CARBON CAPTURE AND STORAGE

International Energy Agency

CCS: critical decade to fulfill its potential in GHG mitigation

Bonn Climate Change Talks, SB 36

IEA Side event

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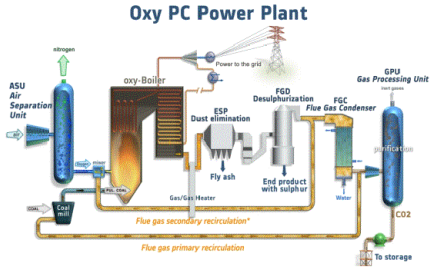
CCS IS A *CHAIN*

Carbon Capture and Storage is a chain/group of technologies and applications that enable:

1. **Capture of CO_2 from large point sources**

   Power plants, steel, cement, refineries, gas processing etc.



Alstom

2. **Its transport**

   Trucks, ships, pipelines

Maersk

Gassco

3. **Storage of CO2 in geological formations**

   Depleted oil and gas fields, saline aquifers, EOR, ECBMR etc.

Vattenfall

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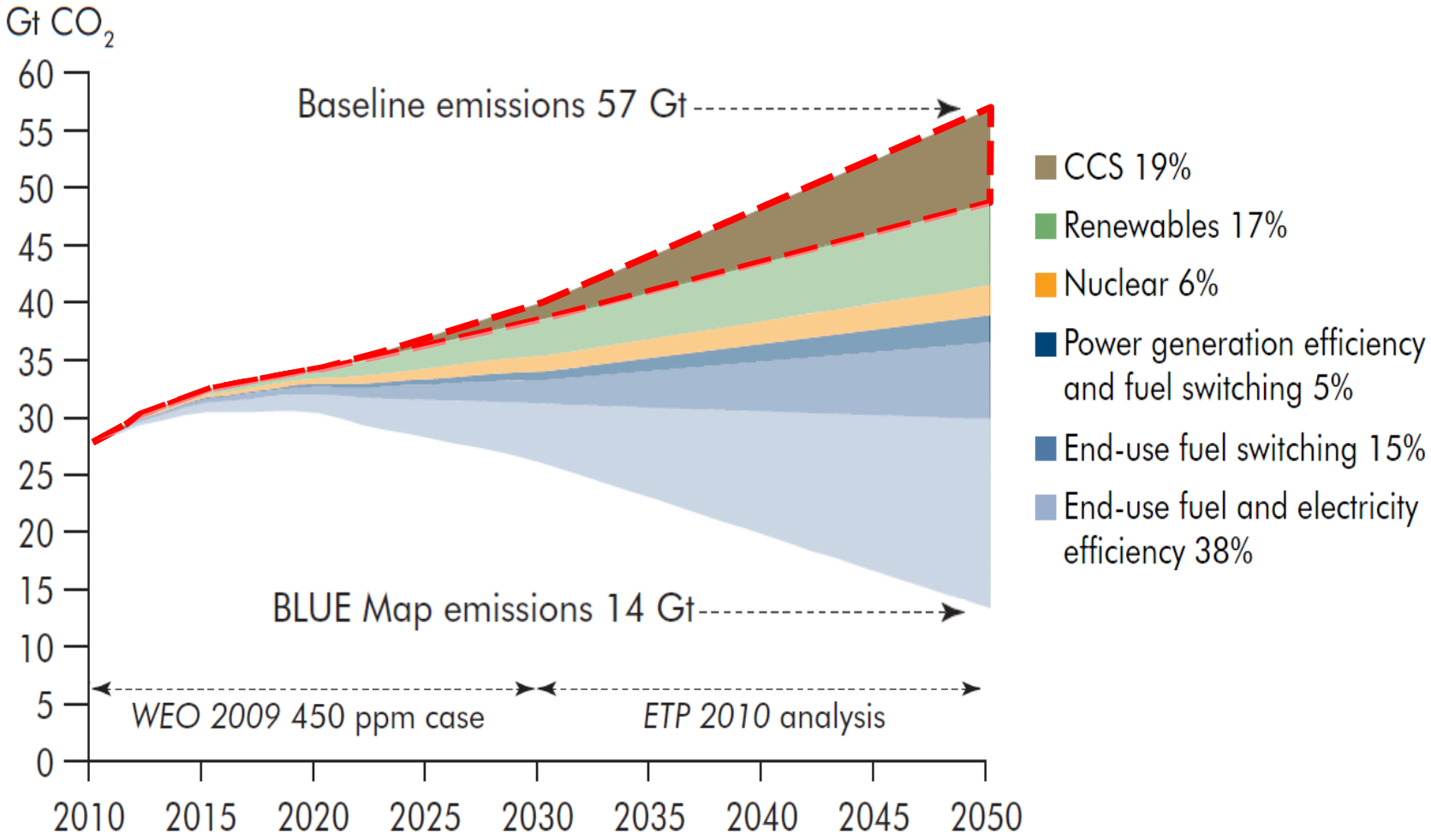
Major contribution of CCS to global GHG reductions by 2050



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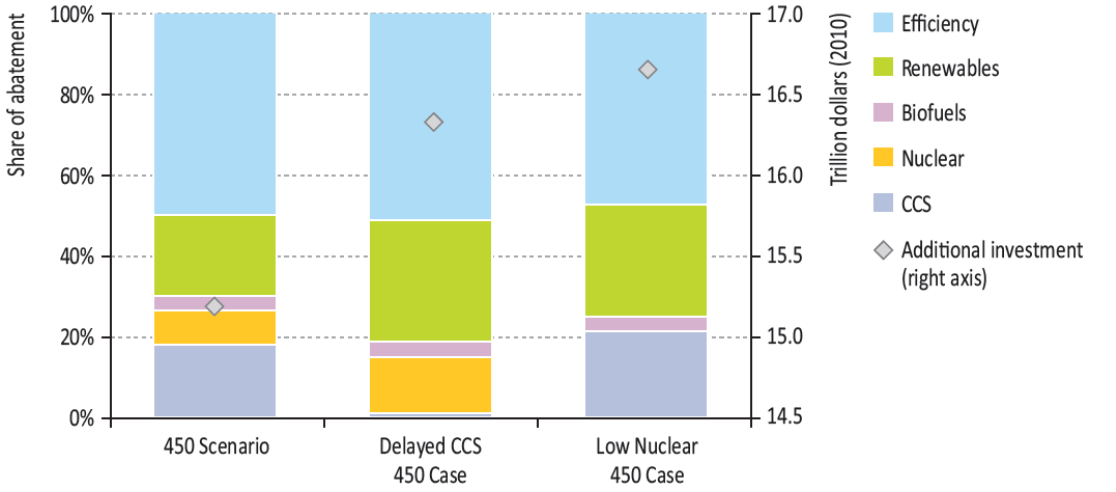
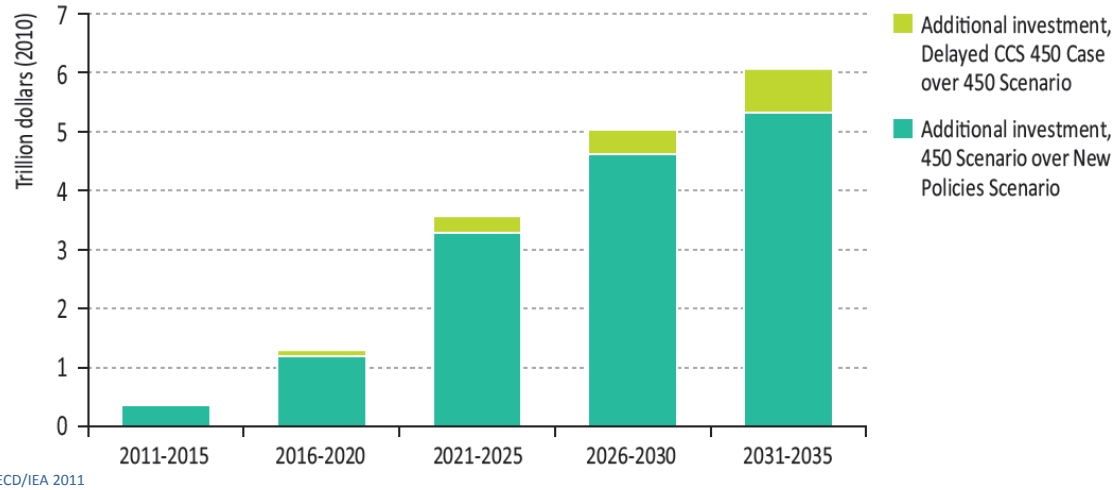
WHAT IF CCS IS DELAYED UNTIL 2030?





- Abatement shifts to renewables and nuclear
- A further energy efficiency boost seems impossible

- Significant cost increase: 1.14 trn USD additional investment

Source: IEA World Energy Outlook 2011

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Upcoming ETP 2012

- CCS's share in required CO_2 emission reductions in 2DS in 2050 remains high
- Increased investment needs in the electricity sector without CCS
- Nearly 123Gt of CO_2 need to be stored through 2050
  - More than half in developing countries
- Large number of projects are needed by 2020
  - 38 projects (16 GW of power generation)
  - 82 projects in industry and energy transformation

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CCS must be deployed **now**

2012

0
GW OF POWER GENERATION FITTED WITH CCS IN 2012

5
MT OF CO2 CAPTURED IN INDUSTRIAL APPLICATIONS IN 2012

0
POWER PLANTS FITTED WITH CCS IN 2012

4
INDUSTRIAL PROJECTS EMPLOYING CCS IN 2012

2020

16
GW OF POWER GENERATION FITTED WITH CCS IN 2020

196
MT OF CO2 CAPTURED IN INDUSTRIAL APPLICATIONS IN 2020

38
POWER PLANTS FITTED WITH CCS IN 2020

82
INDUSTRIAL PROJECTS EMPLOYING CCS IN 2020

Source: IEA Tracking Clean Energy Progress, 2012

Tracking Clean Energy Progress: CCS

- CCS is making the slowest progress in deployment among all low carbon technologies
  - Demonstration and R&D activities are moving ahead
- Number of large CCS projects remains constant
- Majority of public funding for CCS between 2007-2009, no substantial new commitments since then
- Conducive policy development remains limited
  - UK electricity market reform
  - Australia CO2 tax and imminent GHG trading
- Legal frameworks continue to be developed
- More emphasis needed on industrial CCS

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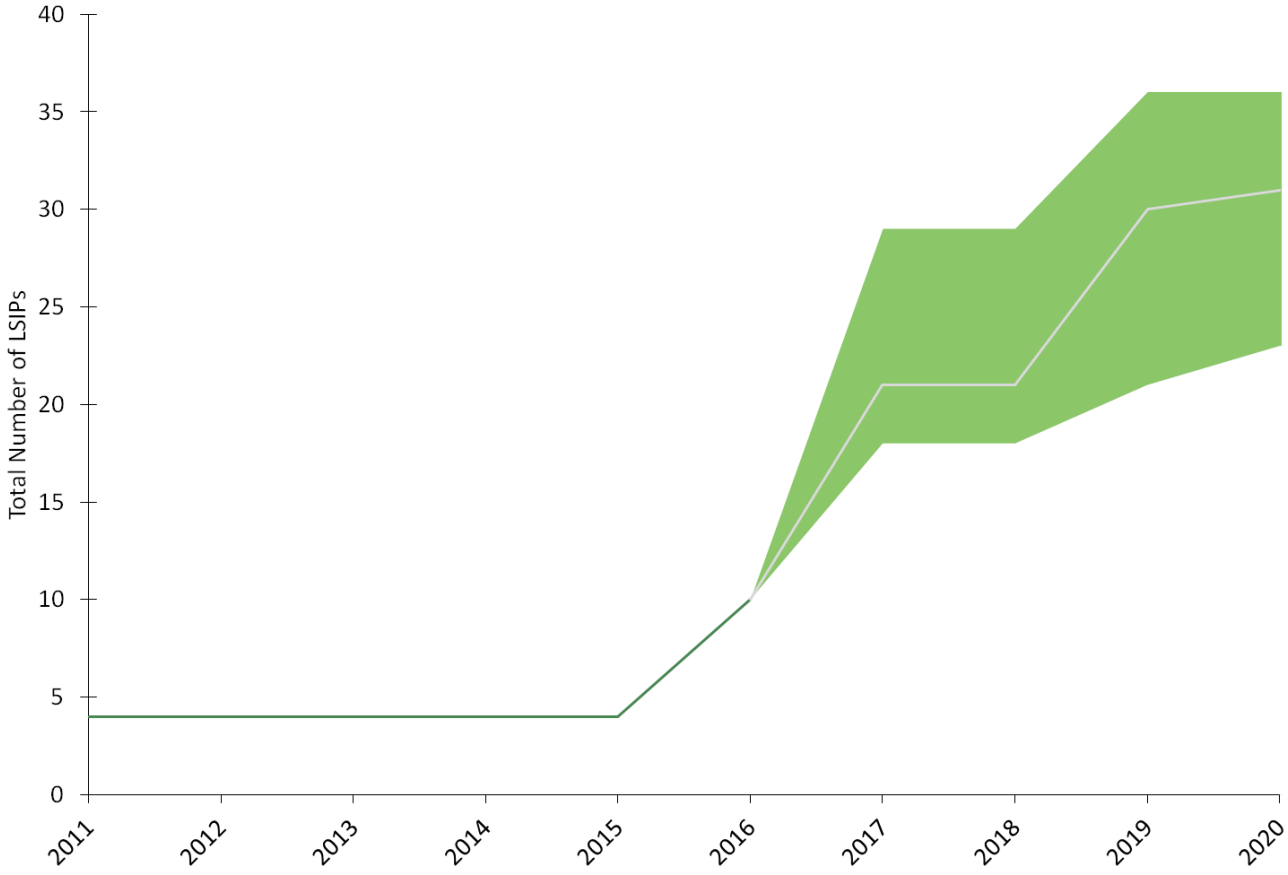
Are we on track for 2020?



NO

Not enough plants are in the development pipeline to meet the 2DS goal today

Source: GCCSI LSIP Database and IEA Analysis

The main challenges for CCS deployment

- **Lack of strong policy drivers** that would put a high-enough cost (=value!) to emitting CO2.
- **Lack of incentives and supporting policies**. Since 2008, USD 21-24bn have been committed by various governments for first CCS projects, out of which only USD 14 bn have been allocated.
- **Poor image and lack of public acceptance** is an issue, BUT, this is not uniform across the globe.
- Setting and implementing **legal and regulatory frameworks**.
- Lacking understanding of **CO2 storage**.
- **High cost of technology, especially capture**.
  - between 55-80 USD / t to capture CO2 from power plants
  - 30 USD /t in gas processing
  - 5-10 USD/t for transport and storage

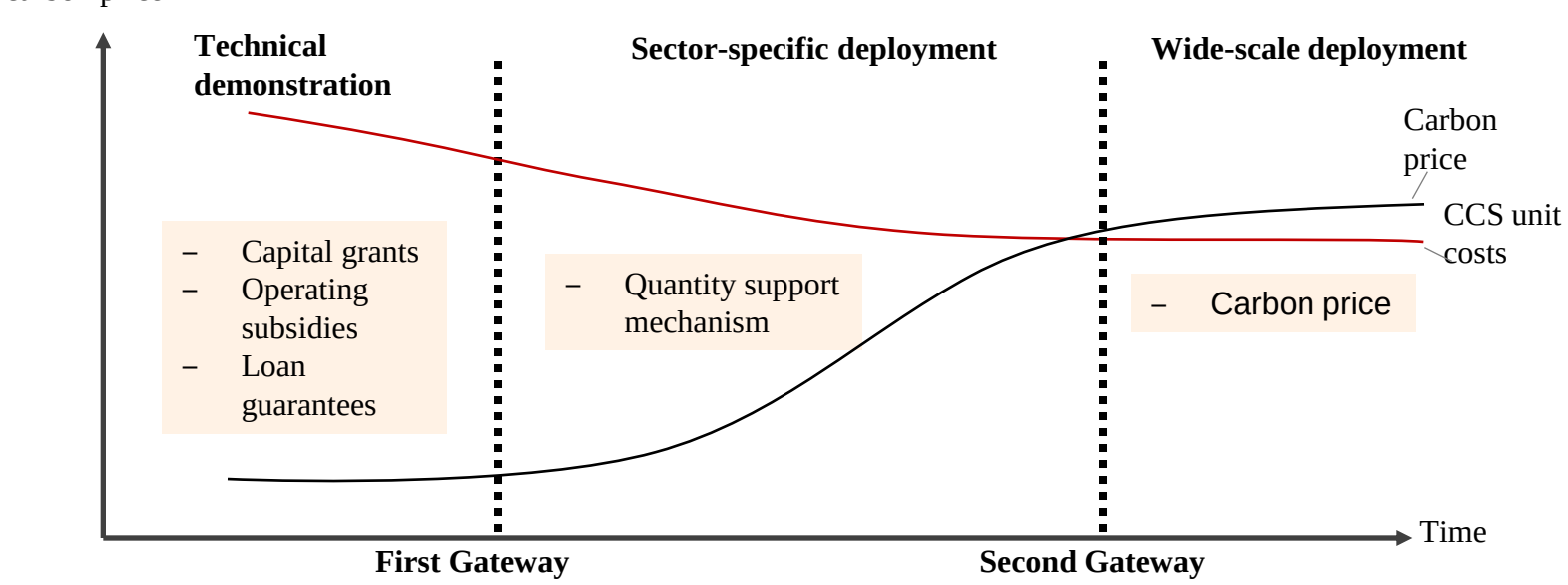
POLICY ARCHITECTURE AND GATEWAYS

US: Demo funding
EU: NER300, EEPR
AUS: Flagship pr.
UK: CCS competition
NO: Mongstad
Etc..

Long-term policy architecture can enhance credibility and effectiveness

UK: 2011 Electricity Market Reform

NO: Carbon tax
AUS: Carbon tax
EU: ETS



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CCS is needed in developing countries

- 50-65% of CCS deployment will need to occur in non-OECD countries to achieve global emission reduction targets
- Enabling activities are needed now, including development of policy and regulatory frameworks, identifying suitable storage, demonstrating technology
- UNFCCC mechanisms should be utilized: CDM, NAMAs and Green Climate Fund, Technology Mechanism

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*CCS remains a critically important technology, and **concerted policy action is necessary**:*

- Countries to assess the role of CCS in their energy futures;
- Government funding and incentive policies for CCS;
- Government and industry efforts to demonstrate CCS at a commercial scale;
- Enabling legal and regulatory frameworks for both demonstration and deployment of CCS;
- Enhanced efforts on storage capacity estimates;
- Increased emphasis on CO_2 transport and storage infrastructure;
- Engaging the public at both policy and project levels to ensure transparency.

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Thank-you!

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