

# Advancing CCS in times of challenge

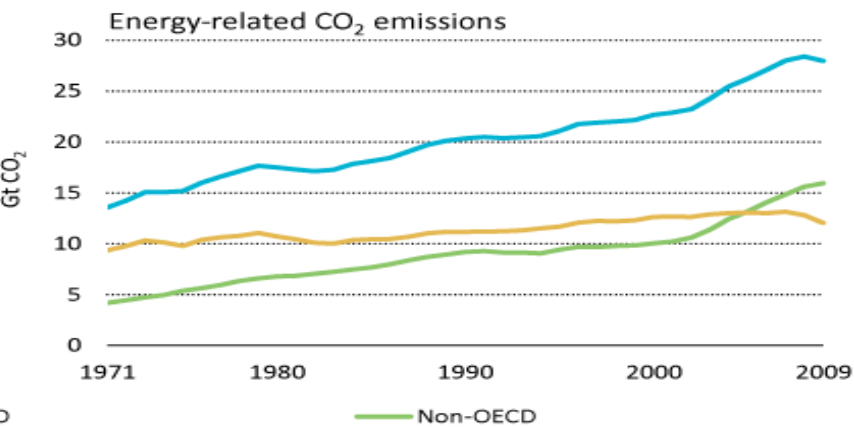
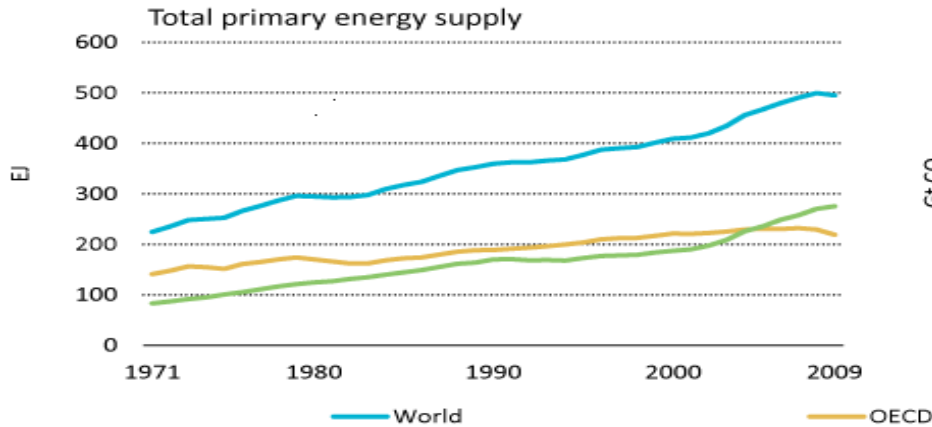
CSLF Policy group meeting  
Perth, 25 October 2012

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# Outline

- “The Four Fundamentals”
- What could CCS do (if it was allowed to)
- What should we really concentrate on RIGHT NOW?

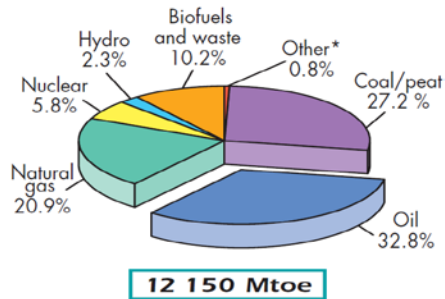
# First fundamental: Energy demand and CO<sub>2</sub> emissions doubled in past 40 years



- From 6000 Mtoe to 12 000 Mtoe
- Rapid demand growth outside OECD

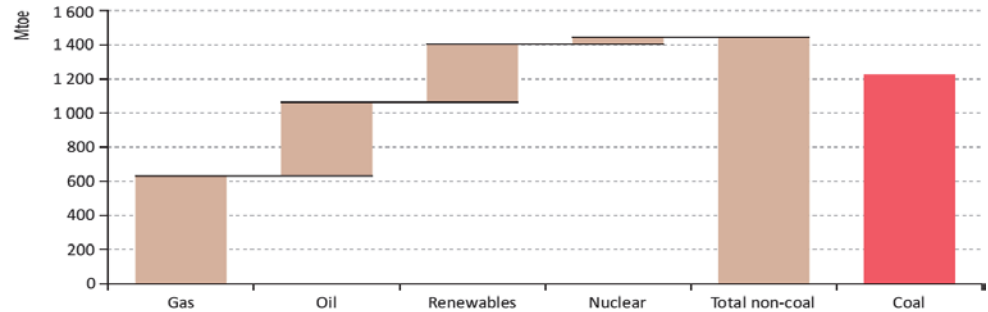
- CO<sub>2</sub> emissions from 14Gt to 30Gt
- Since 2005, non-OECD countries emit more than OECD

## Second fundamental: Fossil fuels: Indisputably part of mix



Source: IEA statistics

**Figure 10.1** • Incremental world primary energy demand by fuel, 2000-2010



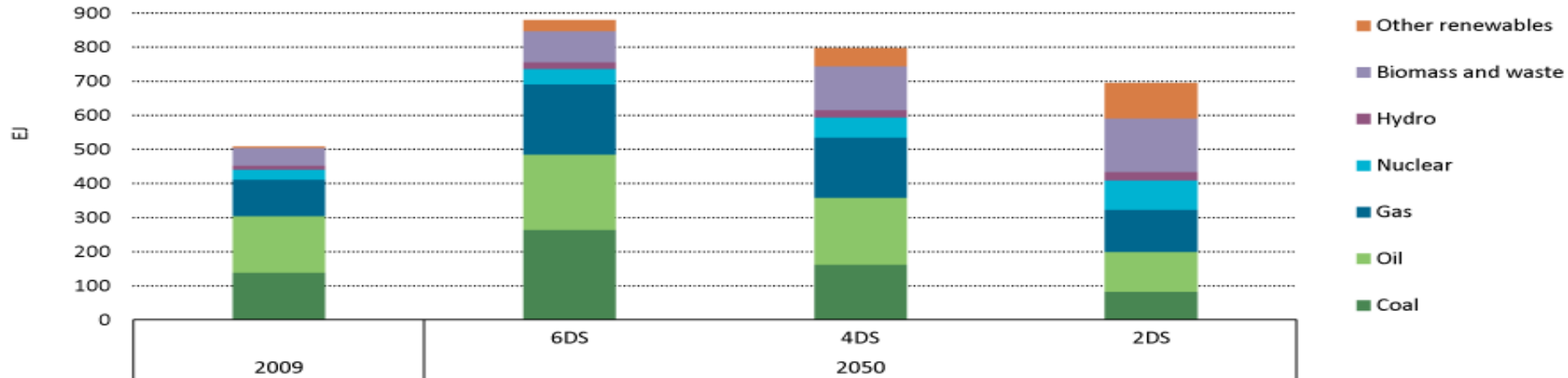
Note: IEA estimates for 2010.  
WEO 2011

- In 2009, fossil fuels made up 81% of the global primary energy demand
- Fossil fuels accounted for 85% of incremental demand in the last decade

Third fundamental:

## Global energy use continues to grow

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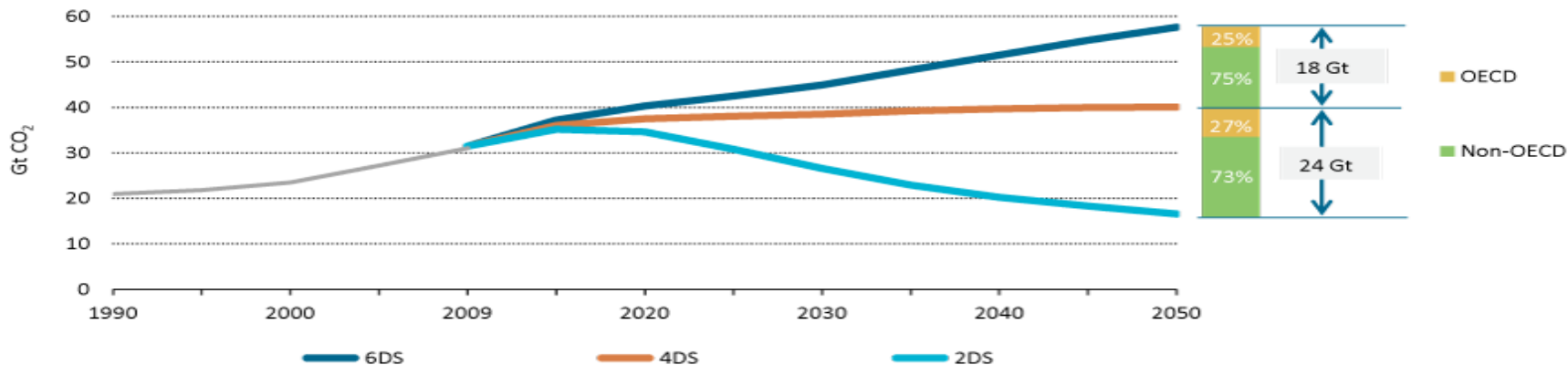
- Global energy consumption is increasing: growth of 35% - 65% - 85% by 2050 depending on scenario
- Important regional differences: OECD growth stagnates, non-OECD growth remains strong

Fourth fundamental:

## CO<sub>2</sub> emissions must be cut by 50% by 2050

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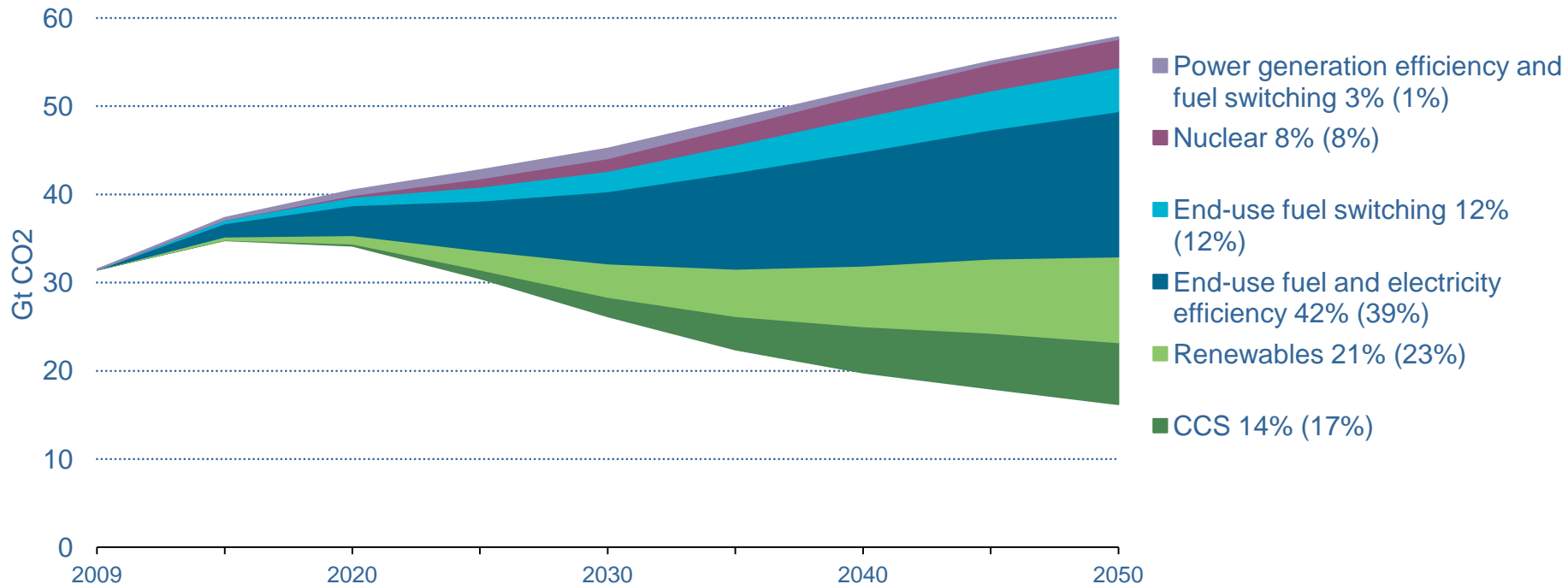
- To achieve ambitious climate goals, the world needs to cut energy-related CO<sub>2</sub> emissions by 50% from today's levels...
- ...but as populations grow and growth in energy consumption is inevitable, the reduction challenge is even higher: **gap of 24-42 Gt CO<sub>2</sub> in 2050**





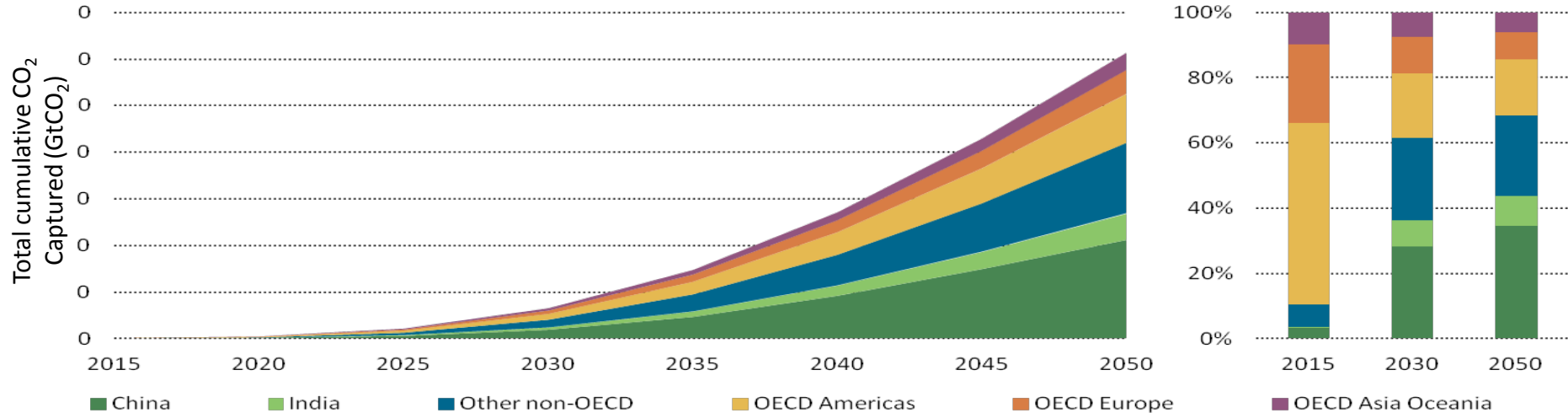
# Role of CCS is very significant

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# 123 Gt of CO<sub>2</sub>

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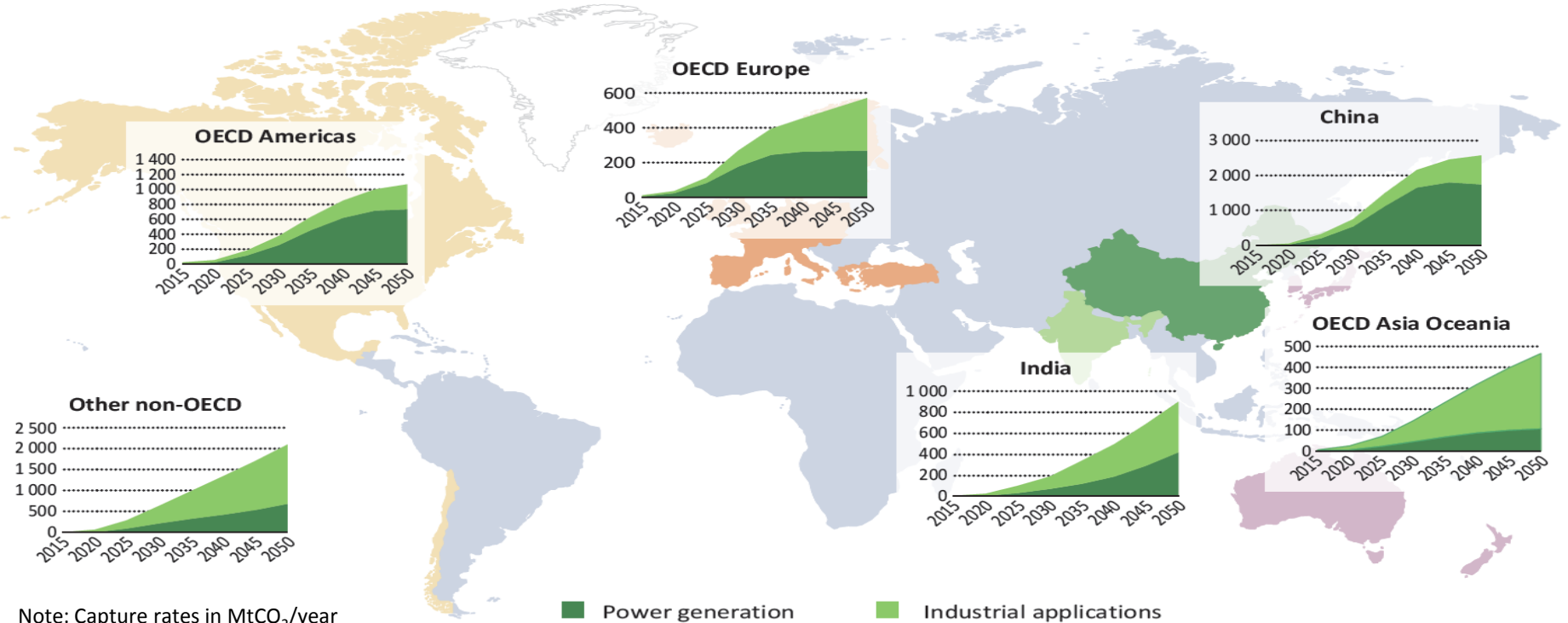


- 2030: capture and store 2,4Gt per annum → **685** Gorgon projects!
- 2050: capture and store 7,8Gt per annum → **2228** Gorgon projects!



# CCS is applied in power *and* industry

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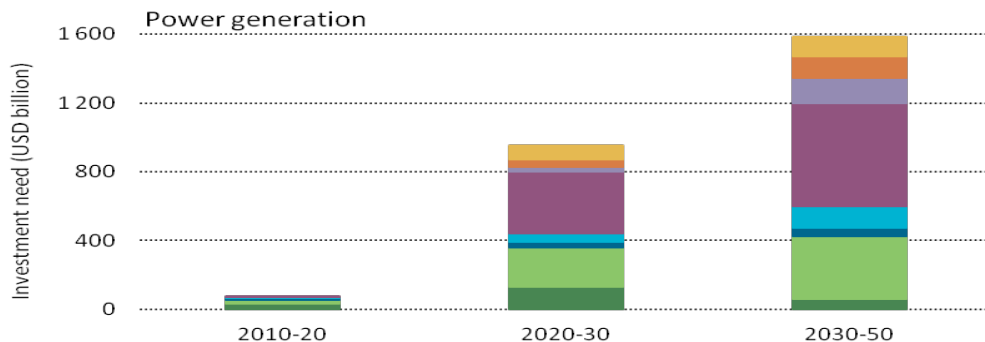


Note: Capture rates in MtCO<sub>2</sub>/year

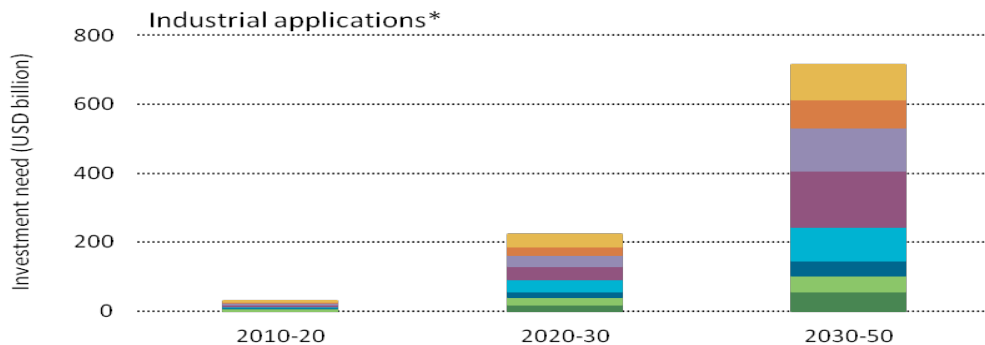
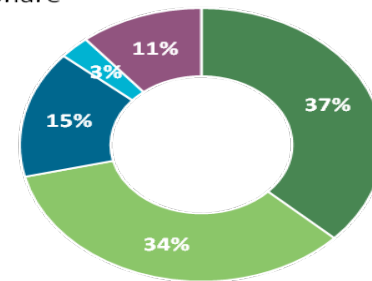
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# Total investment for CCS: 3.6 trillion USD

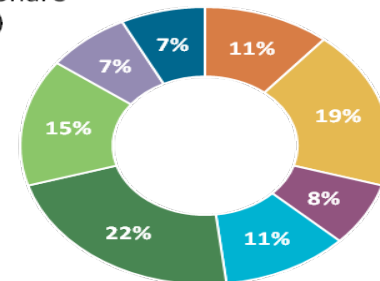
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Investment Share (2010-2020)



Investment Share (2010-2020)



OECD Europe

OECD Americas

OECD Asia Oceania

Africa and Middle East

China

India

Other developing Asia

Other non-OECD

\* Note: Investment cost for industrial applications does not include the cost of transport and storage

# How much is 3.6 trillion USD?

Table 4.1 Investment requirements by sector in the 6DS and 2DS

Sector	6DS (in USD trillions)			2DS (in USD trillions)		
	2010 to 2020	2020 to 2030	2030 to 2050	2010 to 2020	2020 to 2030	2030 to 2050
Power	5.9	6.5	15.9	6.5	8.7	20.7
Buildings	3.2	3.9	9.1	6.2	6.9	14.7
Industry	2.8	2.3	4.4	3.1	2.7	5.4
Transport	(33.0) 7.0	(44.8) 9.9	(137.3) 32.5	(33.7) 8.1	(47.3) 12.5	(149.9) 44.4
<b>Total investment</b>	<b>19.0</b>	<b>22.7</b>	<b>61.9</b>	<b>23.9</b>	<b>30.9</b>	<b>85.2</b>

Notes: Industry includes iron and steel, chemicals, cement, pulp and paper, and aluminium. Transport includes the cost of the powertrain only; full vehicle costs are shown in parentheses.

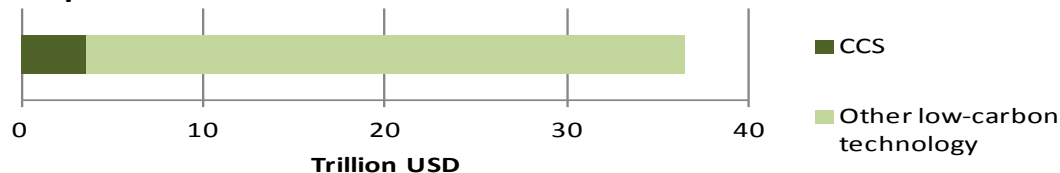
Source: Unless otherwise noted, all tables and figures in the chapter derive from IEA data and analysis.

103.6

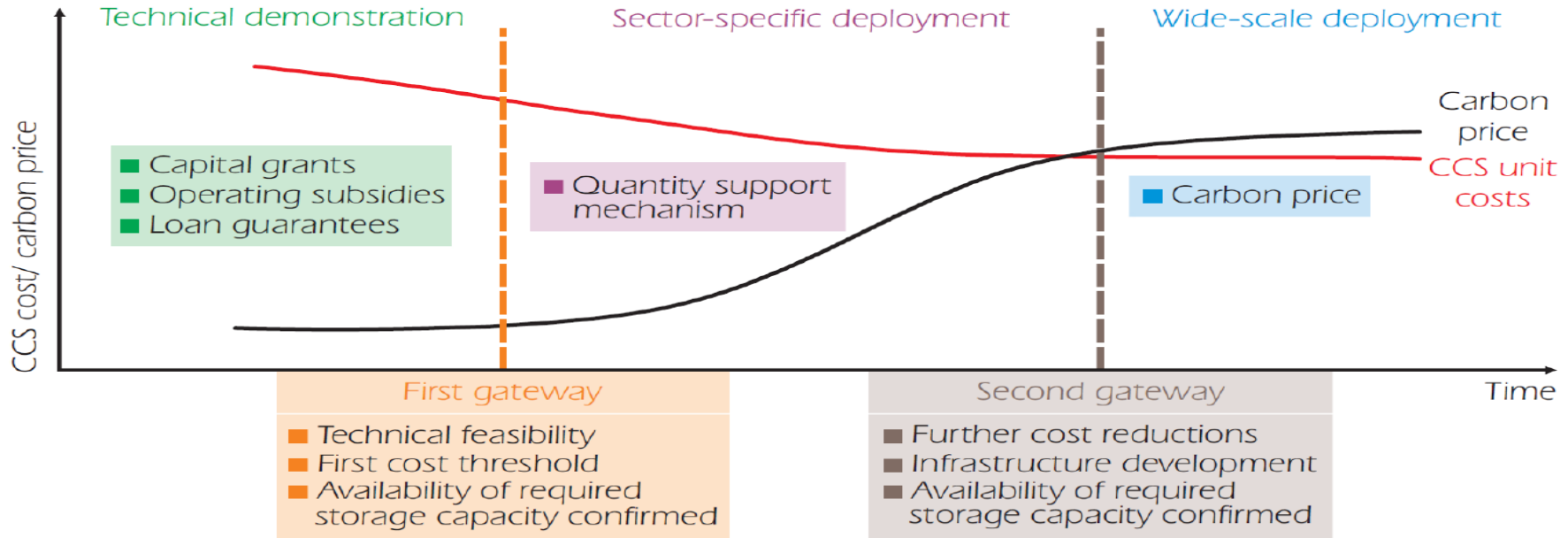
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- Investment requirements without particular clean energy goals are **103.6** trillion USD until 2050
- Investment requirements to reach 2DS scenario are **140** trillion USD until 2050
- Additional investment thus **36,4** trillion USD until 2050

CCS accounts for roughly 10% of the required additional investment:



# ARE WE CLEAR ABOUT INCENTIVE POLICY OBJECTIVES?



# What should we concentrate on RIGHT NOW?

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1. Governments/countries to **assess the role** of CCS in their energy futures
  2. The only way to learn is to **demonstrate**
  3. Design and implement appropriate **incentives** to drive a second wave of CCS deployment
  4. Keep telling the **positive** messages!
- ... and let's not forget about laws and regulations, storage capacity assessments, infrastructure development, engaging the public...

# Thank you!

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