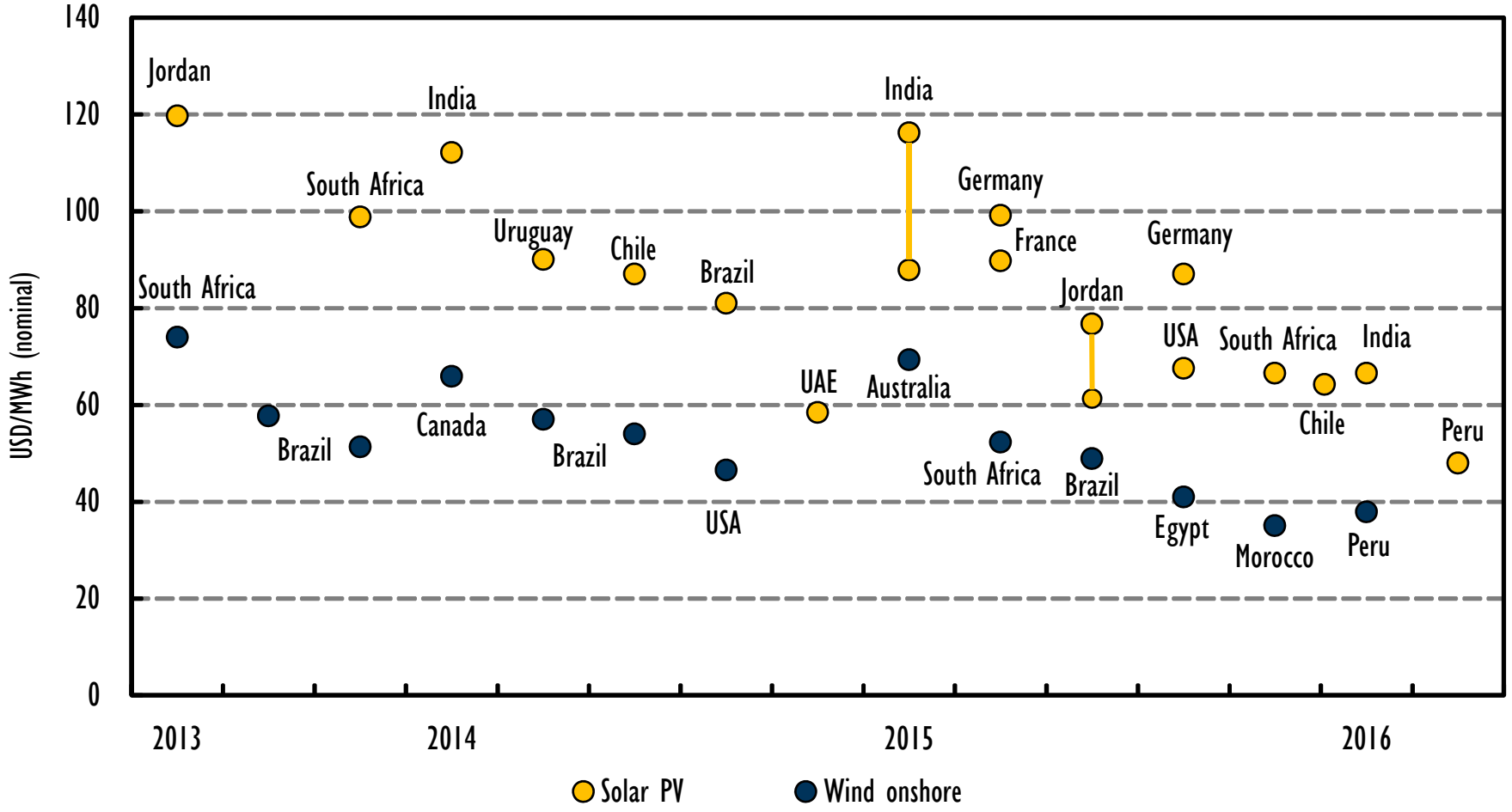
Systems thinking and integration



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

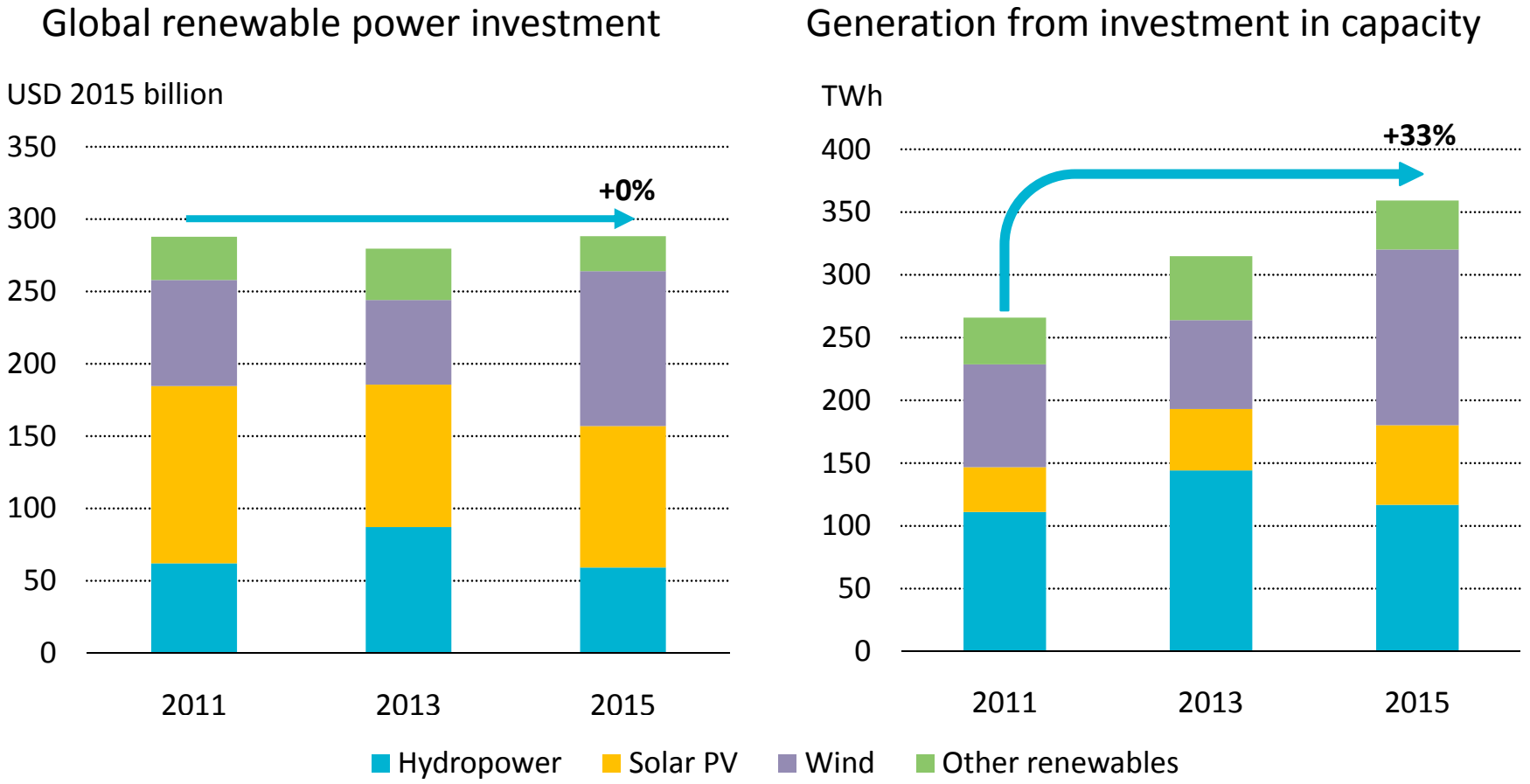
Context: Wind and PV
Downward price trends continuing rapidly

Recent announced long-term contract prices for new renewable power to be commissioned over 2016-2019



Best results occur where price competition, long-term contracts and good resource availability are combined

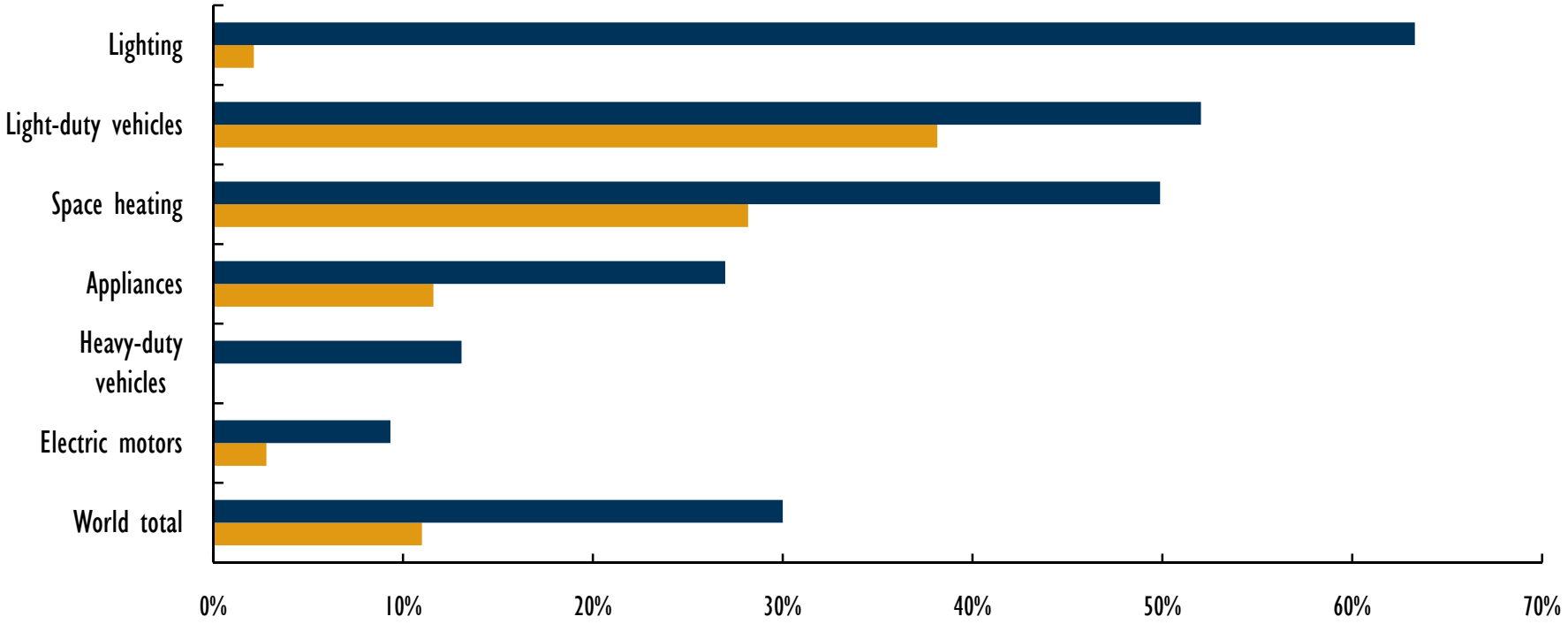
Renewables investment buys much more electricity



Investment from renewables-based capacity more than covers 2015 global electricity growth. Wind leads, surging 35% in 2015 on economics and record offshore growth.

Efficiency gains have been driven by the expansion of policy

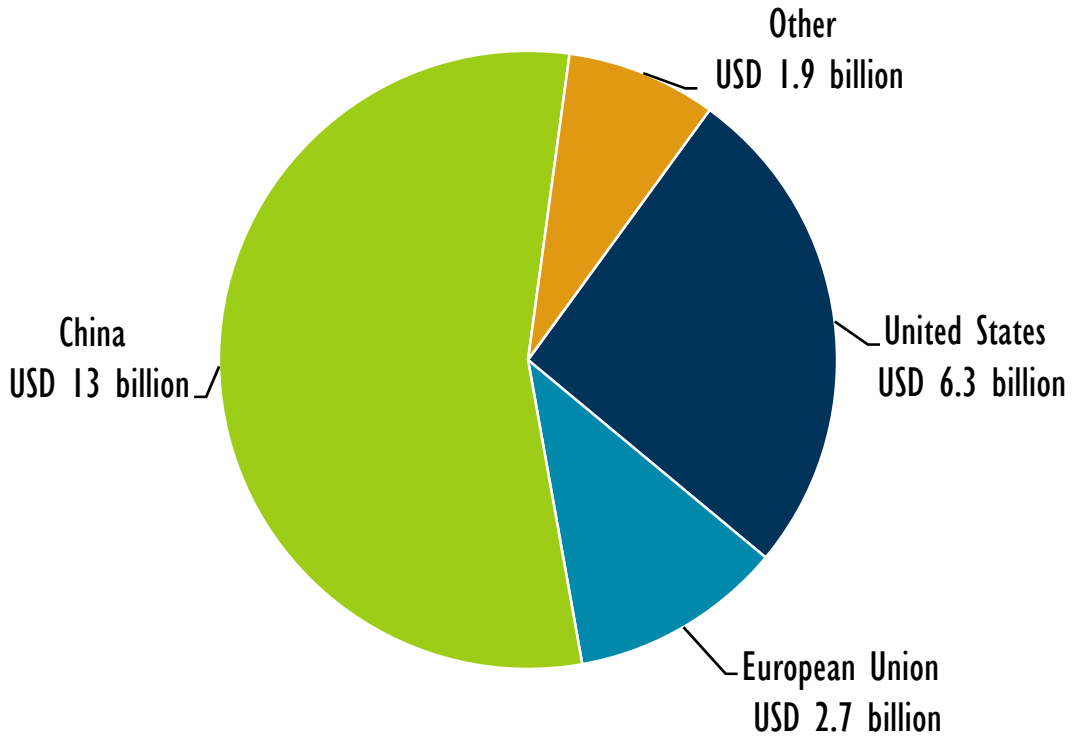
Share of global energy use covered by mandatory standards and regulations



30% of the world's energy consumption is now covered by mandatory standards and regulations, up from 11% in 2000.

The market for energy efficiency services appears poised for growth

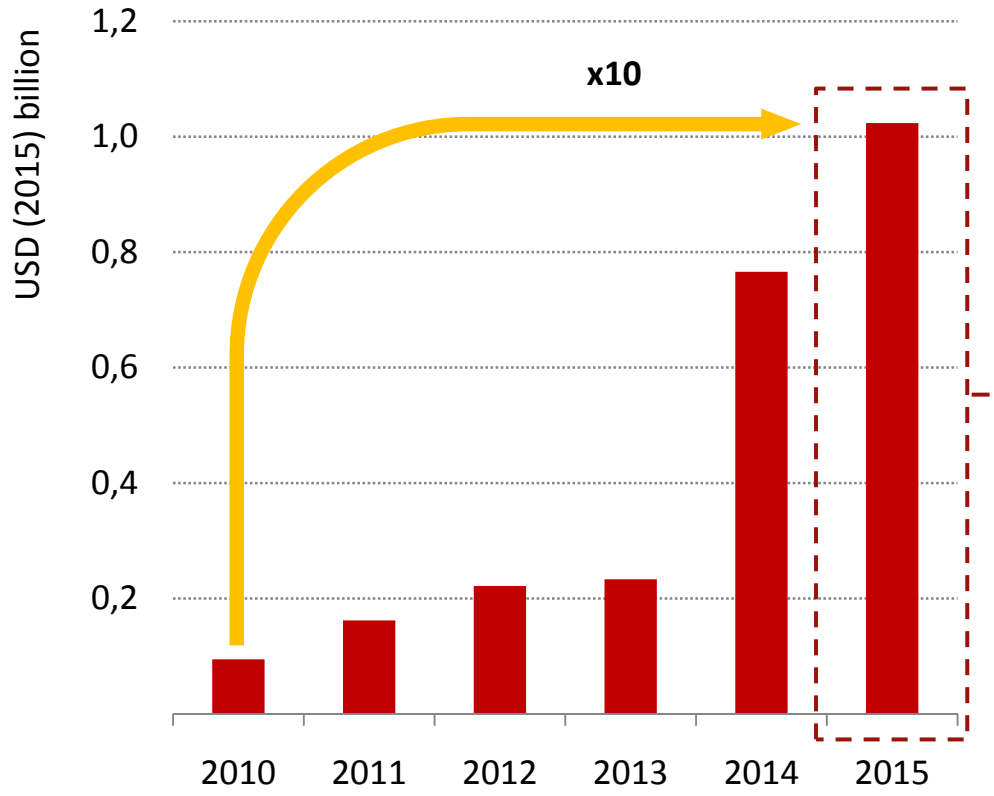
Global energy service company revenues by country/region, 2015



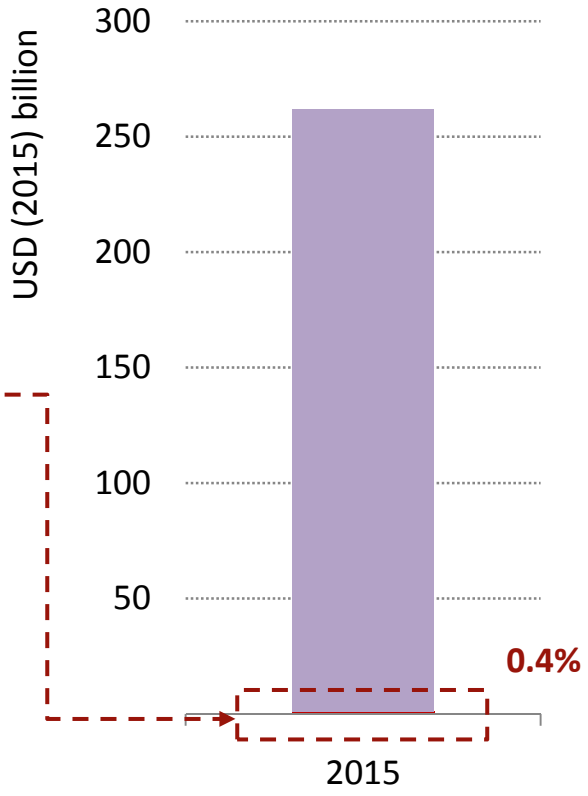
The global energy services market was USD 24 billion in 2015 and indicators point to future growth.

Battery investment has taken off

Global grid-scale battery storage investment



Total networks investment



Grid-scale battery storage spending has expanded tenfold since 2010. Their value lies most in complementing centralised grids that constitute the bulk of investment.

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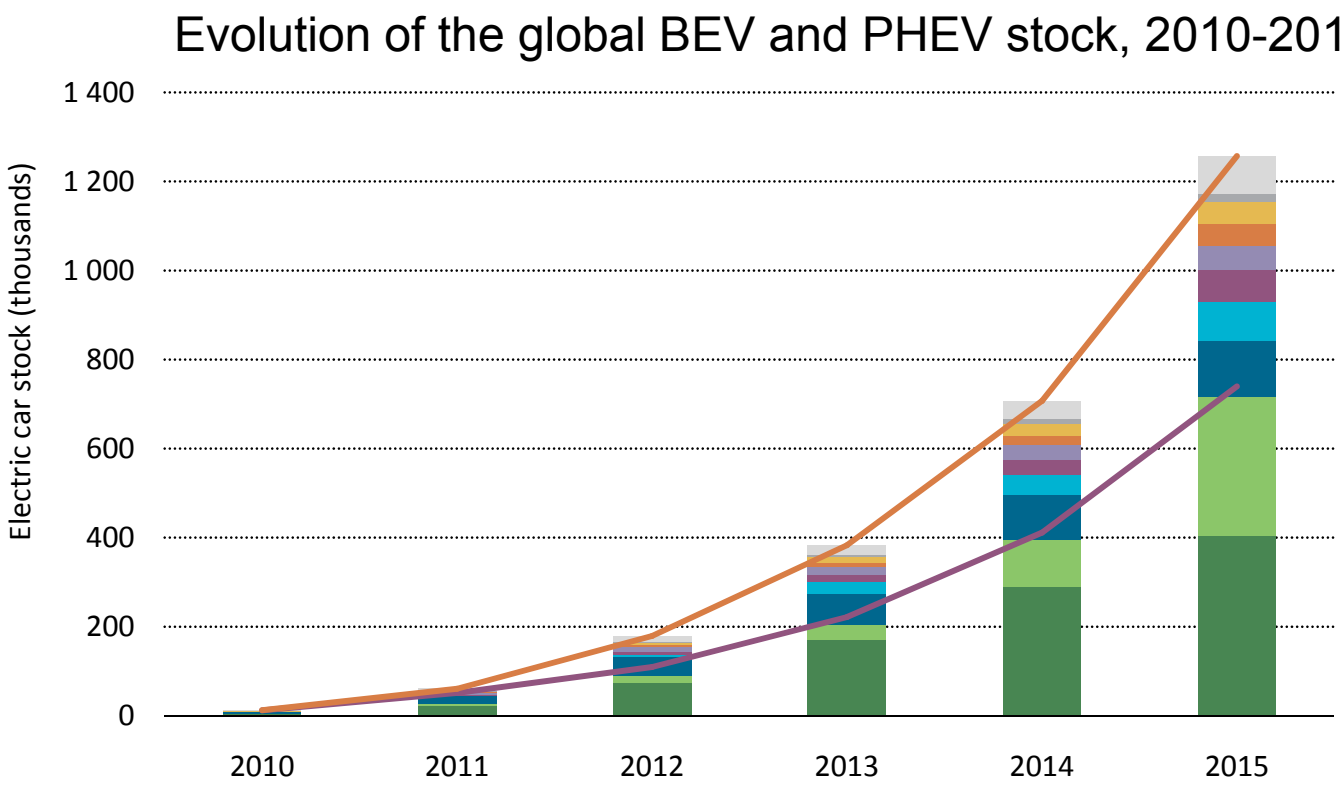
Crossing the 1 million EVs threshold



Annual EV sales grew by 70% over 2014, catching up to rates needed to meet the 2DS target.

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Progress in clean energy needs to accelerate

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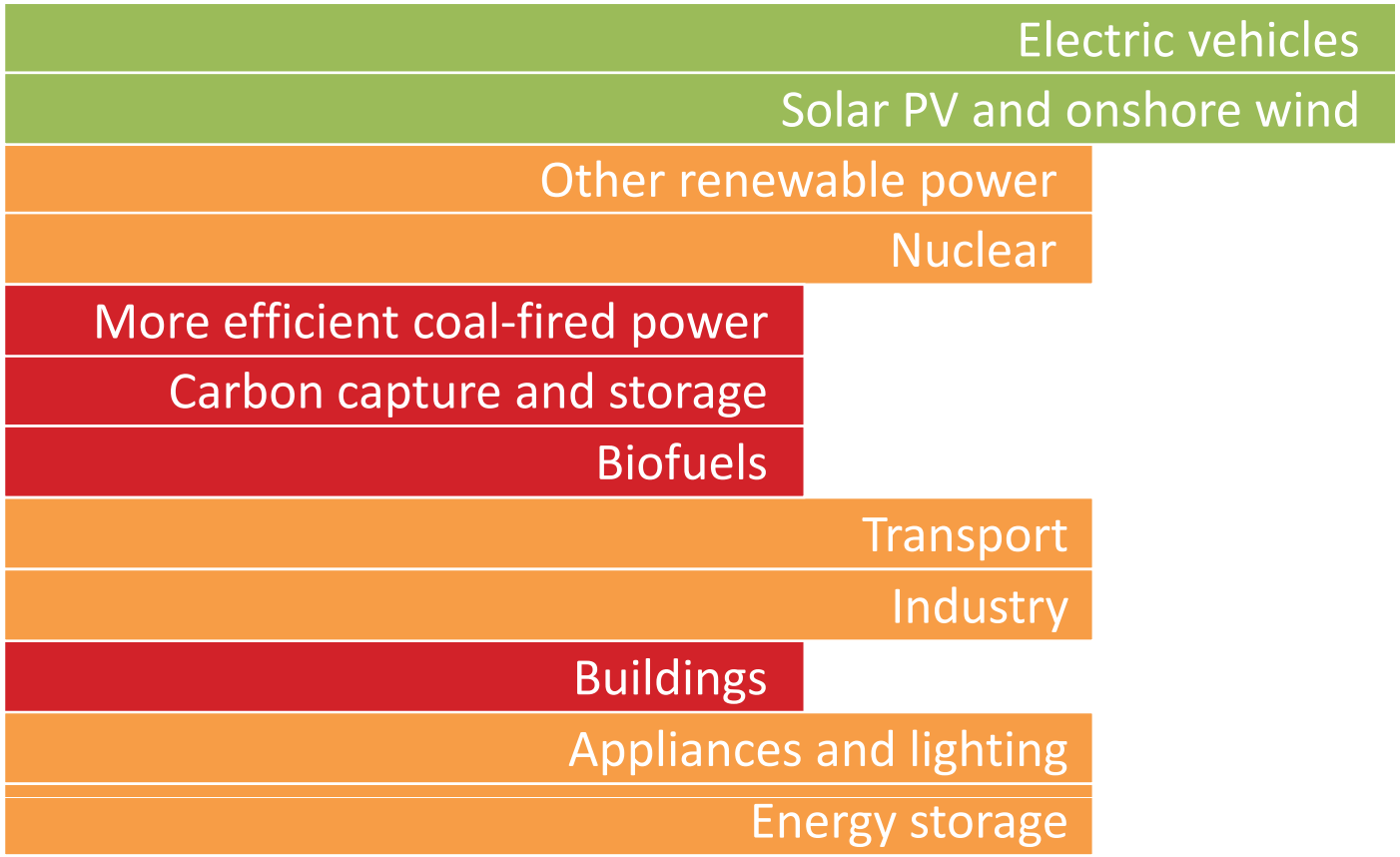
Technology Status today against 2DS targets



Clean energy deployment is still overall behind what is required to meet the 2°C goal, but recent progress on electric vehicles, solar PV and wind is promising

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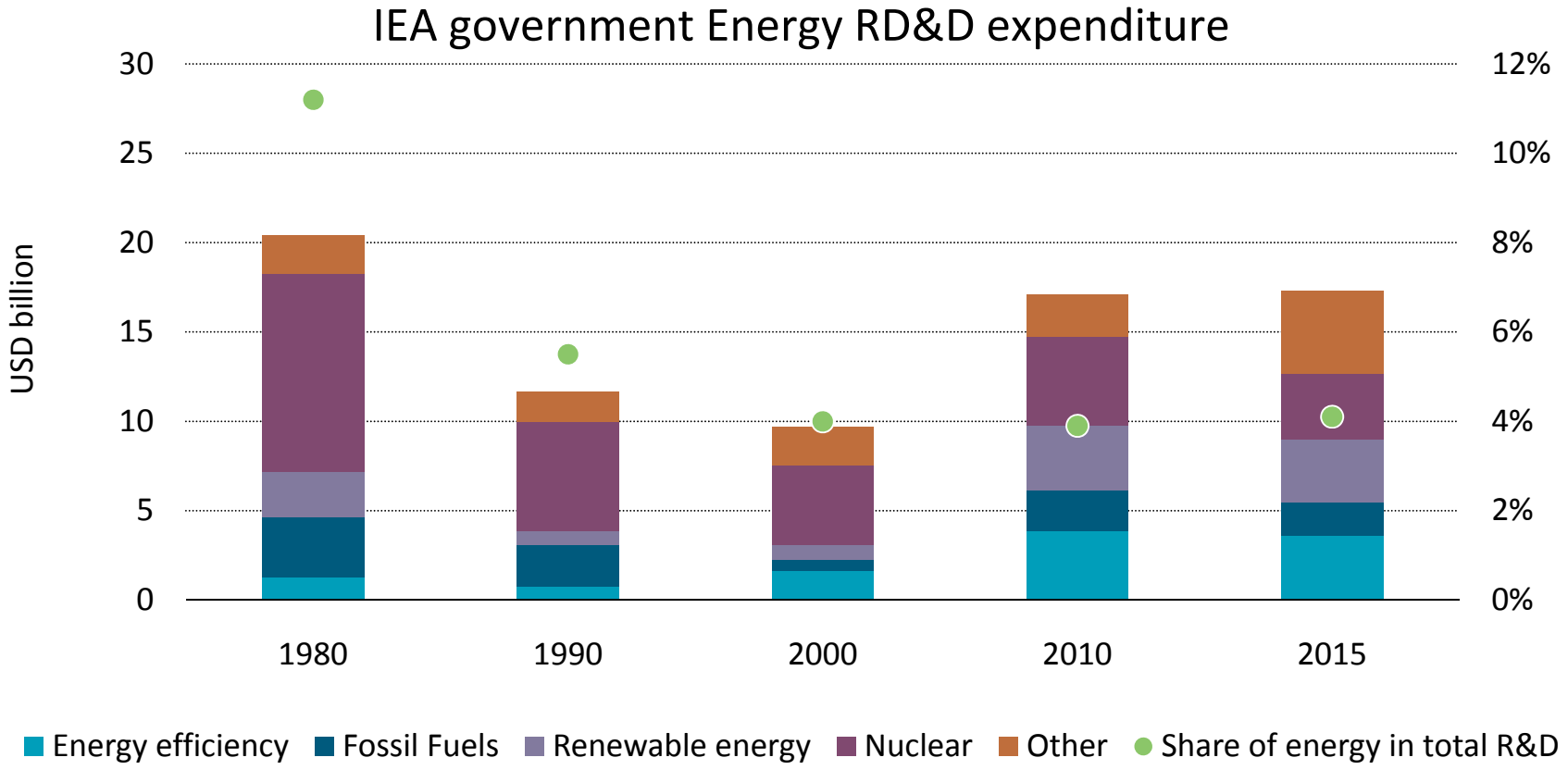
Energy RD&D funding now targets the right issues, but is not enough



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

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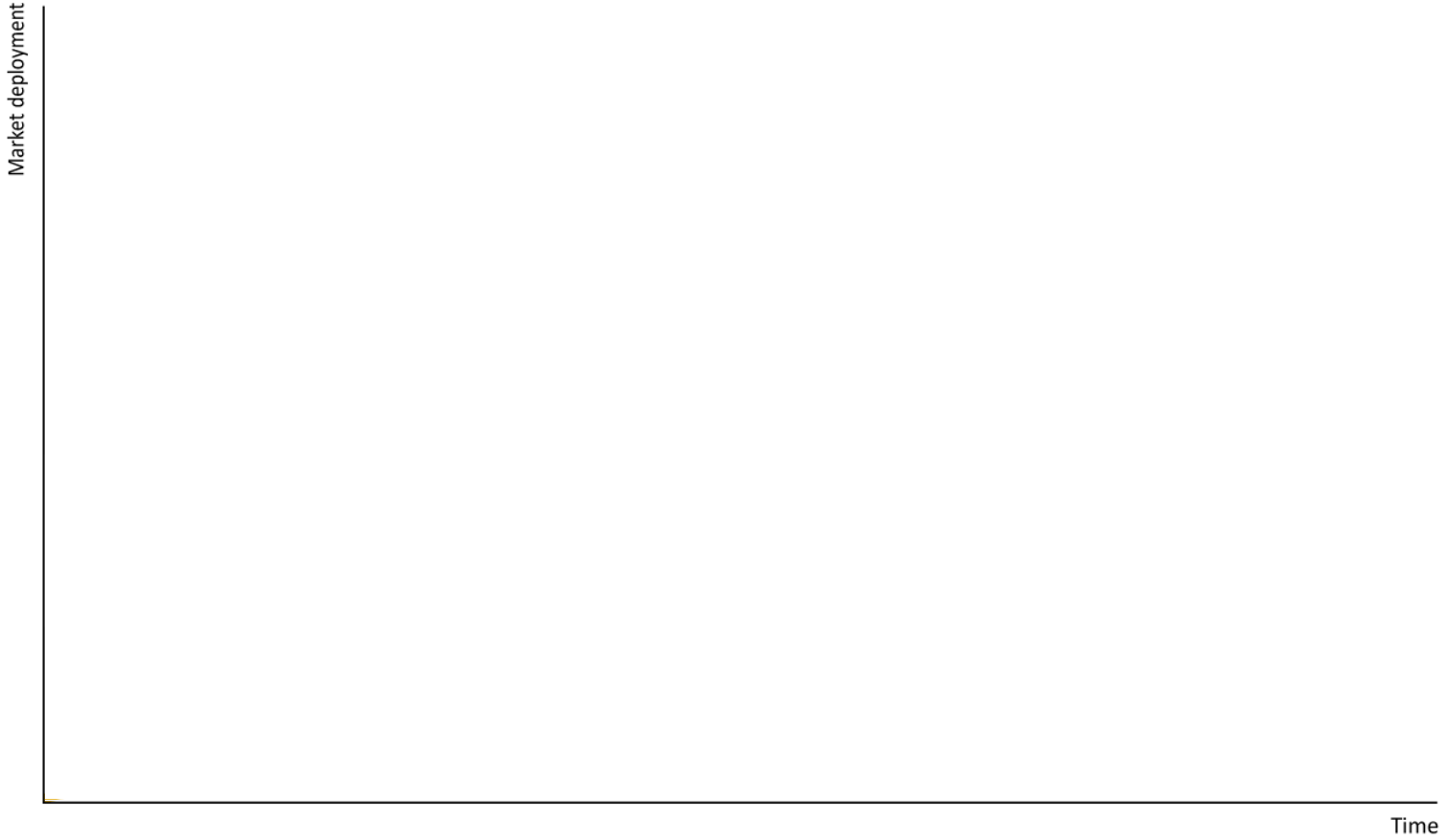
Supporting Energy Innovation: The right policy at the right time



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

Better understanding innovation can increase confidence in its outcomes

Linear model of innovation process

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

Technology Roadmapping:
Bringing stakeholders together

- 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

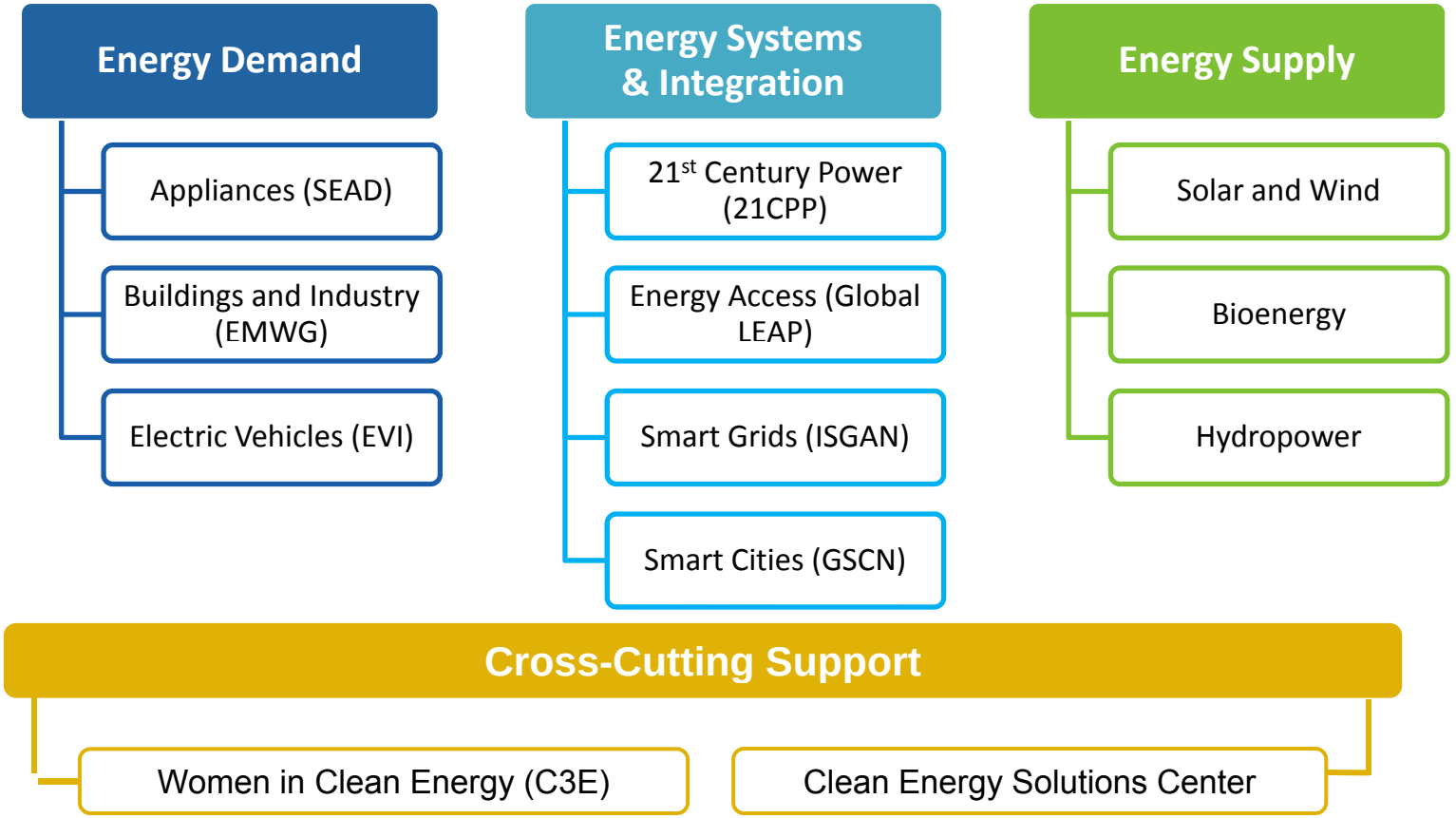
- **32 global publications, 21 different technology areas**
- **Re-endorsed at G7 Energy Ministerial Meeting in May 2016 (Kitakyushu)**
- **New Cycle for Implementation:**
  - Near-term actions
  - Regional Relevance
  - Key partnerships (e.g. Finance)
  - Metrics and Tracking

Low-Carbon Technology Roadmaps

The Clean Energy Ministerial – A new home at the IEA

- Created in 2010 as a forum for major economies and forward-leaning countries

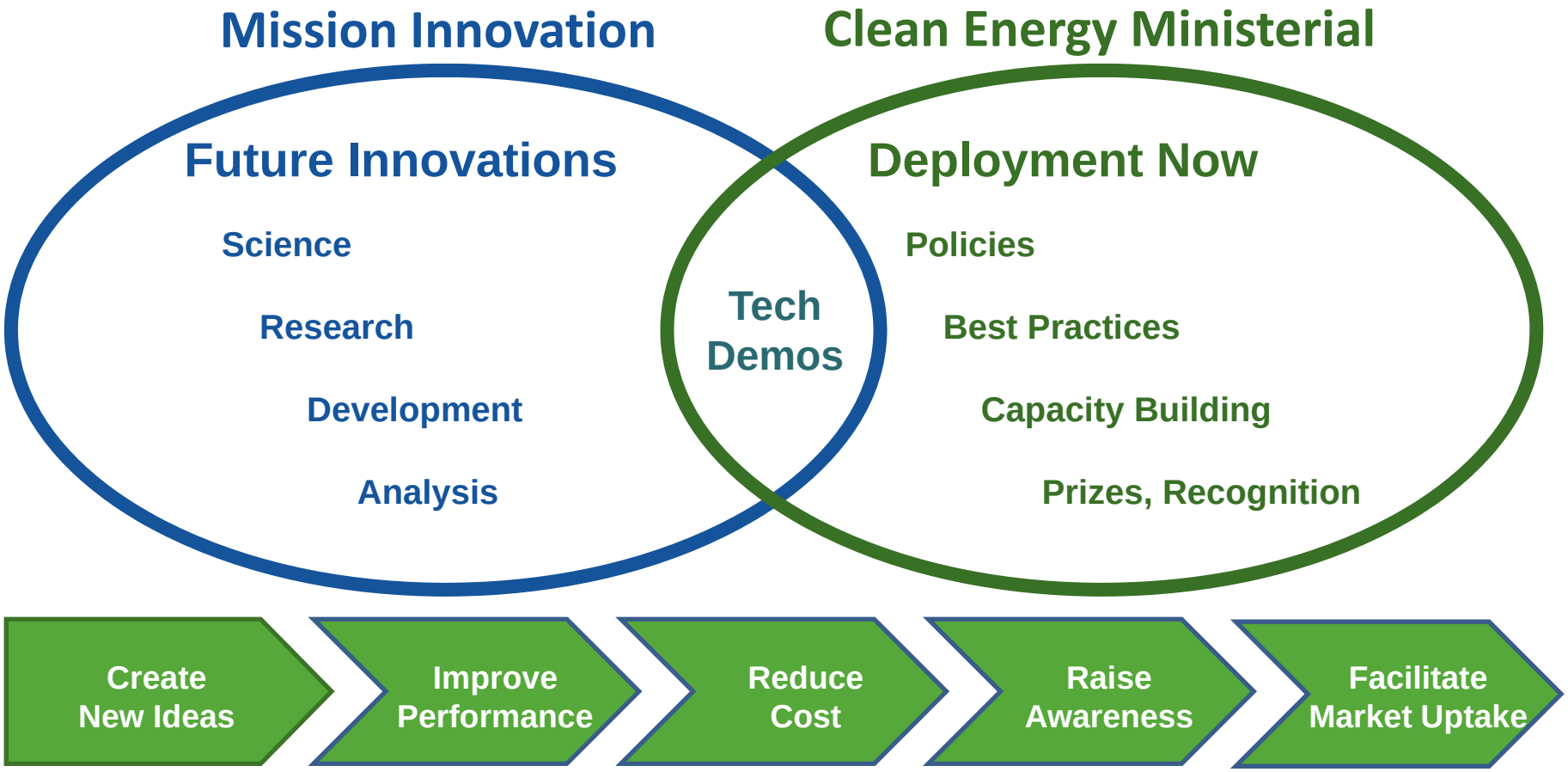
CLEAN ENERGY MINISTERIAL
Accelerating the Global Clean Energy Transition



Mission Innovation (MI)

- Joint Launch Statement at COP21
- Leaders of over **20 countries plus the European Union,** representing well over 80% of global clean energy R&D investments
- Each country supporting a **doubling** of its clean **energy R&D** investments over next 5 years; see: www.mission-innovation.net
- Complemented by a private sector initiative, the **Breakthrough Energy Coalition**; see www.breakthroughenergycoalition.com

Innovation and Deployment – Essential Complements



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

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

National circumstances and resources will drive different technology portfolios and pathways

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Sharing knowledge through the **IEA Technology Collaboration Programmes**

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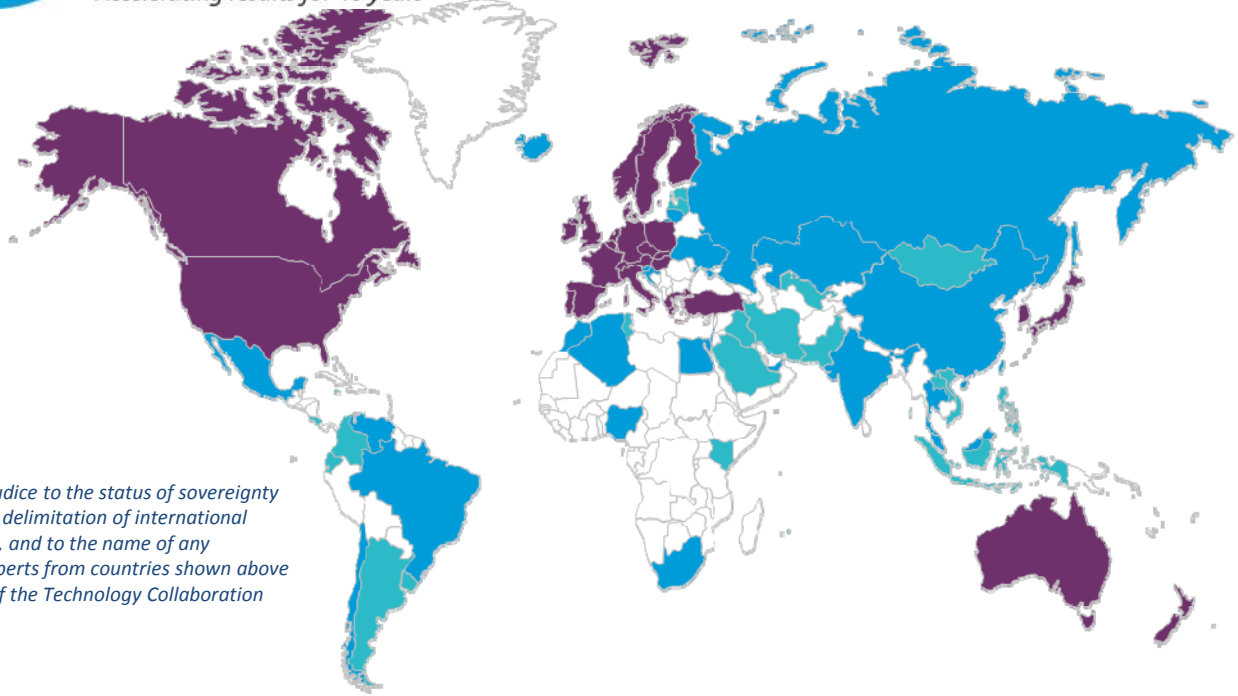
1975-2015 iea Energy Technology Network

Accelerating results for 40 years

- Close to 6,000 experts
- More than 1,900 topics to date
- About 300 public or private entities
- 52 countries
- 39 TCPs
- 4 regional or international organisations



This map is without prejudice to the status of sovereignty over any territory, to the delimitation of international frontiers and boundaries, and to the name of any territory, city or area. Experts from countries shown above participate in activities of the Technology Collaboration Programmes.

Entities participating From IEA countries

Entities participating from partner countries

Entities from countries considering participation

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IEA Energy Technology Activities

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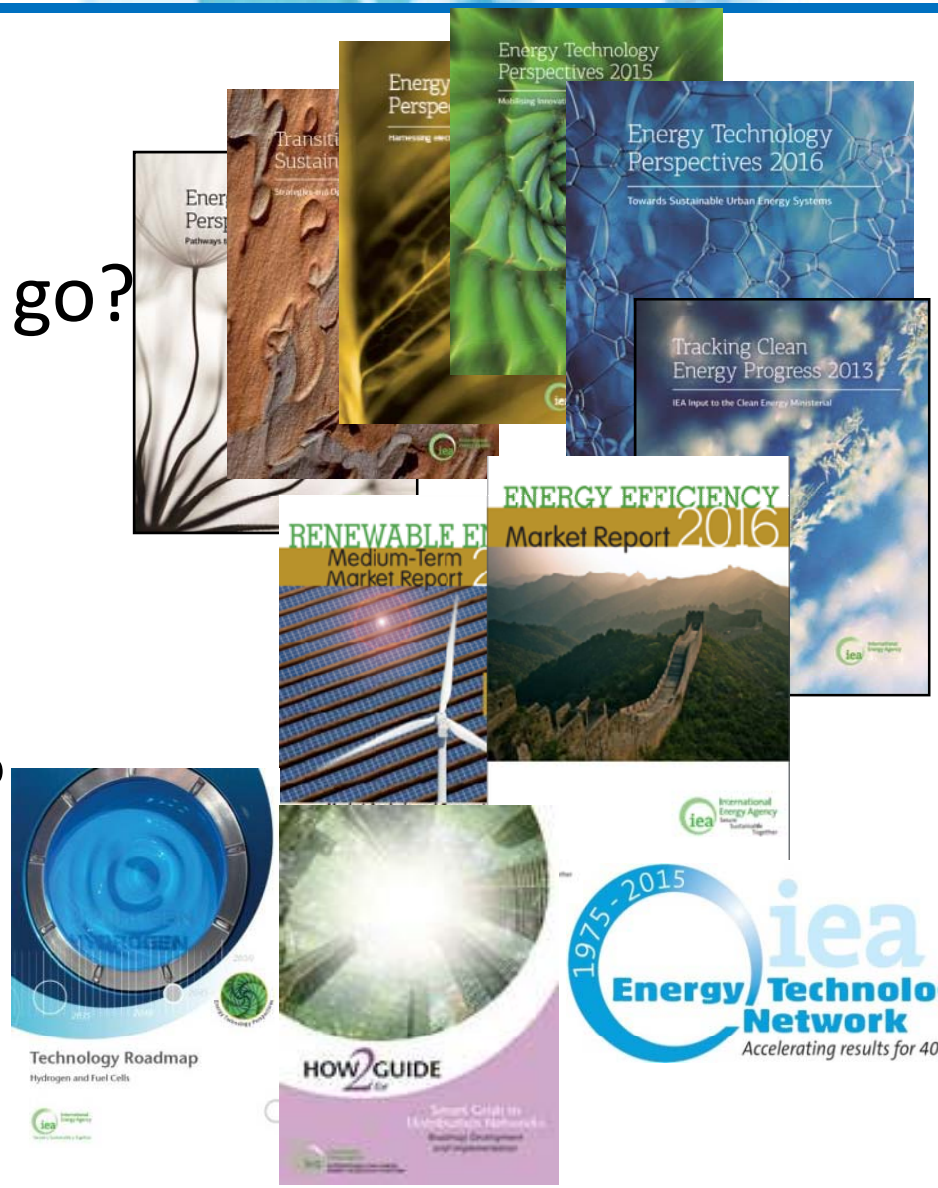
- Where do we need to go?
- Where are we today?
- How do we get there?



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- ***Energy Security***
- ***Environmental Protection***
- ***Economic Growth***
- ***Engagement Worldwide***

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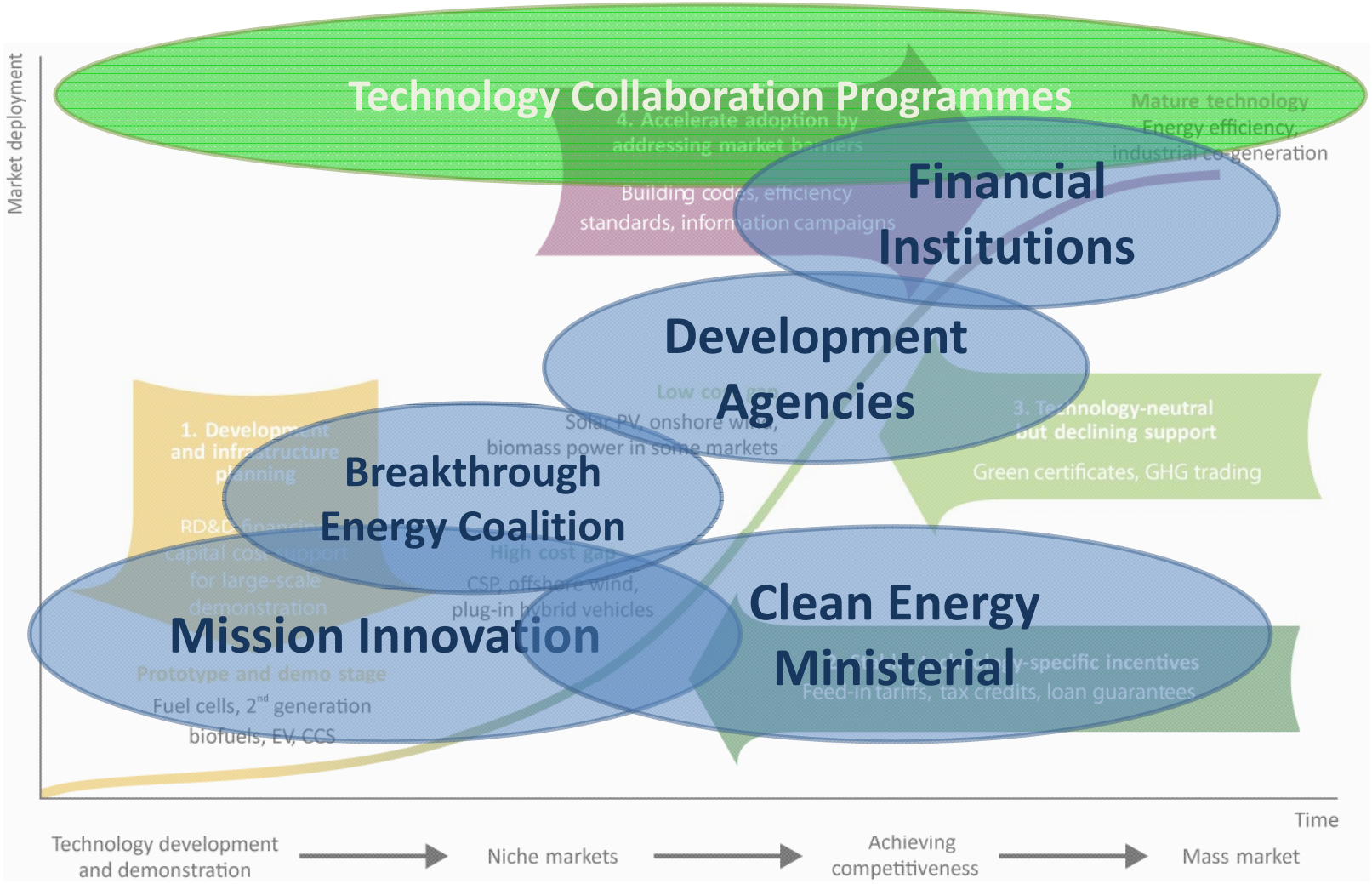
Supporting Energy Innovation Throughout the Entire Cycle



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Thank you

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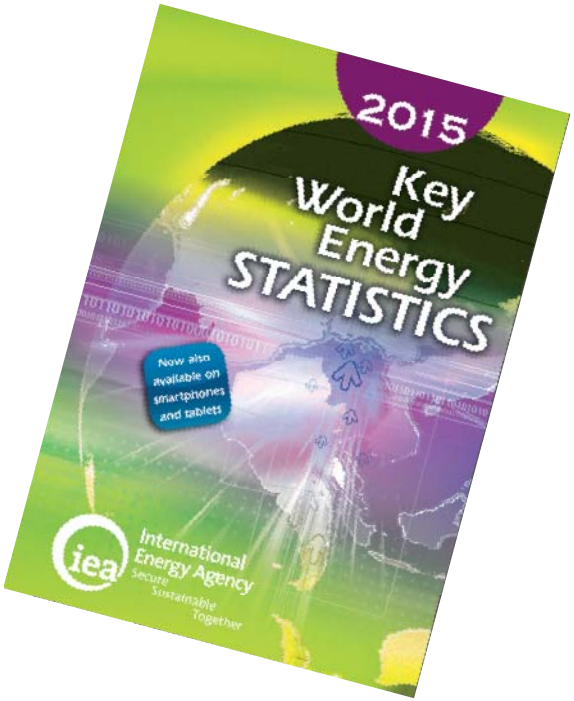
Explore the data behind *ETP*

www.iea.org/etp

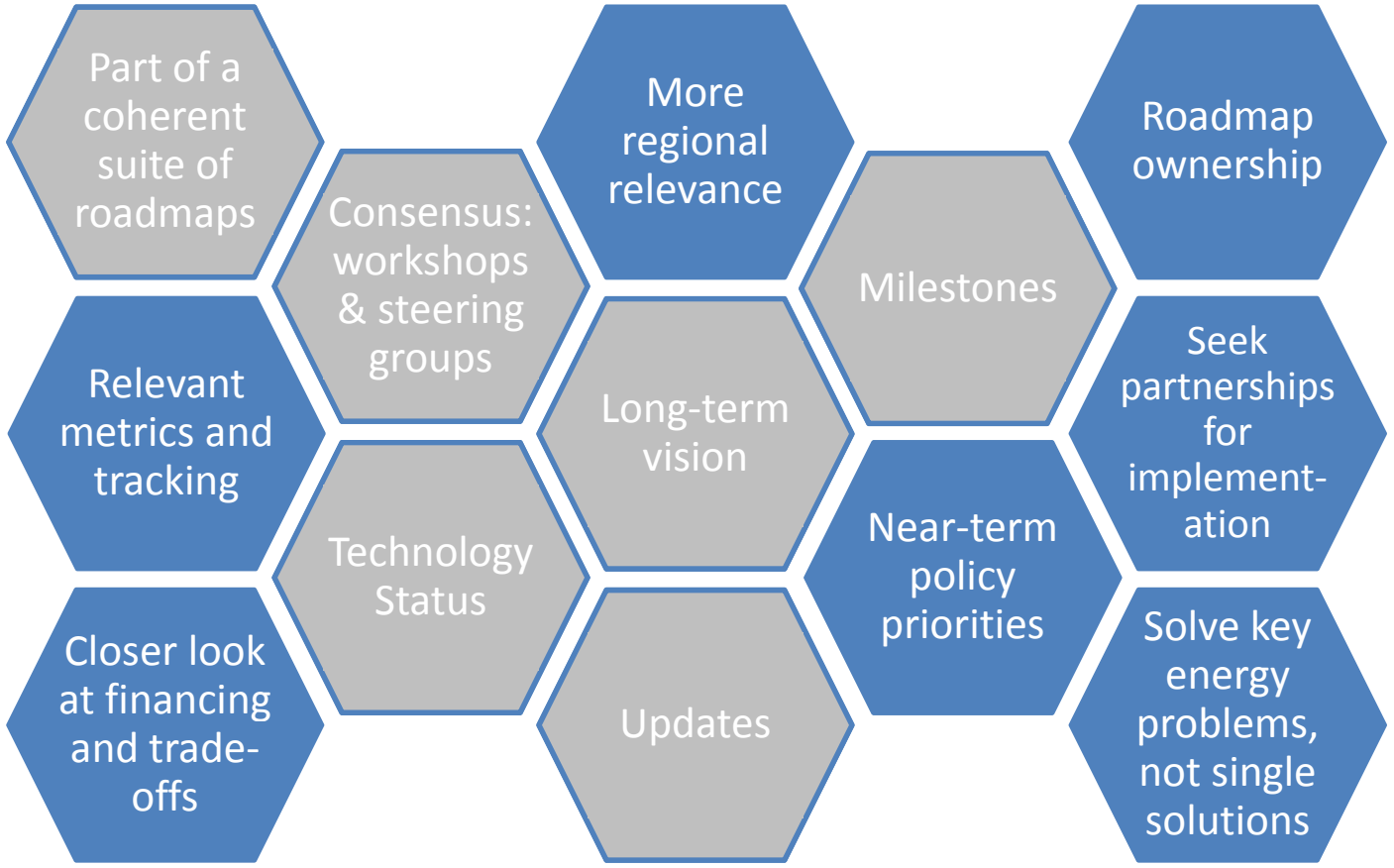


www.iea.org/statistics

ETP Publication Programme

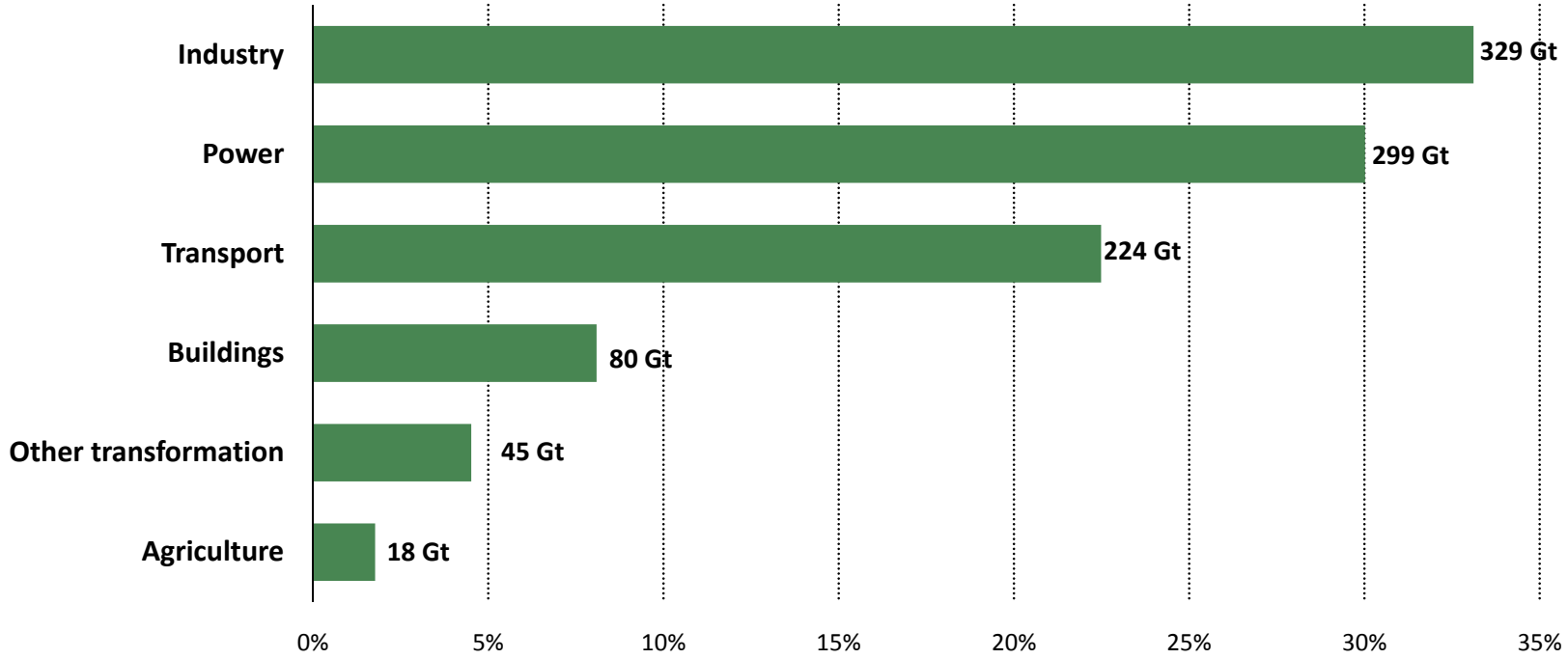
ETP 2014	ETP 2015	ETP 2016	ETP 2017	ETP 2018
Part 1. Setting the Scene				
Global Outlook, Tracking Clean Energy Progress				
Part 2. Driving the Change (Thematic Focus)				
Harnessing Electricity's Potential	Mobilising Innovation to Accelerate Climate Action	Building Urban Energy Systems	Re-Defining Clean Energy Technology Ambitions	TBD • Investing in sustainable infrastructure
Partner Country				
India	China	Mexico	None (Global focus)	TBD (Indonesia; Russia; Brazil)

Building a new cycle on existing foundations



Industry, Power and Transport will be the greatest emitters in the 2DS

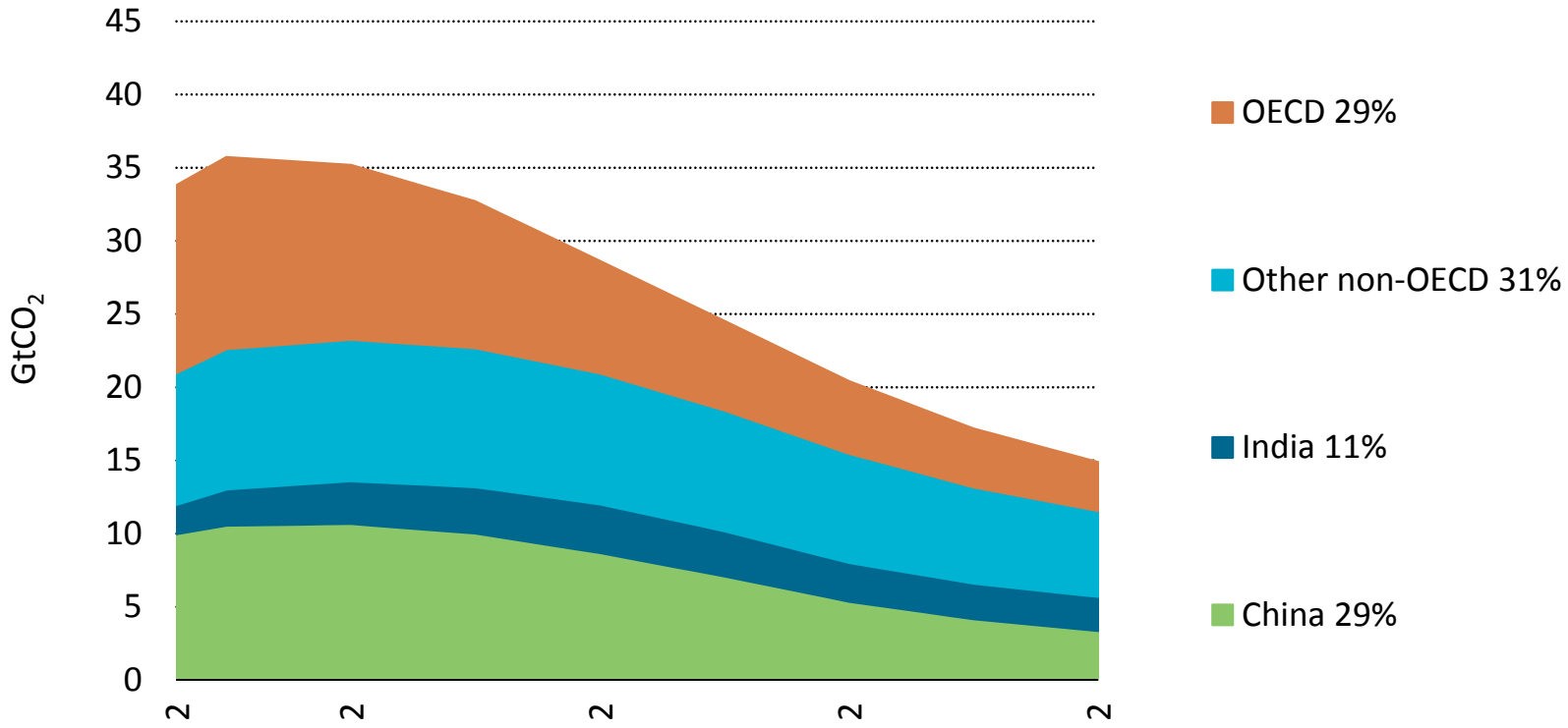
Cumulative energy- and process-related CO_2 emissions by sector in the 2DS, 2013-2050



Industry, power, and transport account for 85% of cumulative direct CO_2 emissions between 2013 and 2050 in the 2DS

Developed and emerging economies need to work together

Energy- and process-related CO_2 emissions by region in the 2DS



In 2013, OECD made up 38% of total emissions.
In 2050 OECD makes up 22% of emissions