

Energy Technology Perspectives Programme

*IEA Networking Event Switzerland
25 September 2015, Fribourg*

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Energy Technology and Policy Division
International Energy Agency*

ETP publication programme

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?)

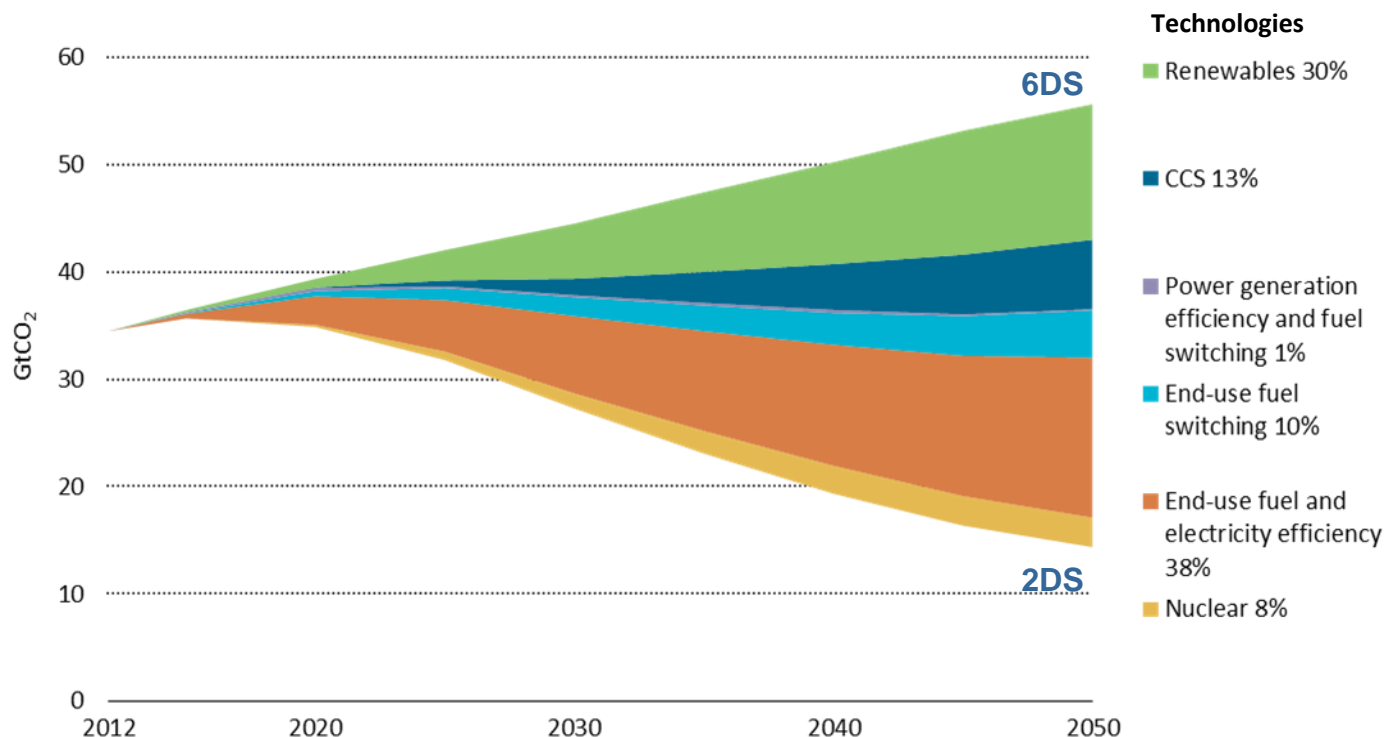
Energy Technology Perspectives 2015

Energy Technology Perspectives 2015: Mobilising Innovation to Accelerate Climate Action

Energy Innovation is crucial in making the 2DS possible

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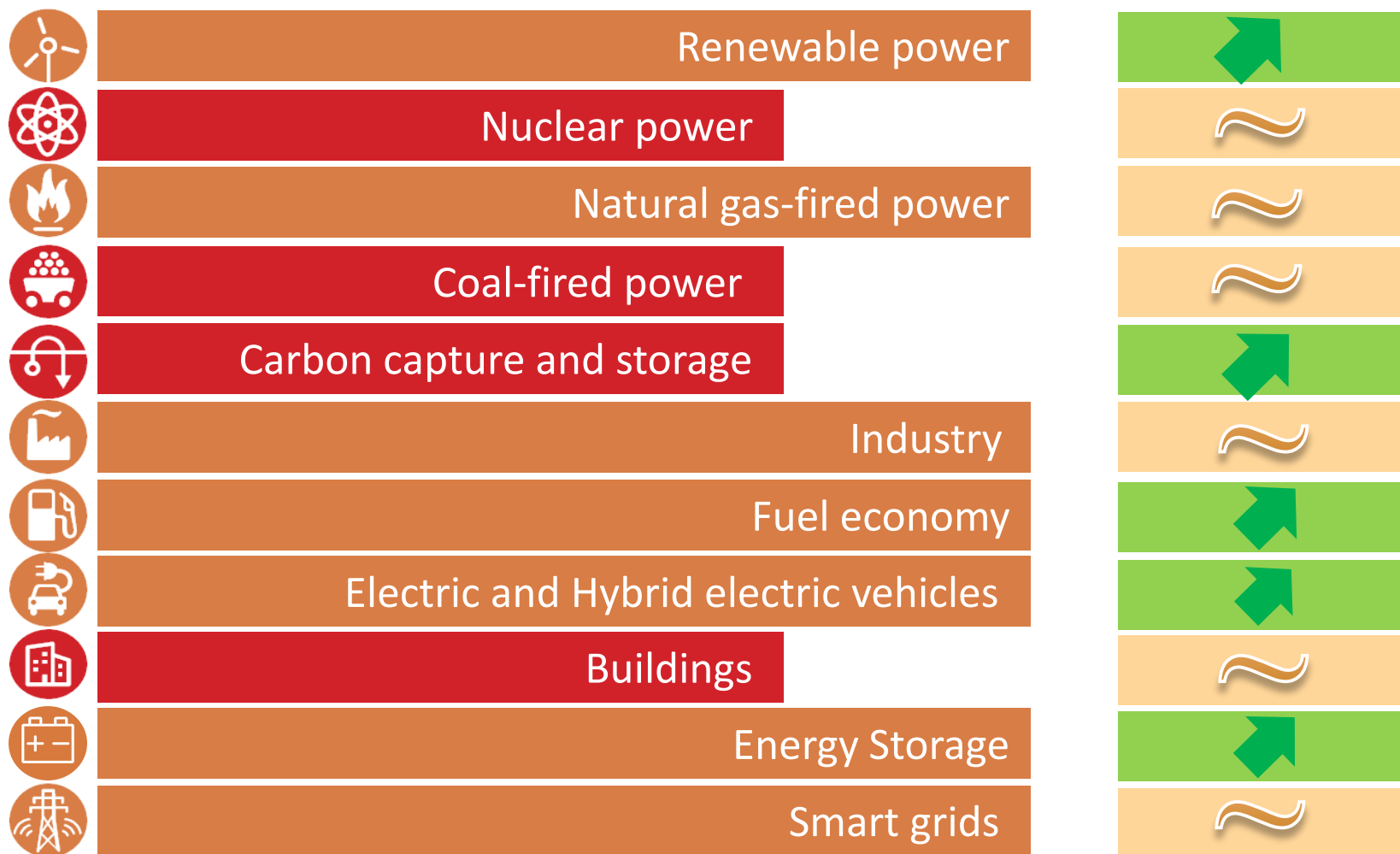
Contribution of technology area to global cumulative CO₂ reductions



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

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

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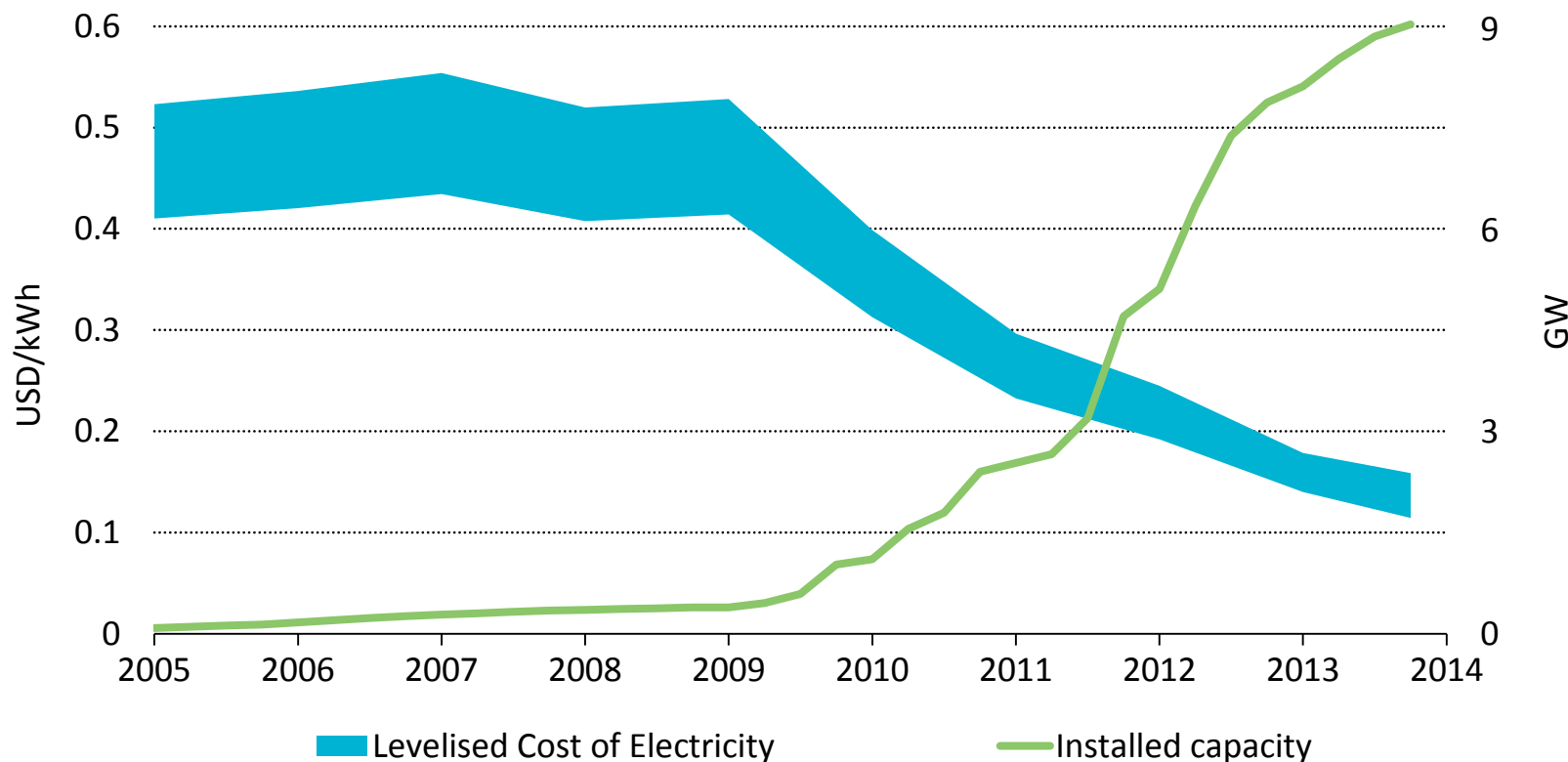


Evidence shows that despite continued progress in many areas, for the first time none of the technologies are in line with 2DS goals

Technology innovation has delivered in the past . . .

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



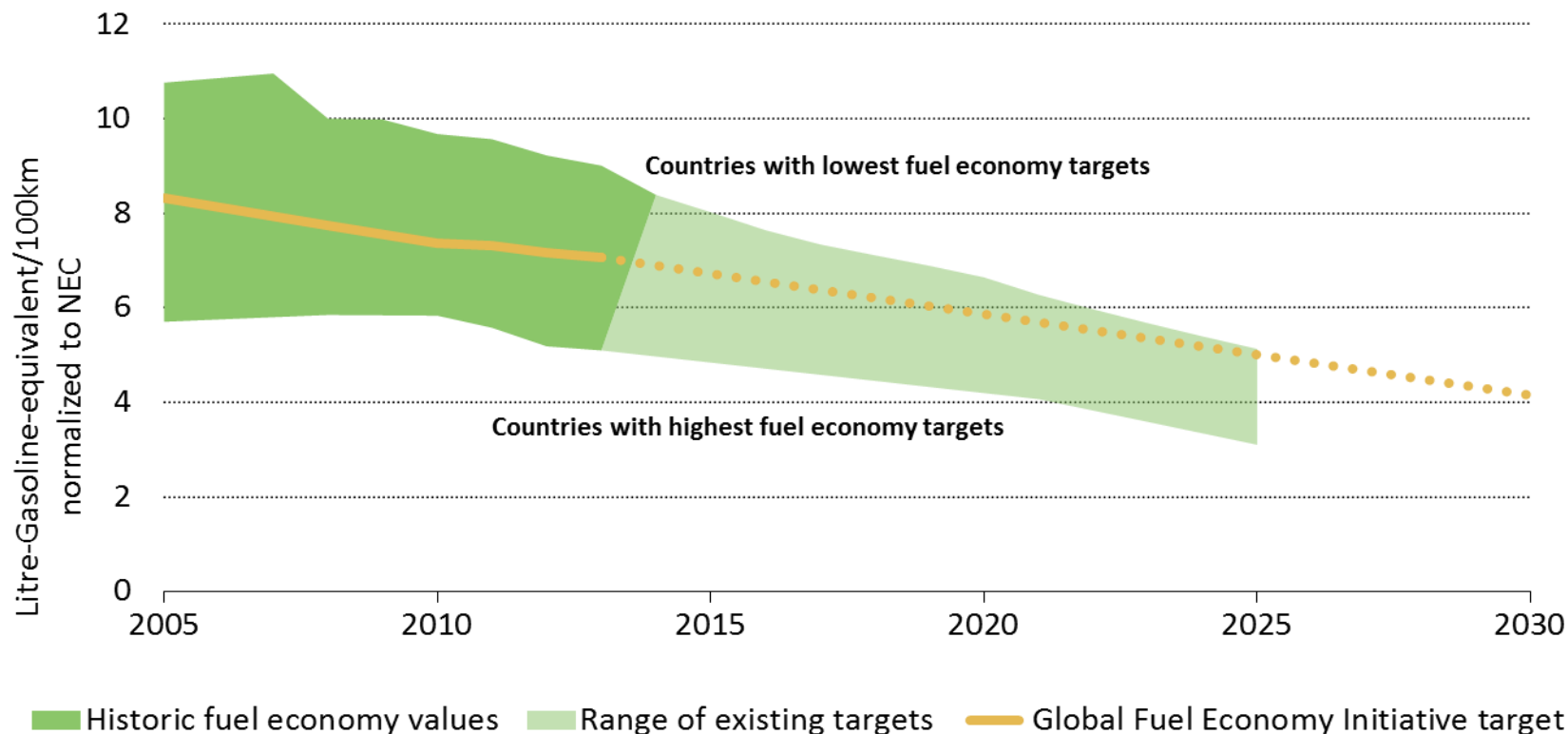
Source: ETP 2015

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

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

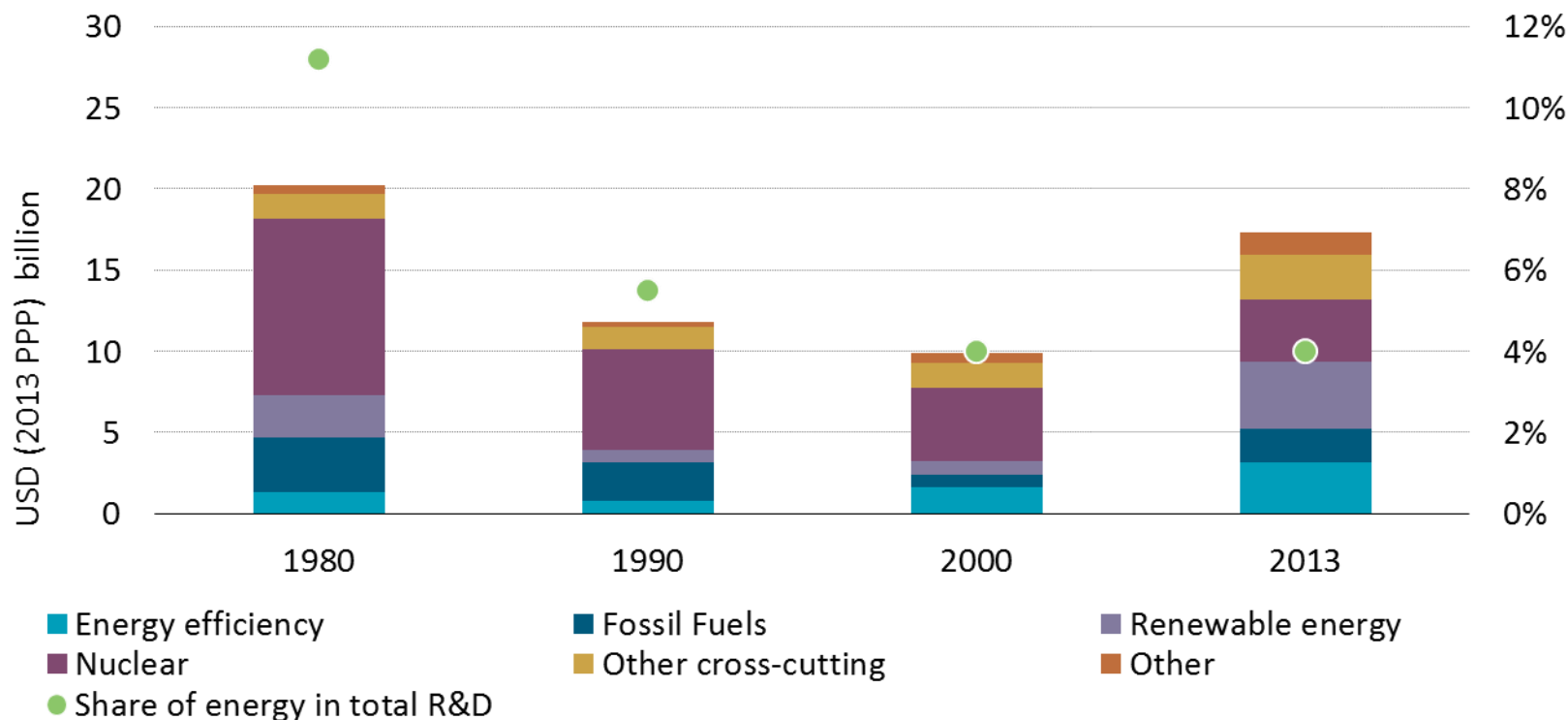


Fuel economy is improving as policy increasingly drives the deployment of more efficient vehicle technologies

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

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IEA government energy RD&D expenditure

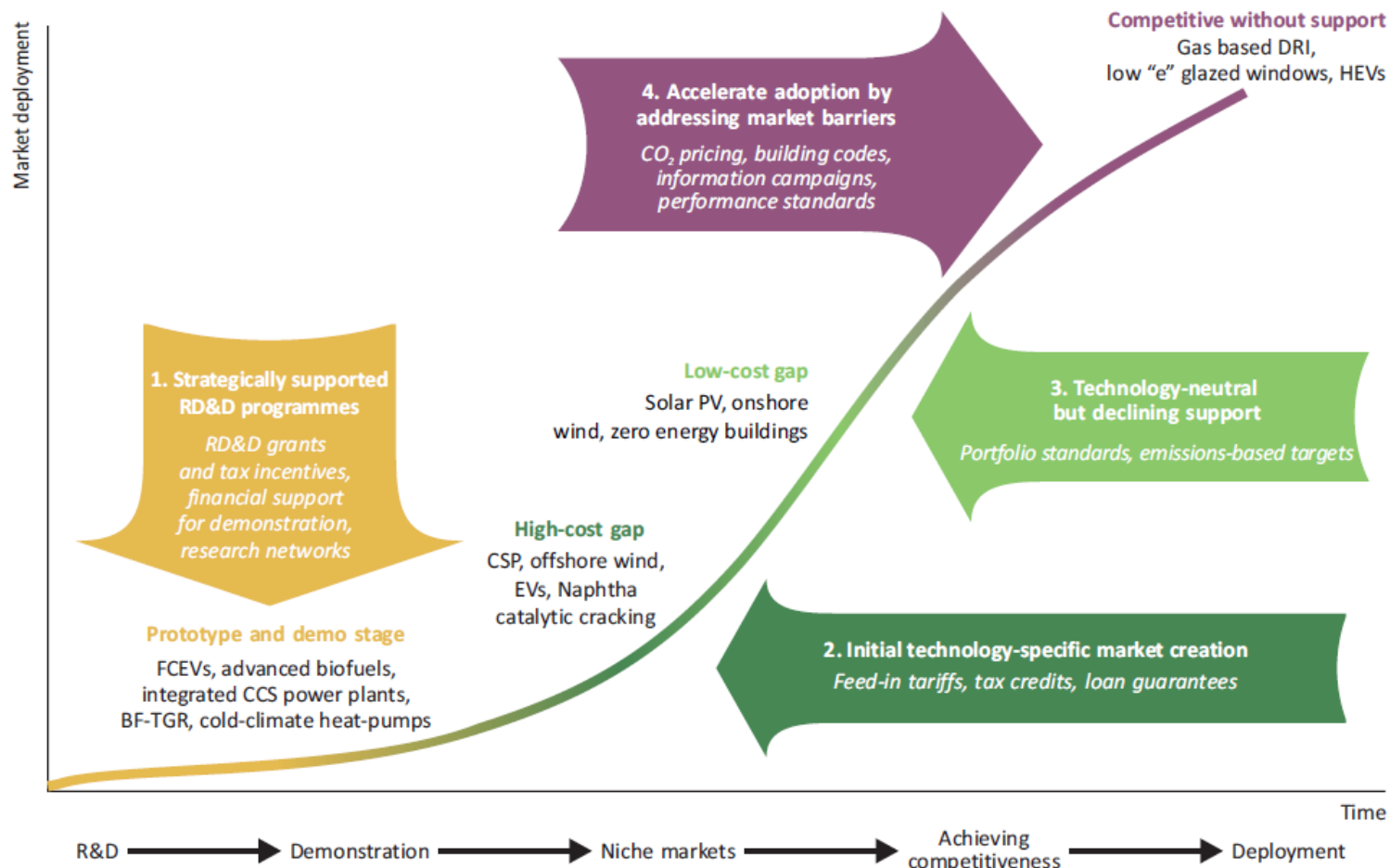


Source: ETP 2015

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

Supporting Energy Innovation: The right policy at the right time

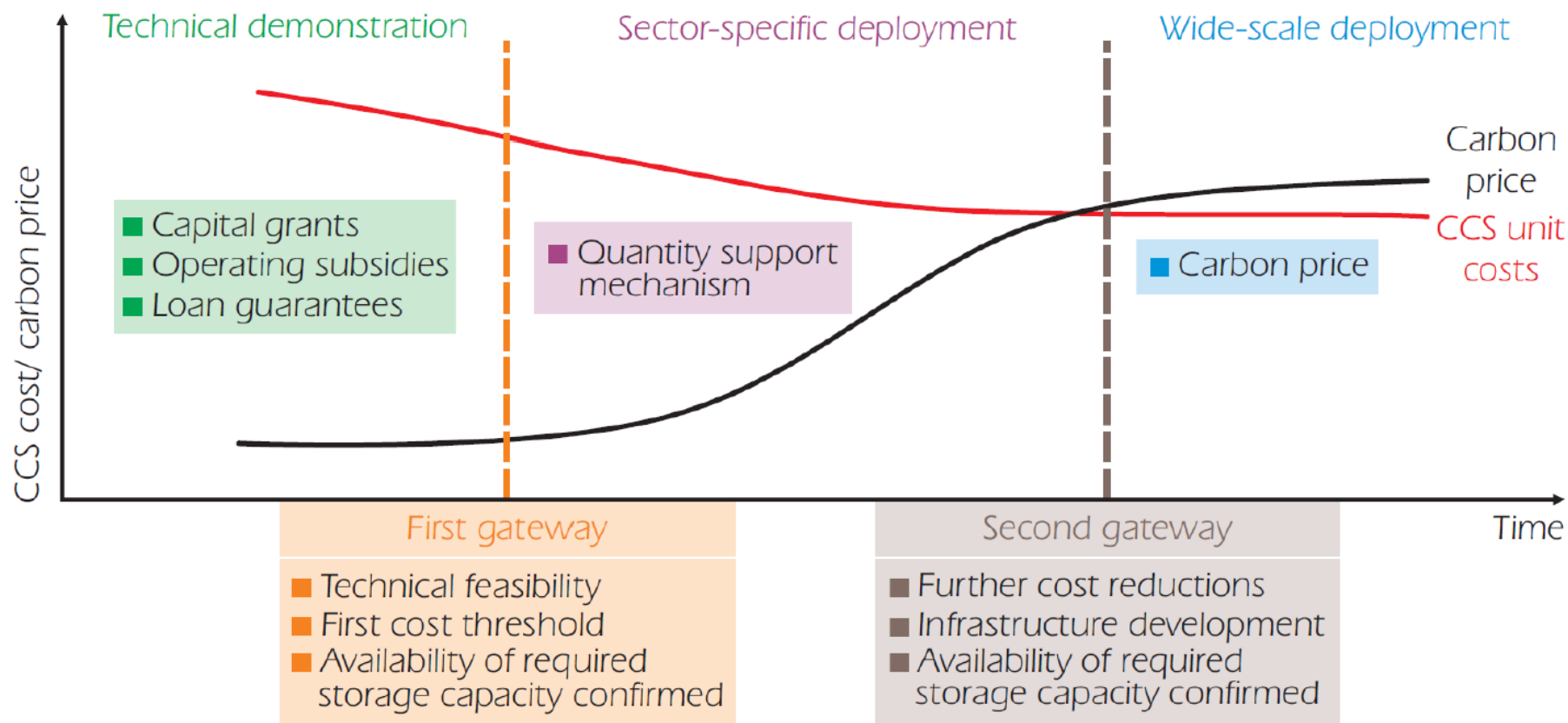
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The right support depends on the maturity of the technology and the degree of market uptake

The “cost gap” needs to be closed, not just reduced

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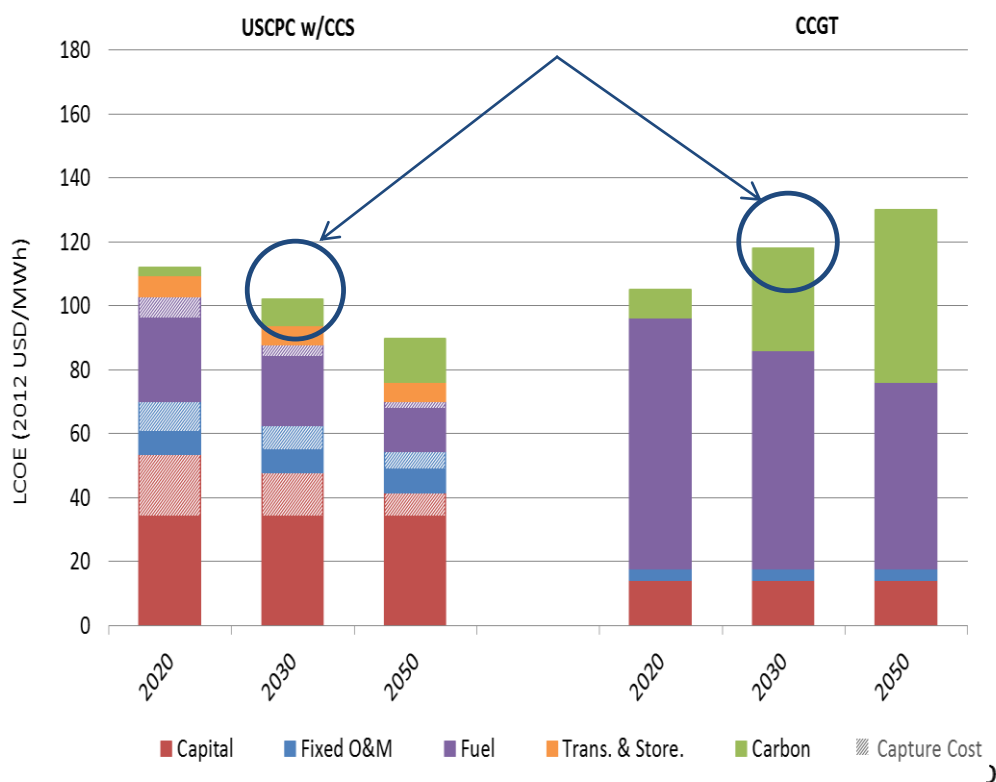


During scale up, competitiveness rises due to cost reductions and increased costs of not using CCS

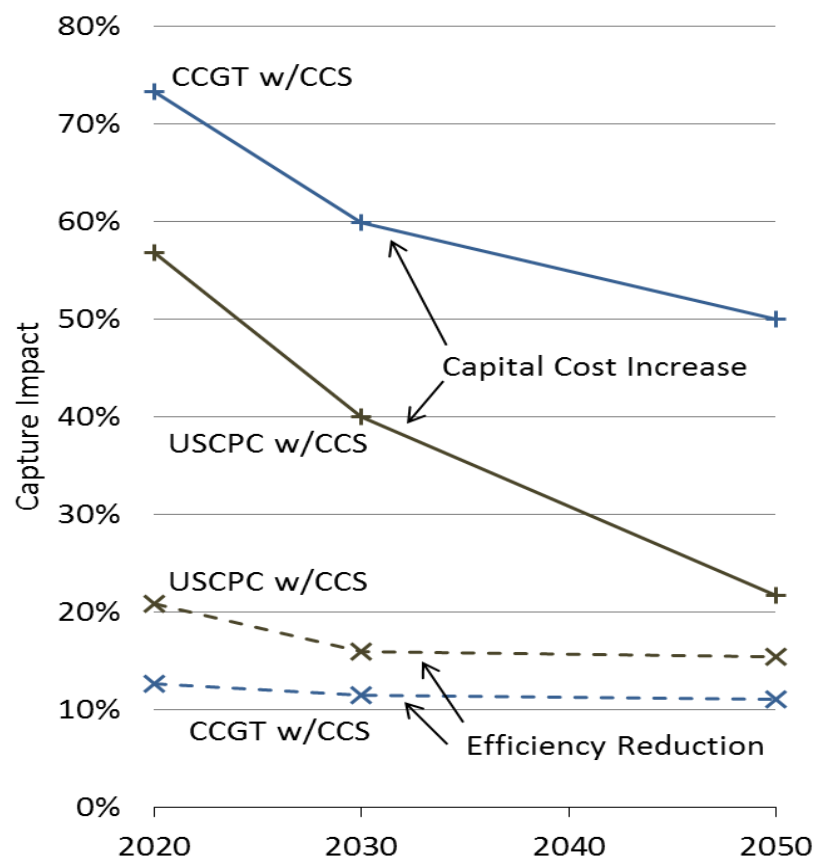
Early stage support is key to improve future technology competitiveness

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Projected Levelised Cost of Electricity of coal power generation in Asia



Assumptions on Capture Cost and Performance in the 2DS

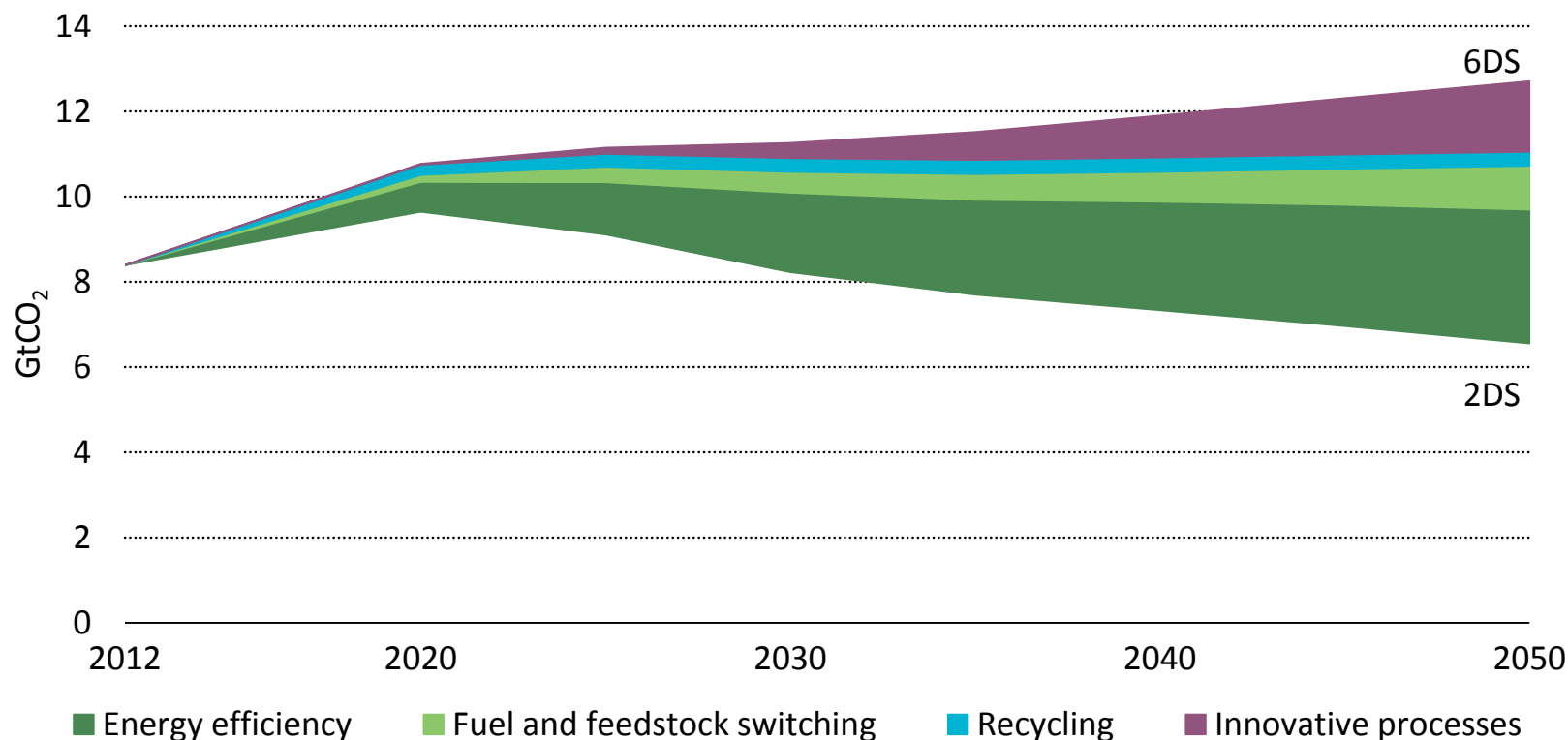


Aggressive cost reductions are needed in the near term to make these projections a reality

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

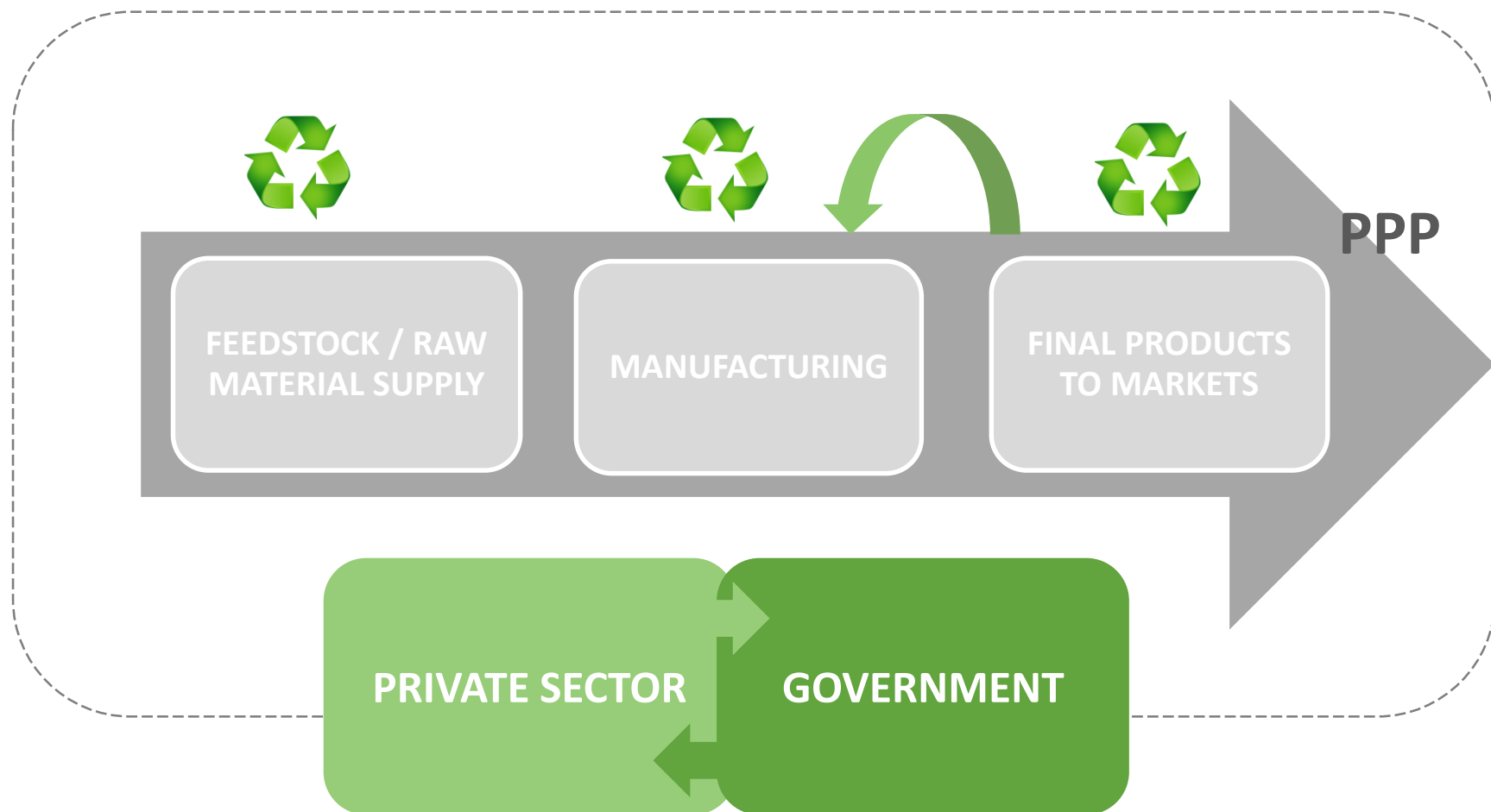


Source: ETP 2015

The deployment of innovative technologies is crucial to making a 2DS scenario possible

Role of public private partnerships in catalysing innovation in industry

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Partnerships can accelerate innovation while increasing the chances that a technology will be adopted

There is no “one-size fits all” solution that can meet all local requirements

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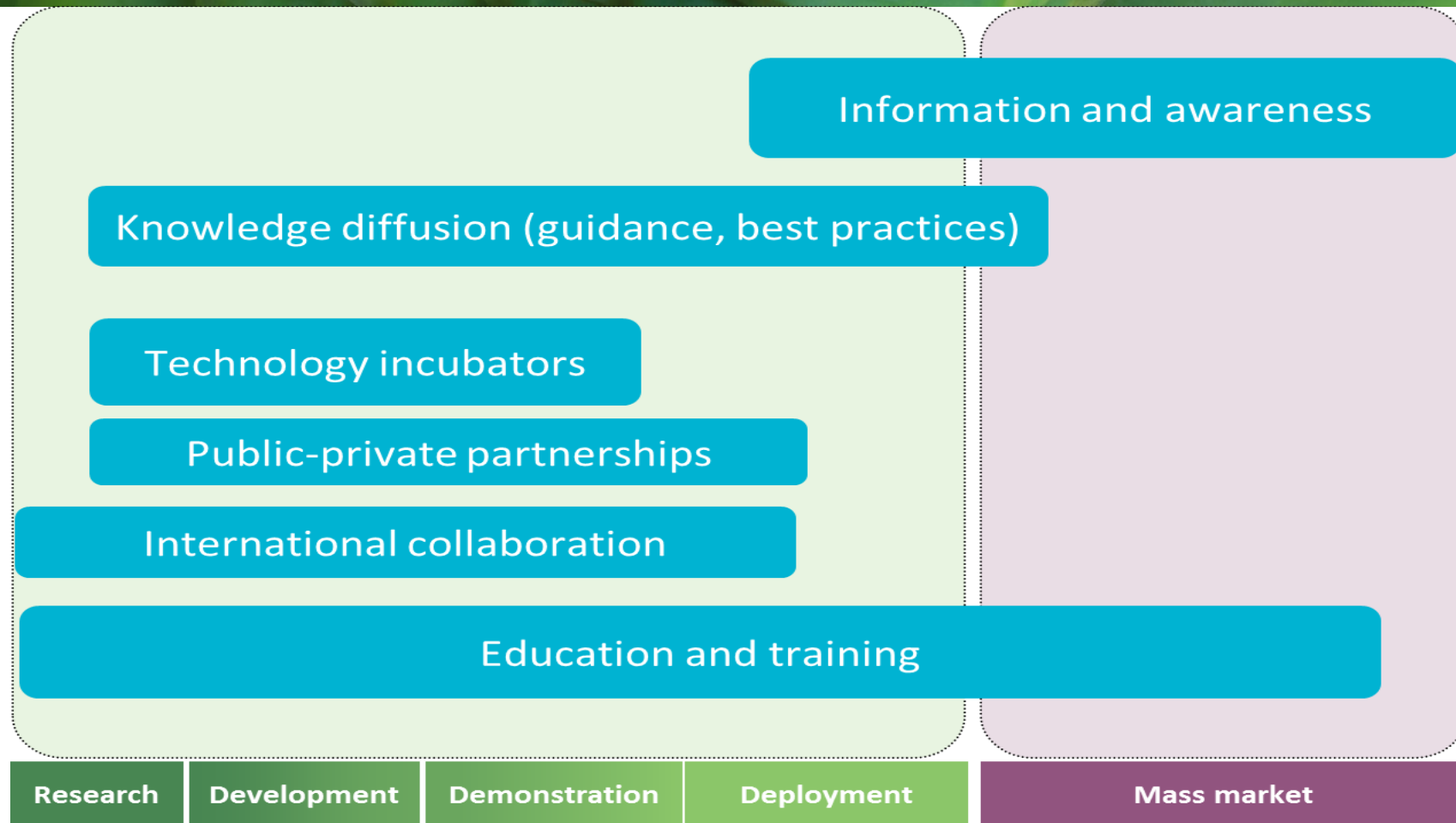
Regional technology shares in primary energy supply



National circumstances and resources will drive different technology portfolios and pathways

Building innovation capacity is key to successful technology deployment

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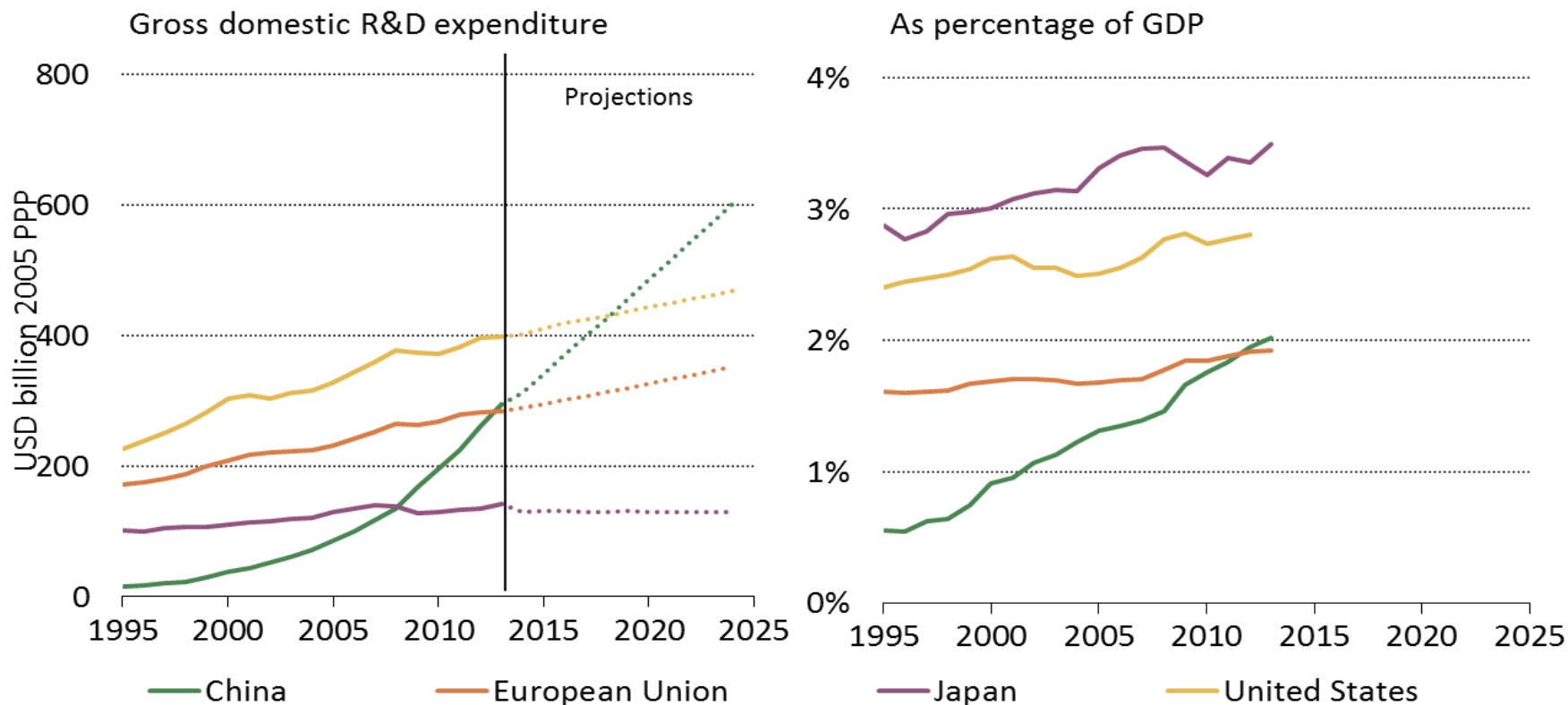
Source: ETP 2015

*Cooperation between industrial and emerging economies
could be a win-win solution*

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

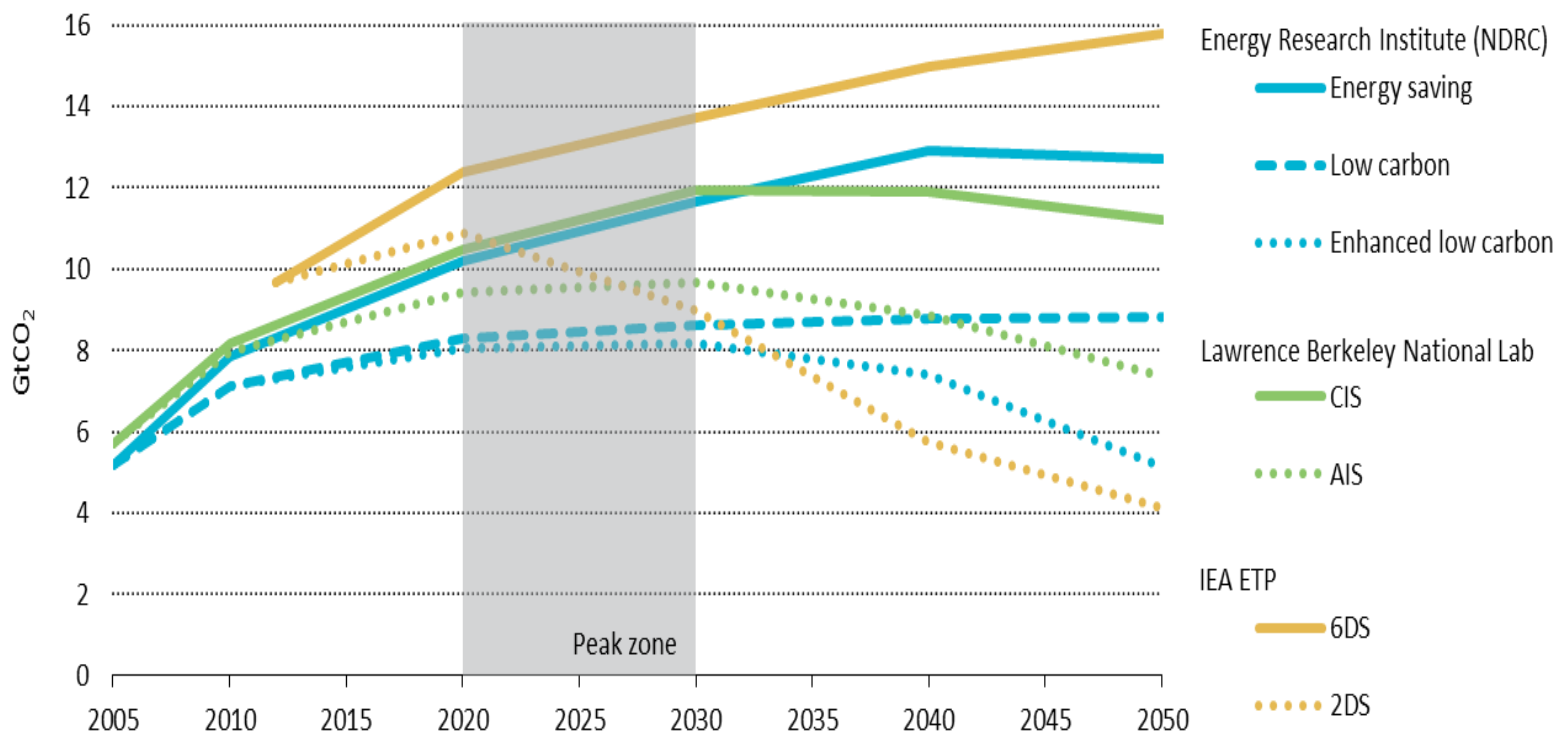


China is poised to become the global leader in R&D spending

Solutions exist to China's daunting energy challenge

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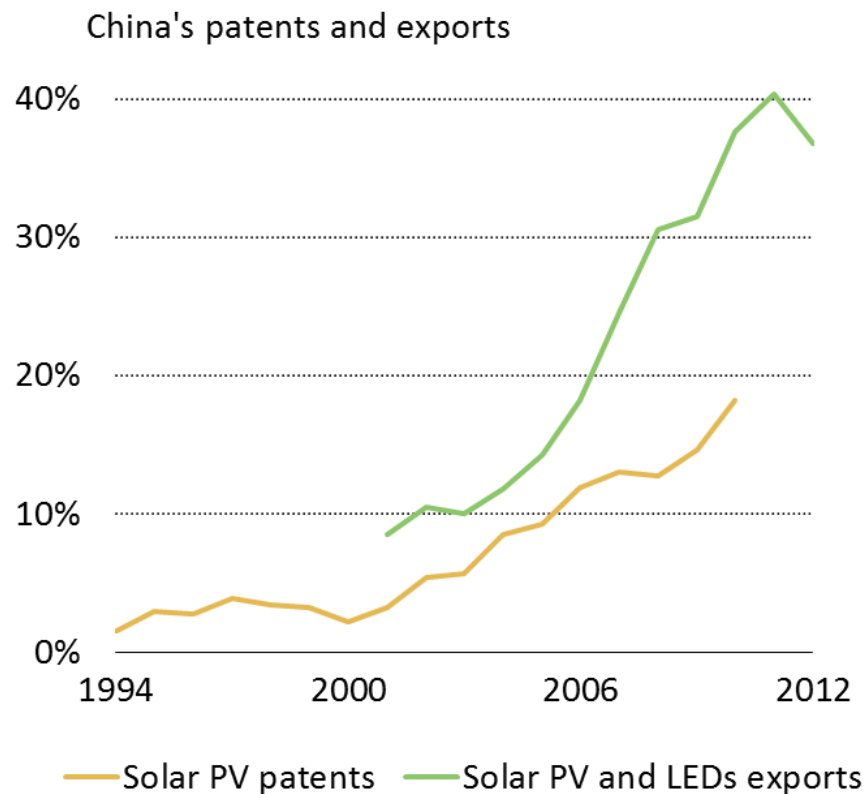
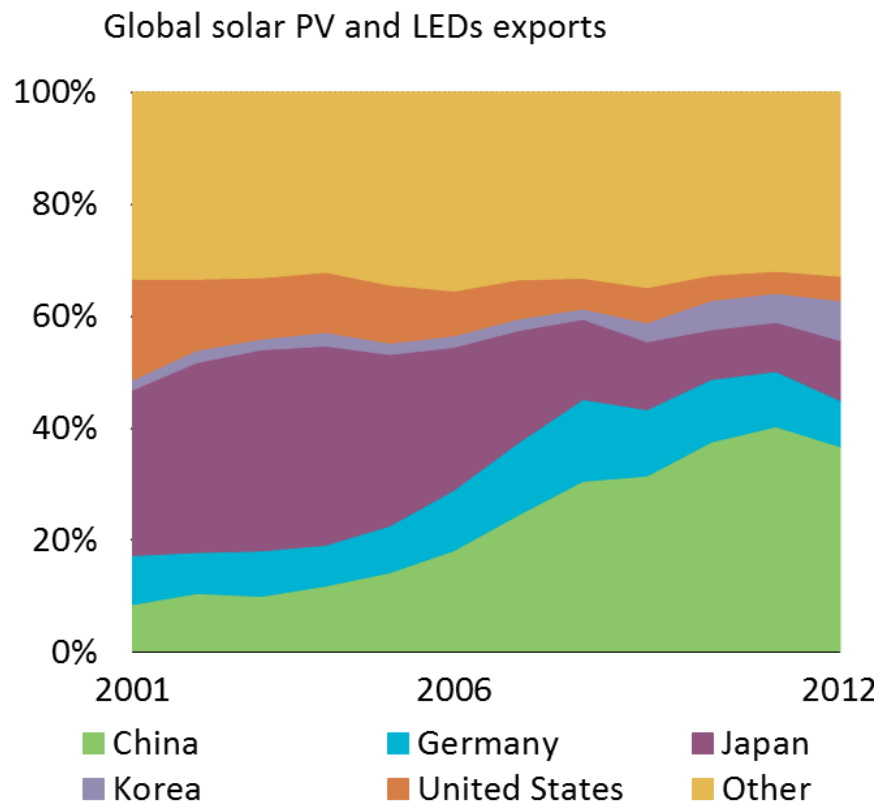
Long-term scenarios of China's 2030 emissions peak



China can make the 2Ds possible with strong policies encouraging energy technology innovation

Patent and high-tech exports in China

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China's global export share by value of solar and LEDs has grown significantly to roughly 40%, with its share of patents doubling between 2005 and 2010.

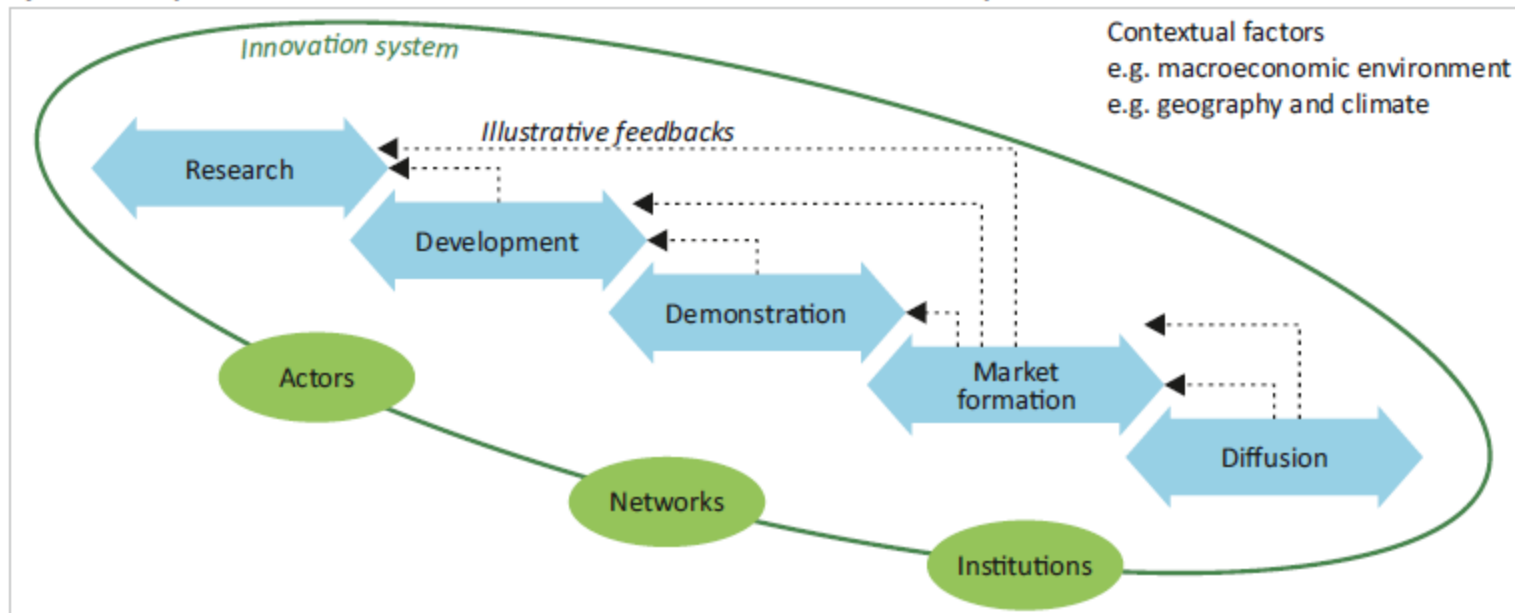
Better understanding innovation can increase confidence in its outcomes

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Linear model of innovation process



Systematic representation of innovation with chain-linked model of innovation process



Understanding innovation

From this

To this

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



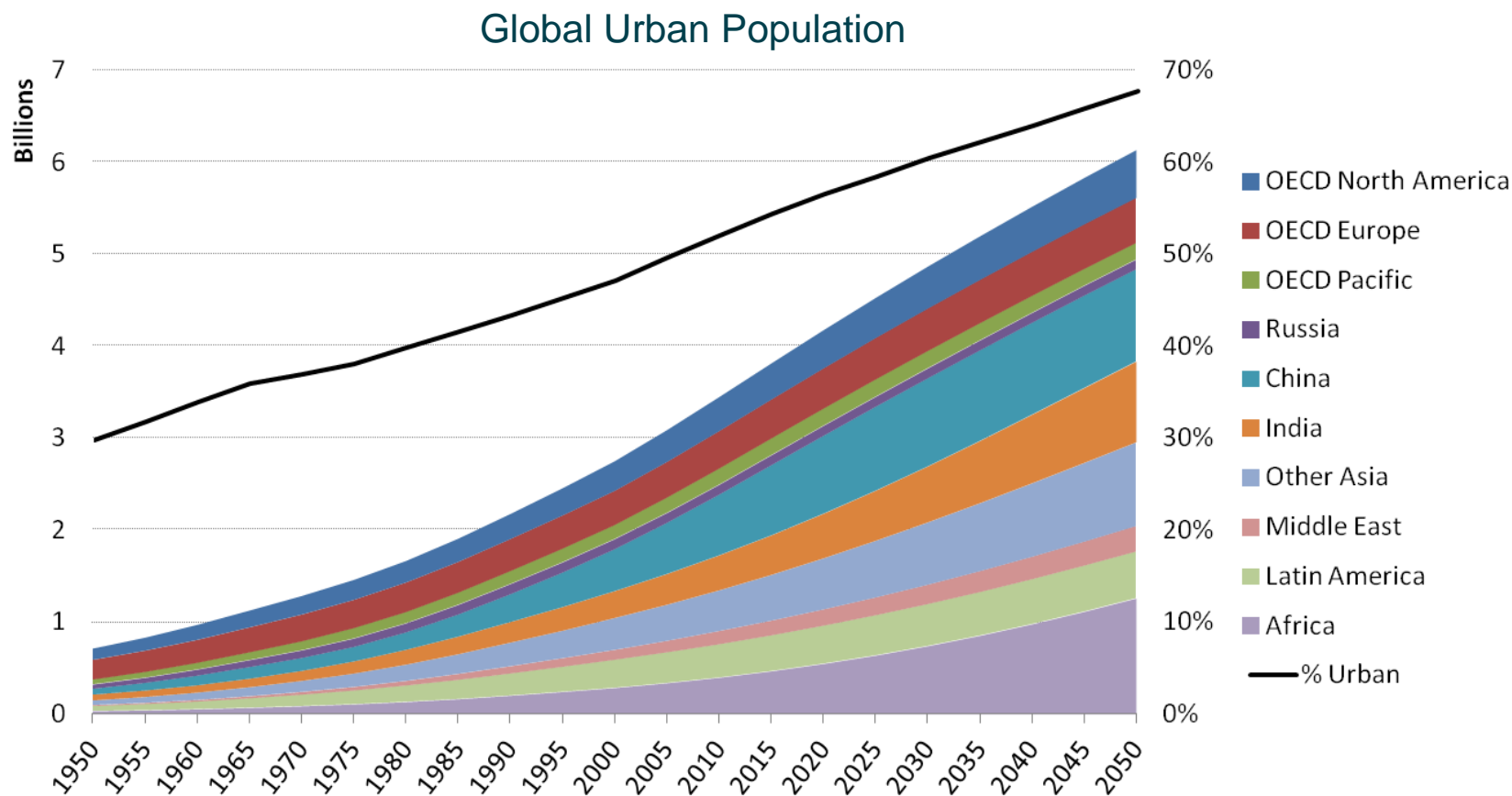
International
Energy Agency

Secure • Sustainable • Together

Energy Technology Perspectives 2016: Building Sustainable Urban Energy Systems

www.iea.org

ETP 2016: Building Sustainable Urban Energy Systems

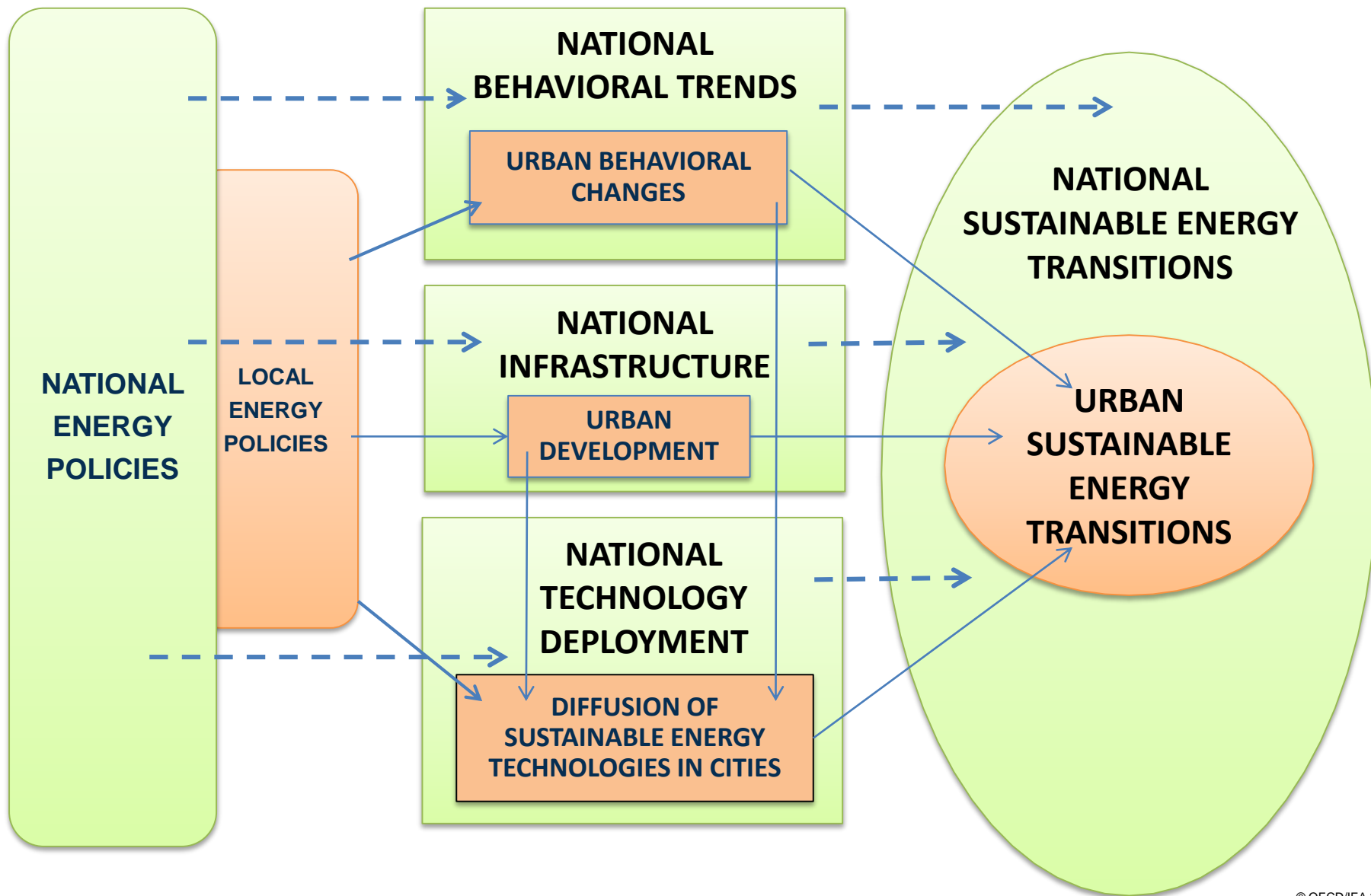


Source: UN DESA, 2012

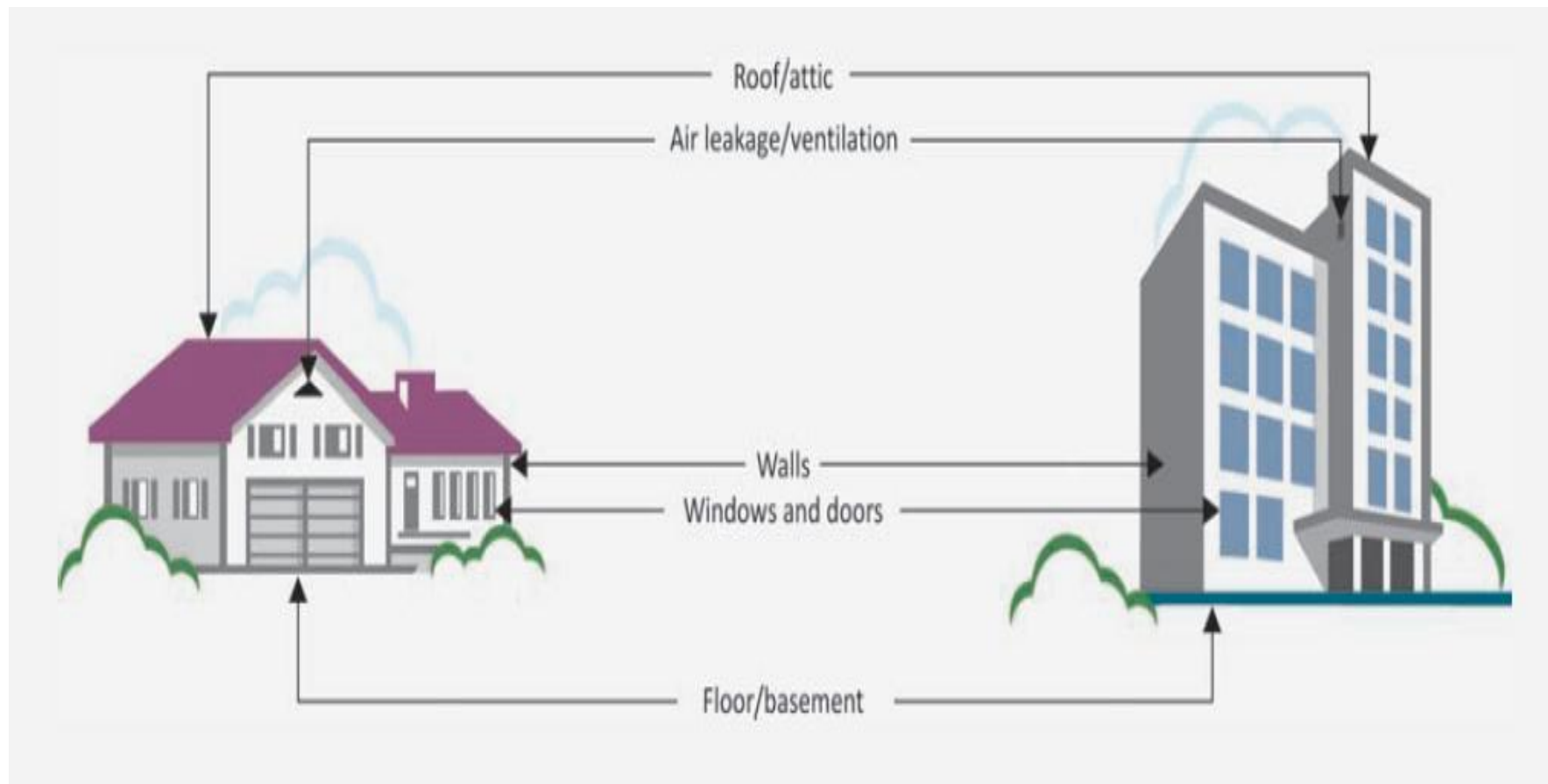
*Global urban populations are growing rapidly,
and with them demand for energy in cities*

- **Part 1: Setting the Scene**
 - Global Outlook
 - Tracking Clean Energy Progress
- **Part 2: Building Sustainable Urban Energy Systems**
 - The Urban Energy Challenge
 - Low-Carbon Buildings in the Urban Environment
 - Sustainable Urban Mobility
 - Urban Energy Supply and System Integration
 - Innovative policy and finance frameworks to accelerate urban energy transitions
 - Building a sustainable urban energy transition in Mexico

ETP 2016: integrating local and national energy policies

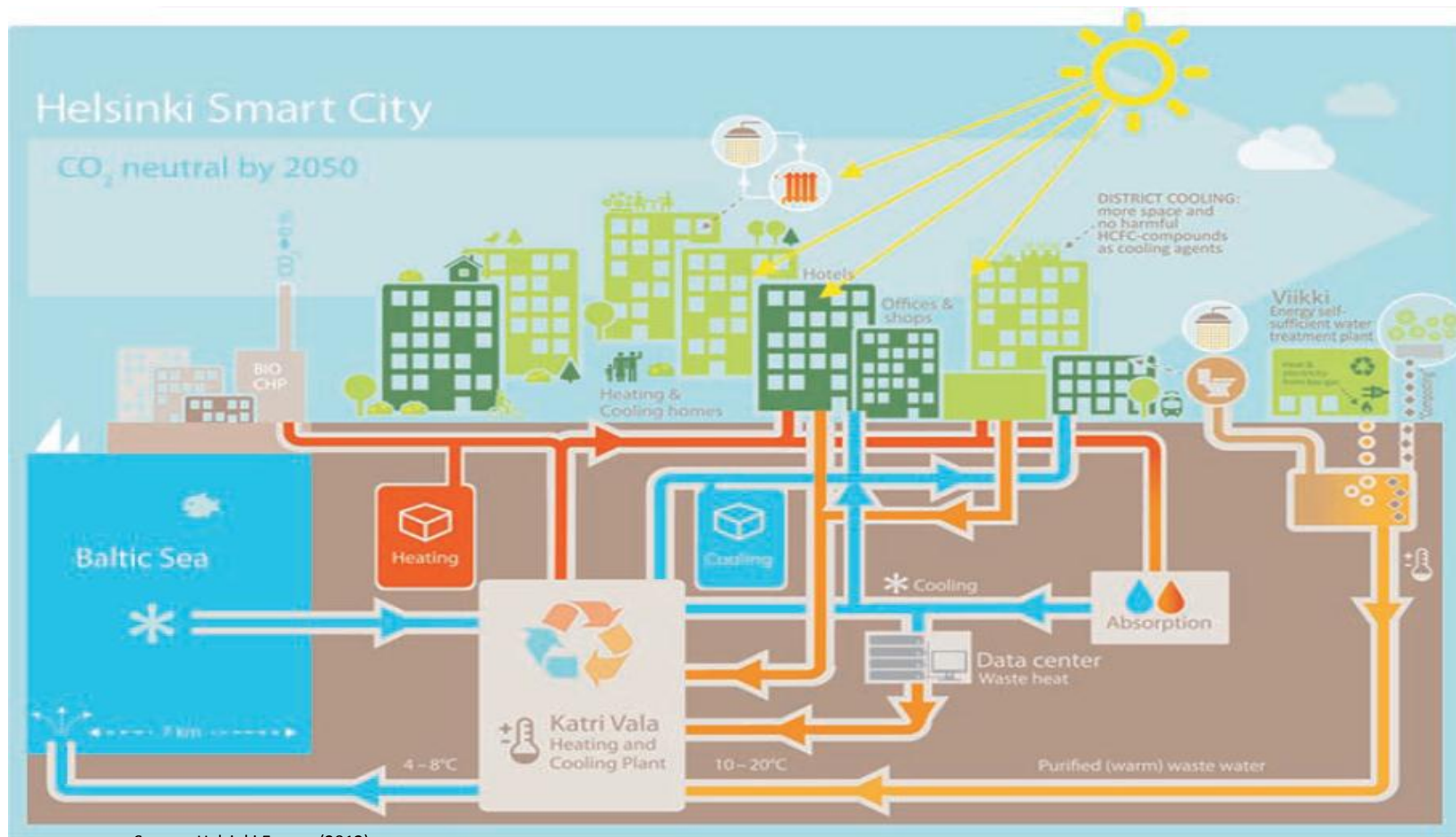


ETP 2016: Sustainable buildings



Sustainable urban buildings incorporate building envelope solutions adapted to denser built environment; district heating

ETP 2016: Sustainable buildings and low-carbon heat supply

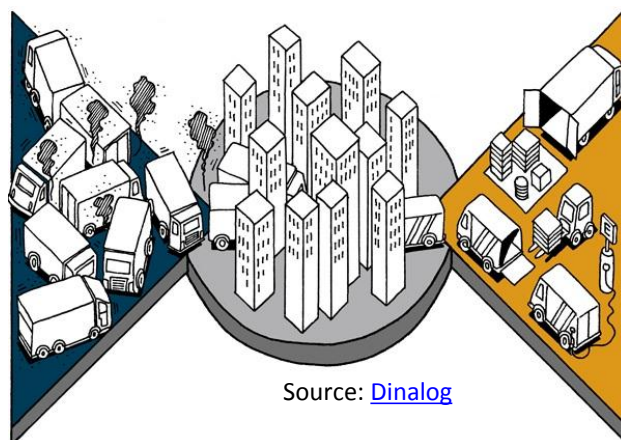


Source: Helsinki Energy (2012)

Meeting thermal comfort demand in dense urban areas in a sustainable way requires informed planning decisions from policy-makers

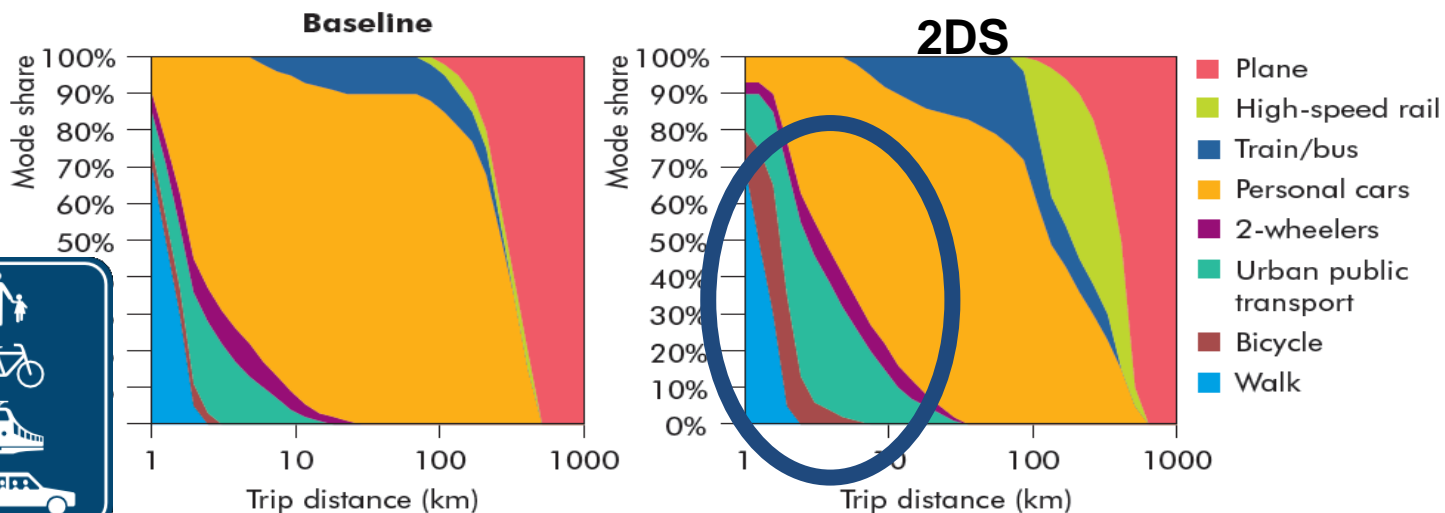
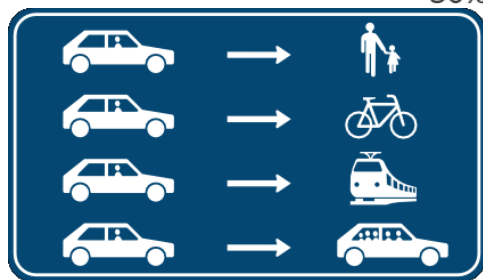
ETP2016: Options for urban mobility

■ Logistics



Source: [Dinalog](#)

■ Mode Shares



A significant portion of travel can be avoided or substituted by more efficient modes and lower carbon options

ETP2016: Urban mobility technologies

	Motorcycles		Passenger cars			Buses		Trucks		Rail		
	Lead acid	Li-ion	PHEV	Small BEV	Large BEV	Urban	Rural	LCV	MFT	HFT	Passenger Urban	Freight Intercity
Battery charging	+	+	+	+	+	+	+	+	+	-	-	-
Swapping	+	-	-	-	+	+	+	+	-	-	n.a.	n.a.
Static induction	-	-	+	+	+	+	+	+	+	+	+	-
Dynamic induction	-	-	+	+	+	+	+	+	+	+	+	-
Catenary	n.a.	n.a.	n.a.	n.a.	n.a.	+	-	-	-	+	+	+
Economic potential	+ positive		- negative									
Technological maturity	● developed		● moderate		● nascent							

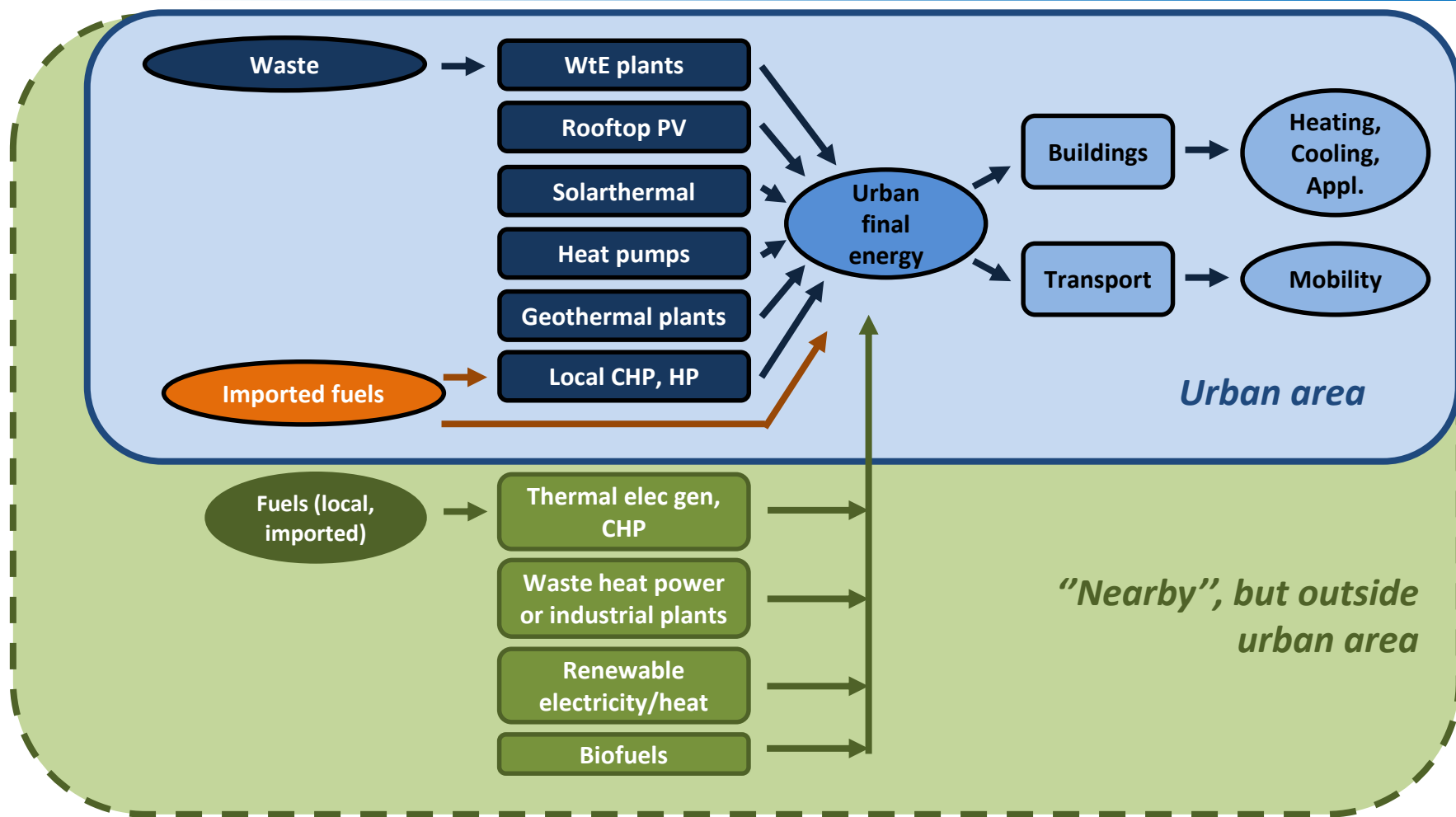
Notes: it is not only the vehicle itself that determines the potential/maturity, but also the application in which it is used. Bicycles, for example, have different results if considered individually or within the context of bike sharing. Abbreviations: Li-ion - lithium ion battery. PHEV - Plug-in hybrid electric vehicle. LCV - Light commercial vehicle. MFT - Medium freight truck. HFT - Heavy freight truck. n.a. - not available.

EV CITY CASEBOOK



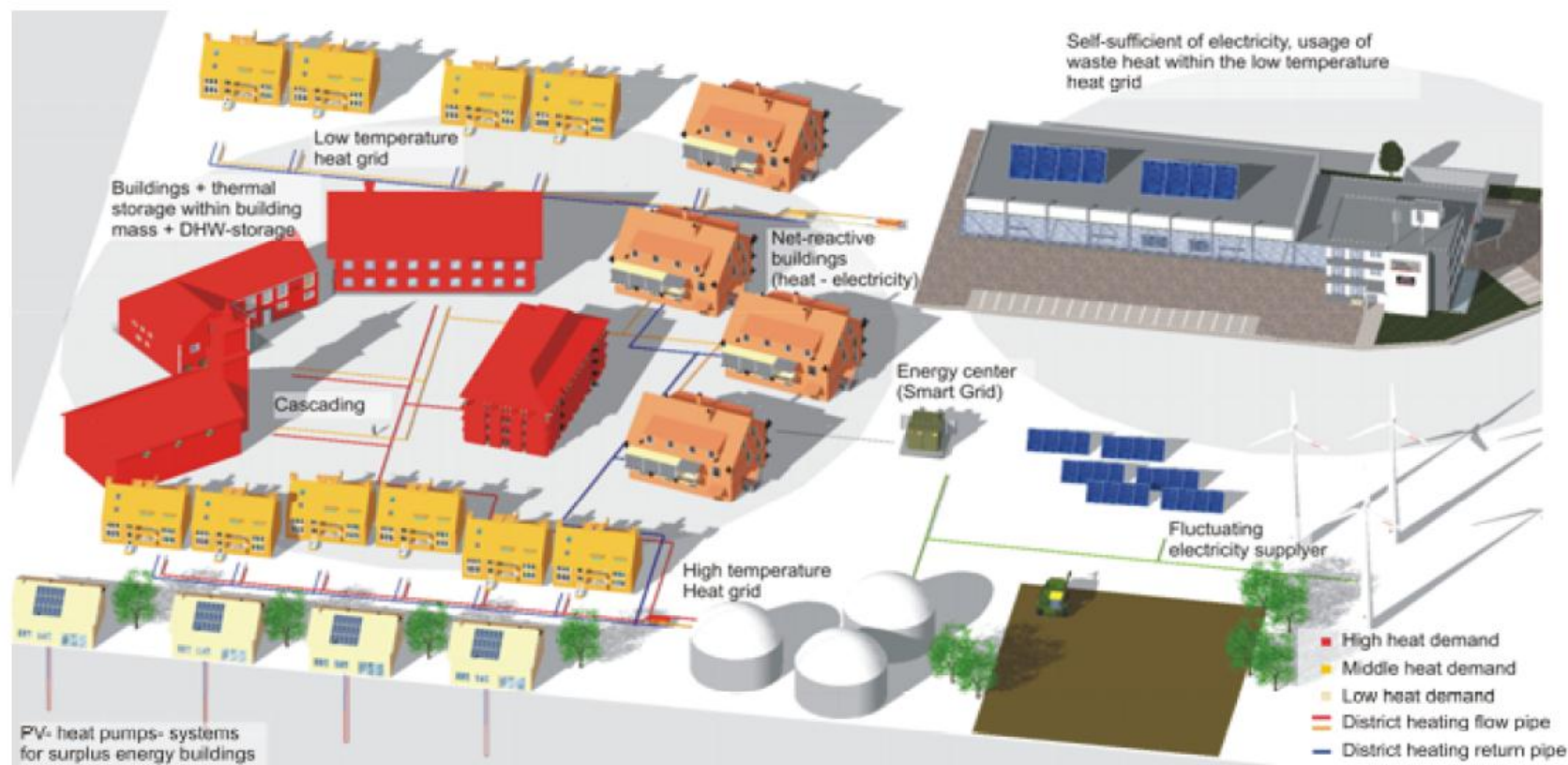
Stakeholders plan to increase the global market share of electric vehicles in cities to reach at least 30% by 2030.

Urban energy supply options



Urban energy supply options can be optimally integrated with sources located in the proximity of urban areas

ETP 2016: System integration



Source: Fraunhofer IBP/IEA-EBC Annex 64 (2015)

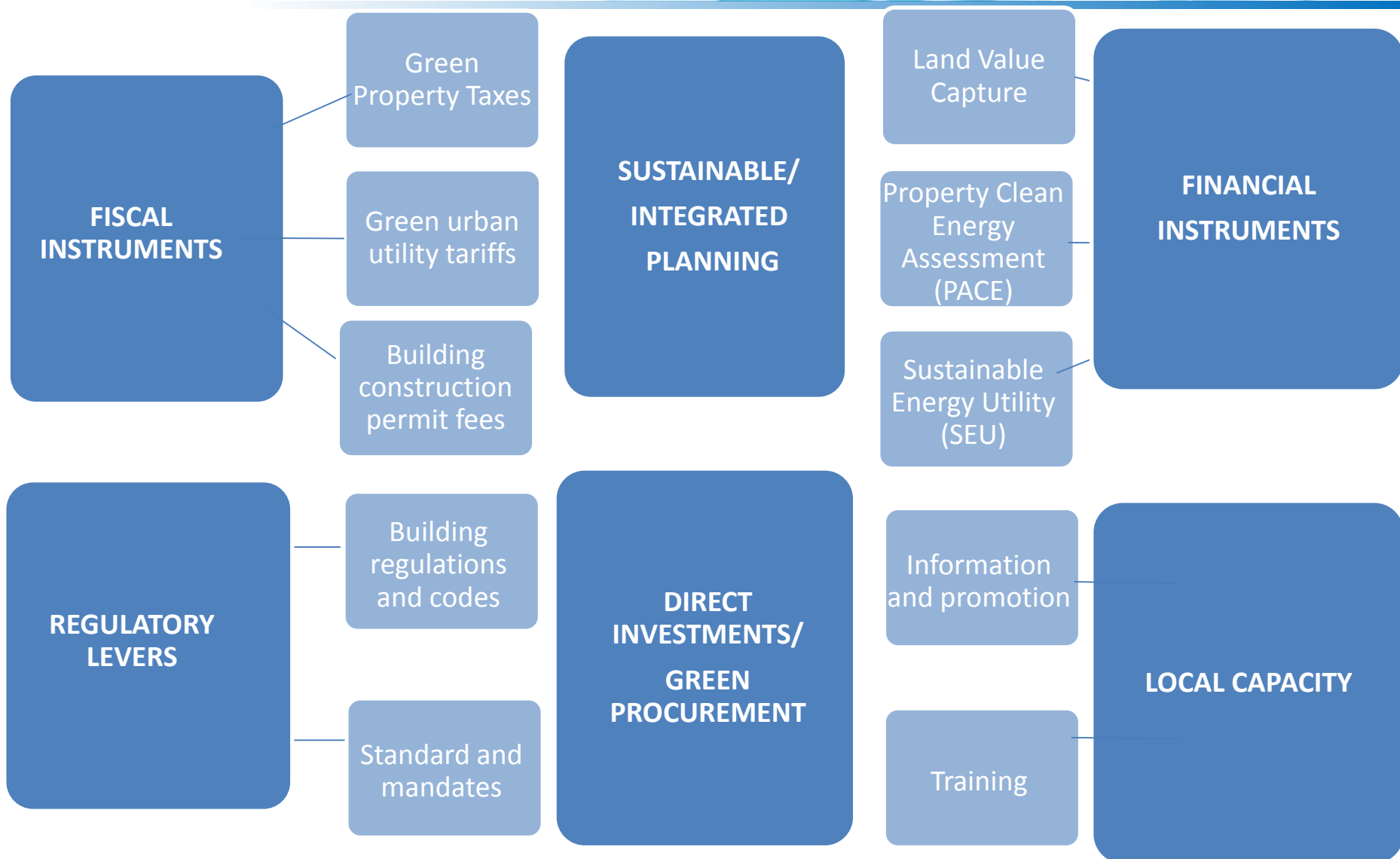
Urban areas offer a significant potential for integrating different energy grids

Building a sustainable urban energy transition in Mexico



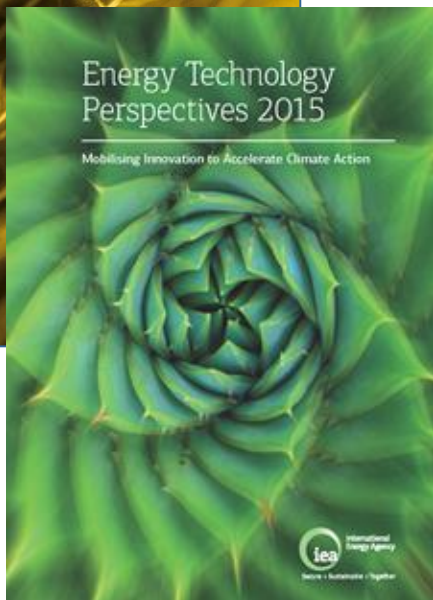
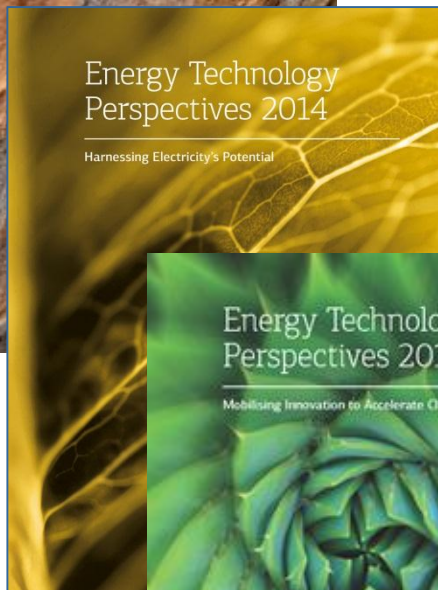
Source: CIA World Factbook

Mexican cities can play a very important role to make national energy policy objectives feasible



- Internal kick-off workshop held in April
- Chapter outlines submitted by lead authors
- Data collection and analysis being finalized
- Analytical partnership with the World Resources Institute
- Planned launch in May 2016
- Dissemination Roadshow
 - CEM?
 - Habitat 3?
 - ...

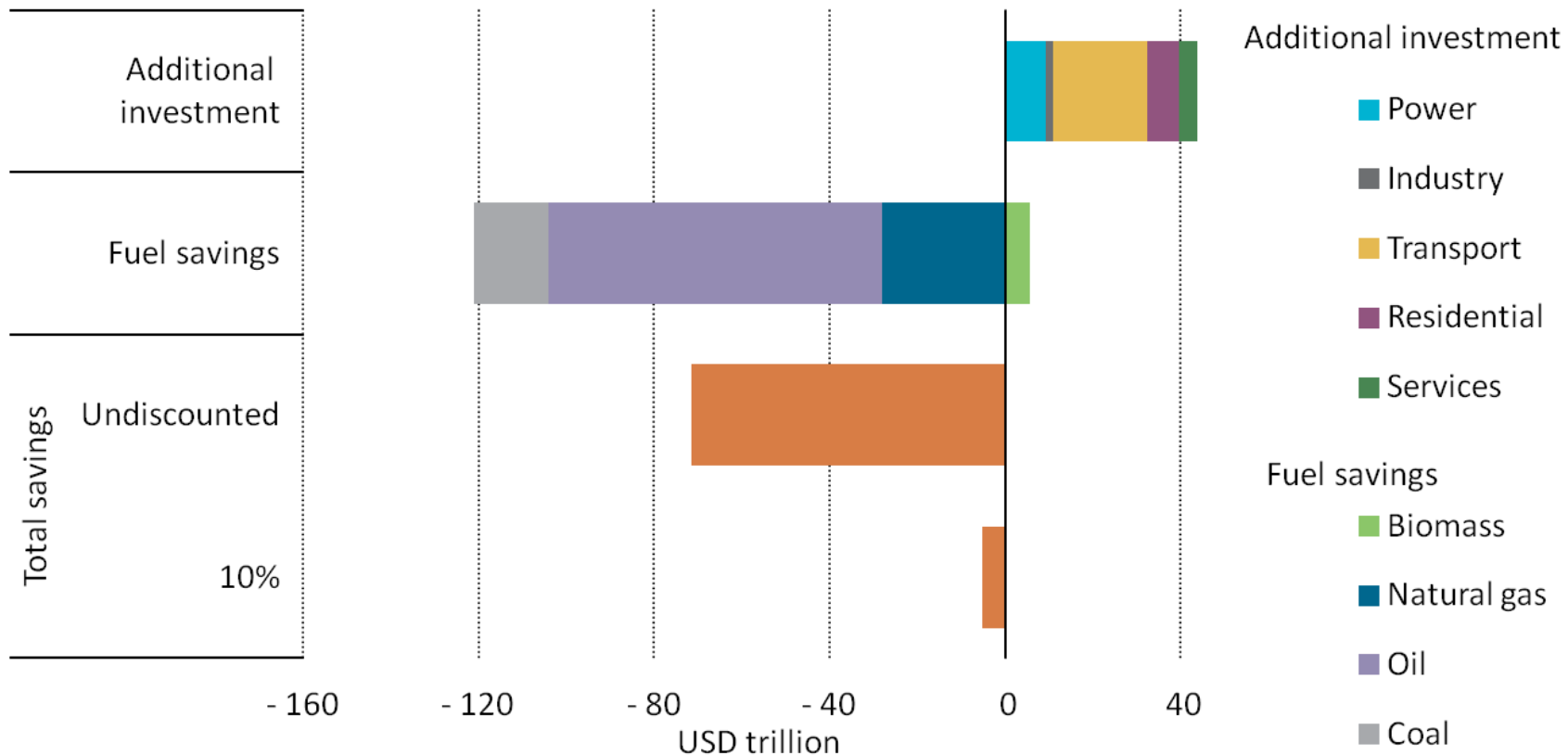
Thank you



Explore the data behind ETP

Investment in our future pays off...

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2015



...and it is cost effective to make the transition