

CLEEN

Cluster for Energy and Environment



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Carbon Capture and Storage Program

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# Introduction to Carbon Capture and Storage Program

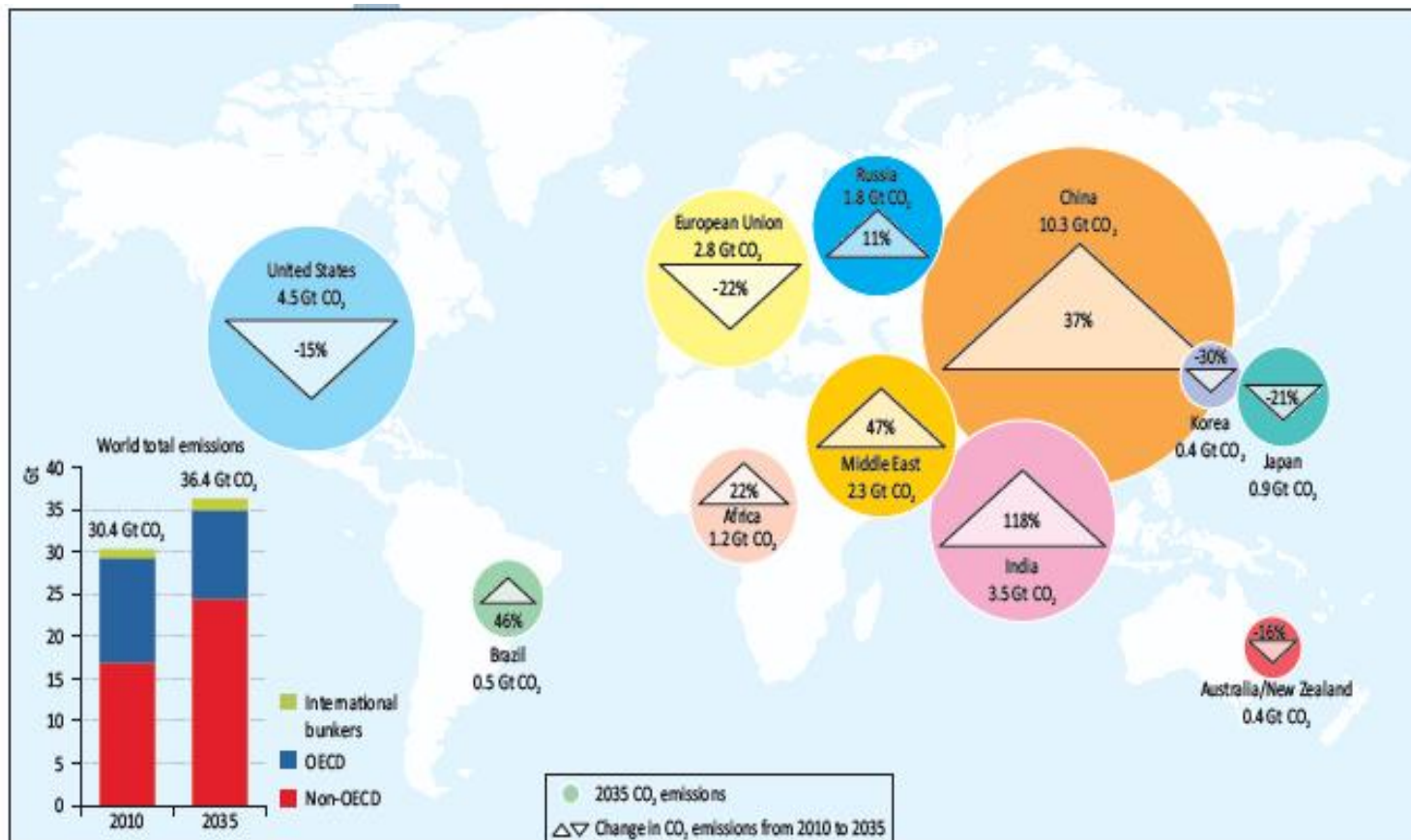
26.1.2012, VI Liekkipäivä, Lappeenranta

Antti Arasto

VTT - Technical Research Centre of Finland

# Energy-related CO<sub>2</sub> emissions

by region in 2035 in the New Policies Scenario and the change from 2010

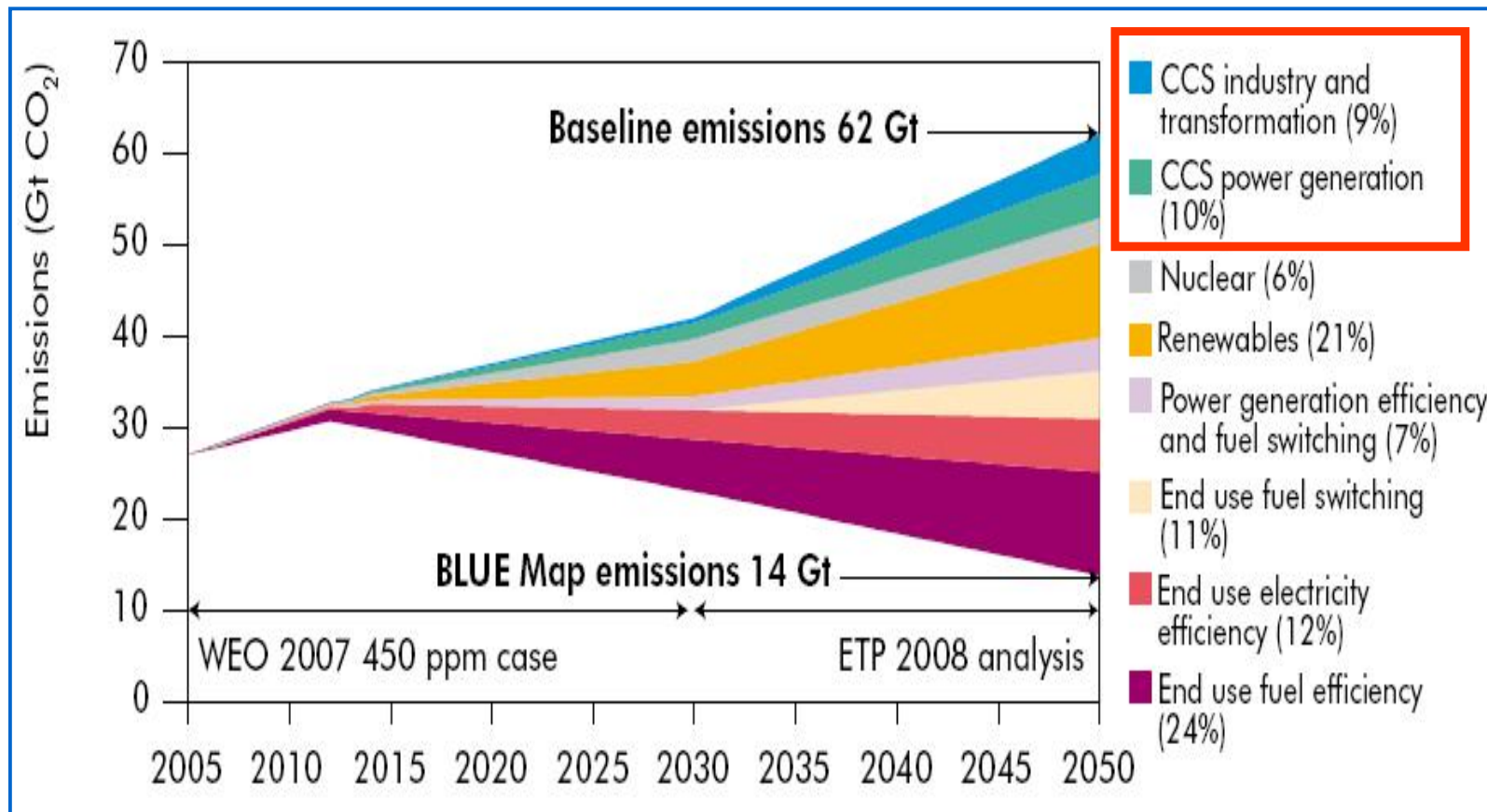


This map is for illustrative purposes and is without prejudice to the status of or sovereignty over any territory covered by this map.

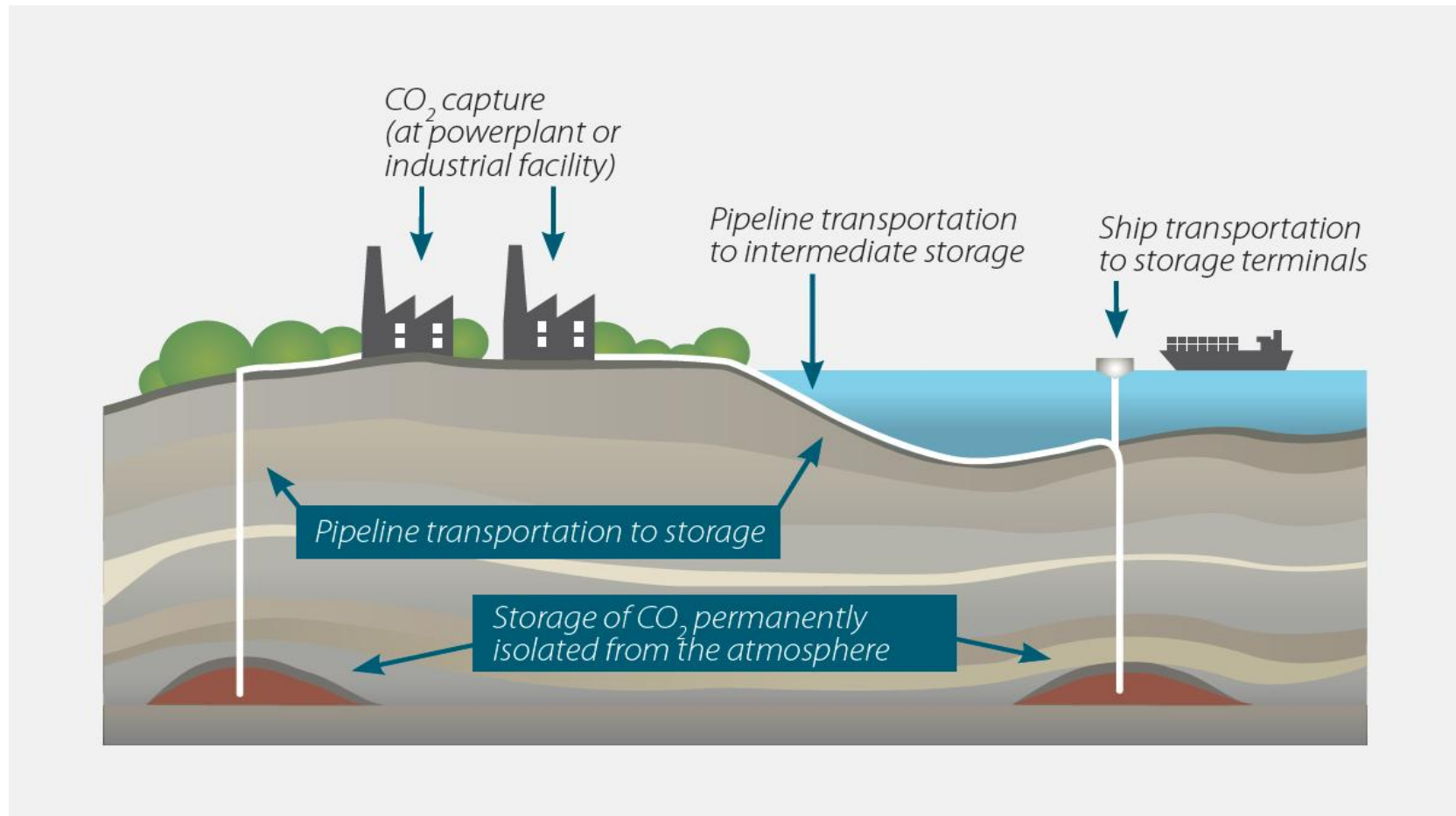
Notes: The circles reflect the relative volume of energy-related CO<sub>2</sub> emissions from selected countries and regions in 2035. The arrows indicate the change in these emissions from 2010 to 2035. The bar chart shows world energy-related CO<sub>2</sub> emissions and the split between the OECD, non-OECD countries and international bunkers.

IEA WEO 2011

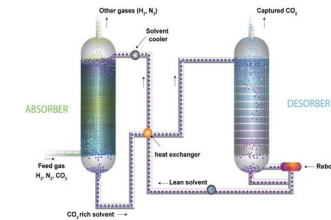
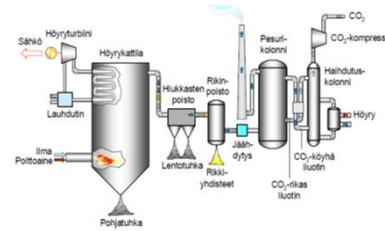
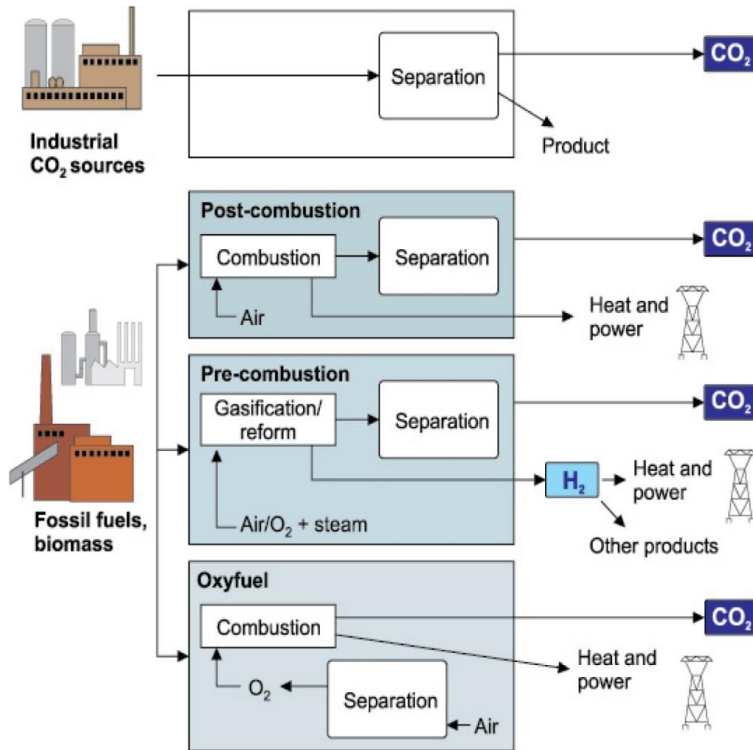
# Backgrounds - A World-Wide Technological Change Needed



# Carbon capture and storage (CCS)

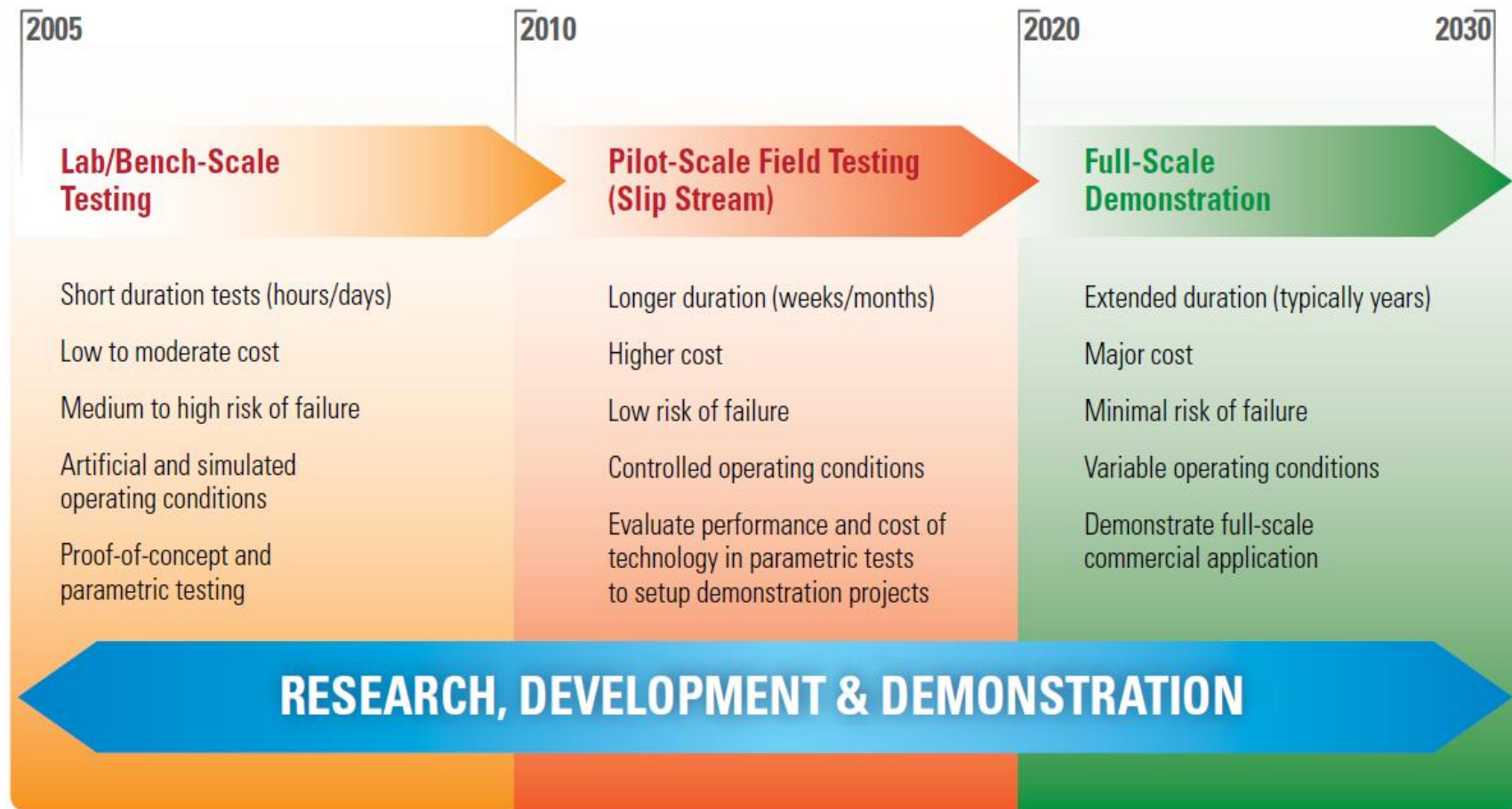


# Carbon capture and storage technologies



More information: <http://www.vtt.fi/proj/ccsfinland>

# Advanced CO2 Capture Technology RD&D (NETL/DOE 2010)



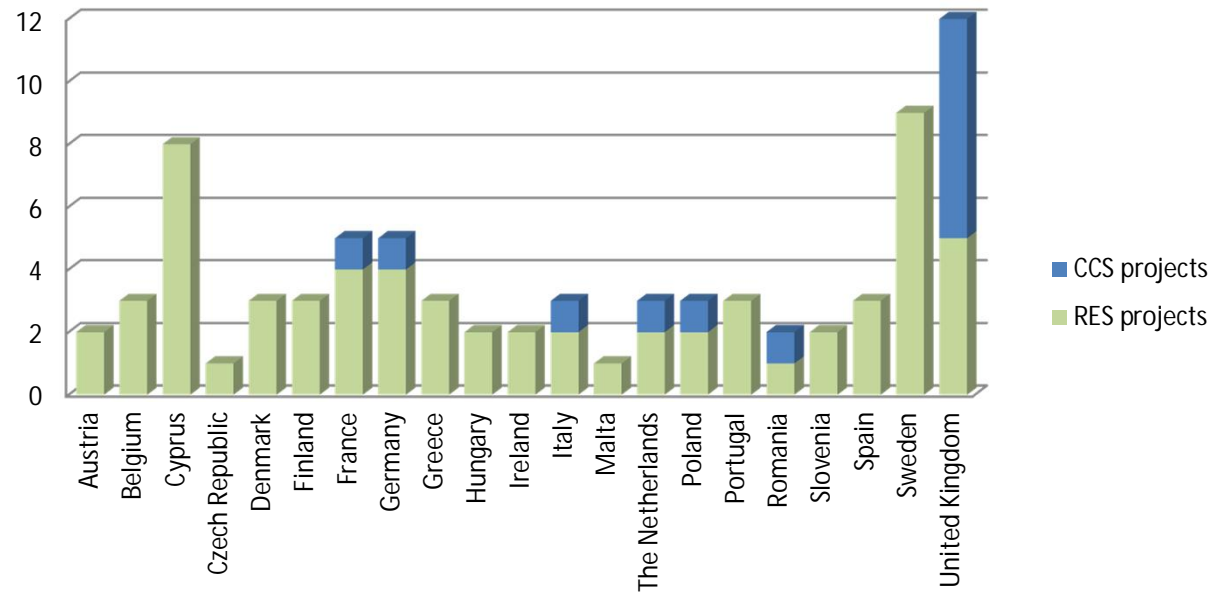


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Carbon Capture and Storage Program

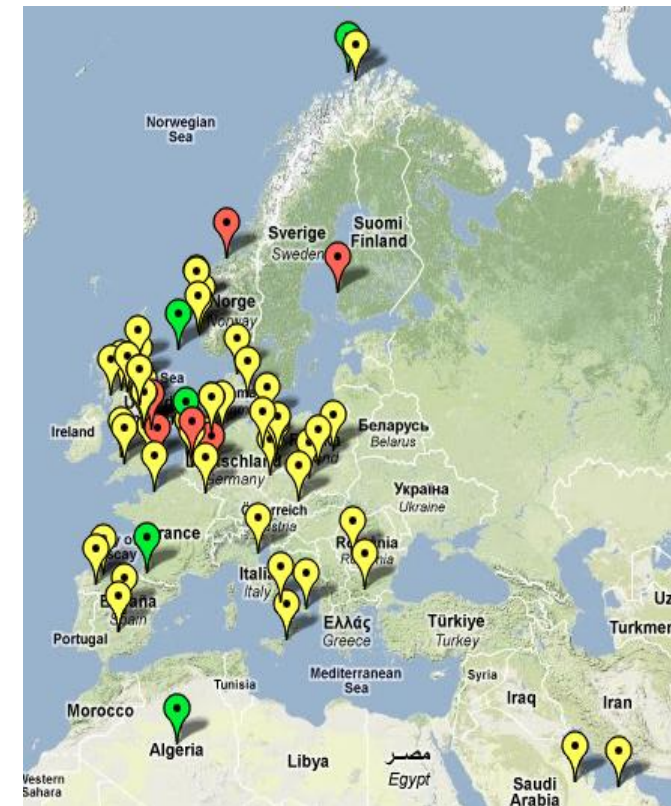
# NER300 projects proposed to EIB by 13.5.11

NER 300 project proposals



The NER300 is the world's largest CCS funding mechanism; the European Commission will grant 300 million EU emission unit allowances – today worth about €4,5 bn – to fund at least eight CCS projects and 34 renewable energy projects.

# Significant CCS sites (injecting > 0.7 MtCO<sub>2</sub>/y) around the globe



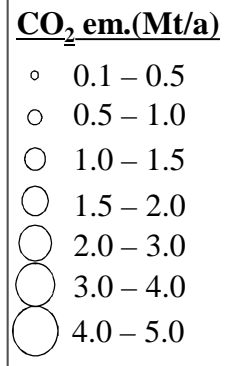
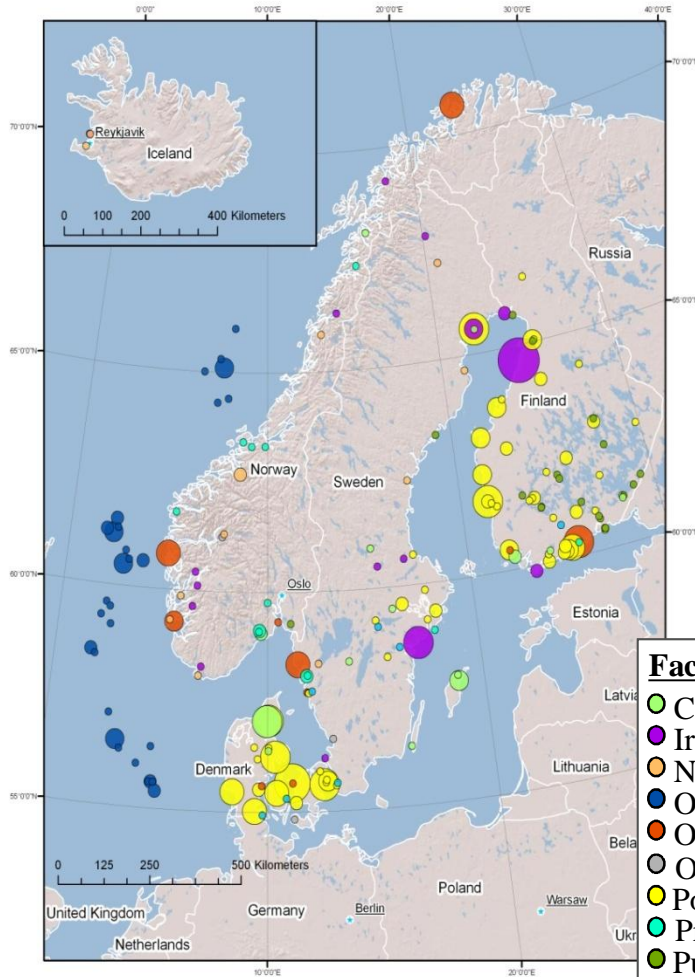
Key

- Sites which are currently injecting CO<sub>2</sub>
- Planned CCS sites. Generally plan on injecting at least 700,000 tonnes CO<sub>2</sub> per year.
- Sites which have been cancelled or have completed injection.

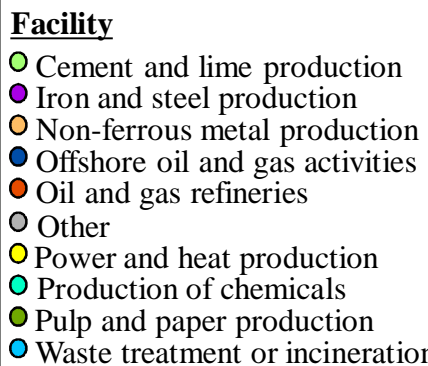
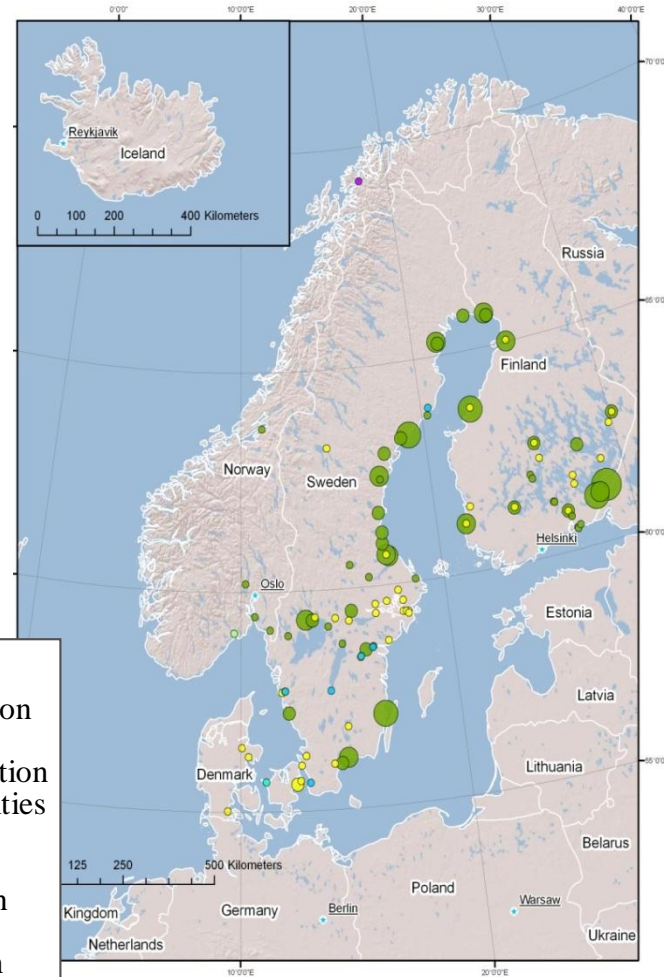


# CO2 Emissions in Nordic countries

Fossil and inorganic CO<sub>2</sub> emissions

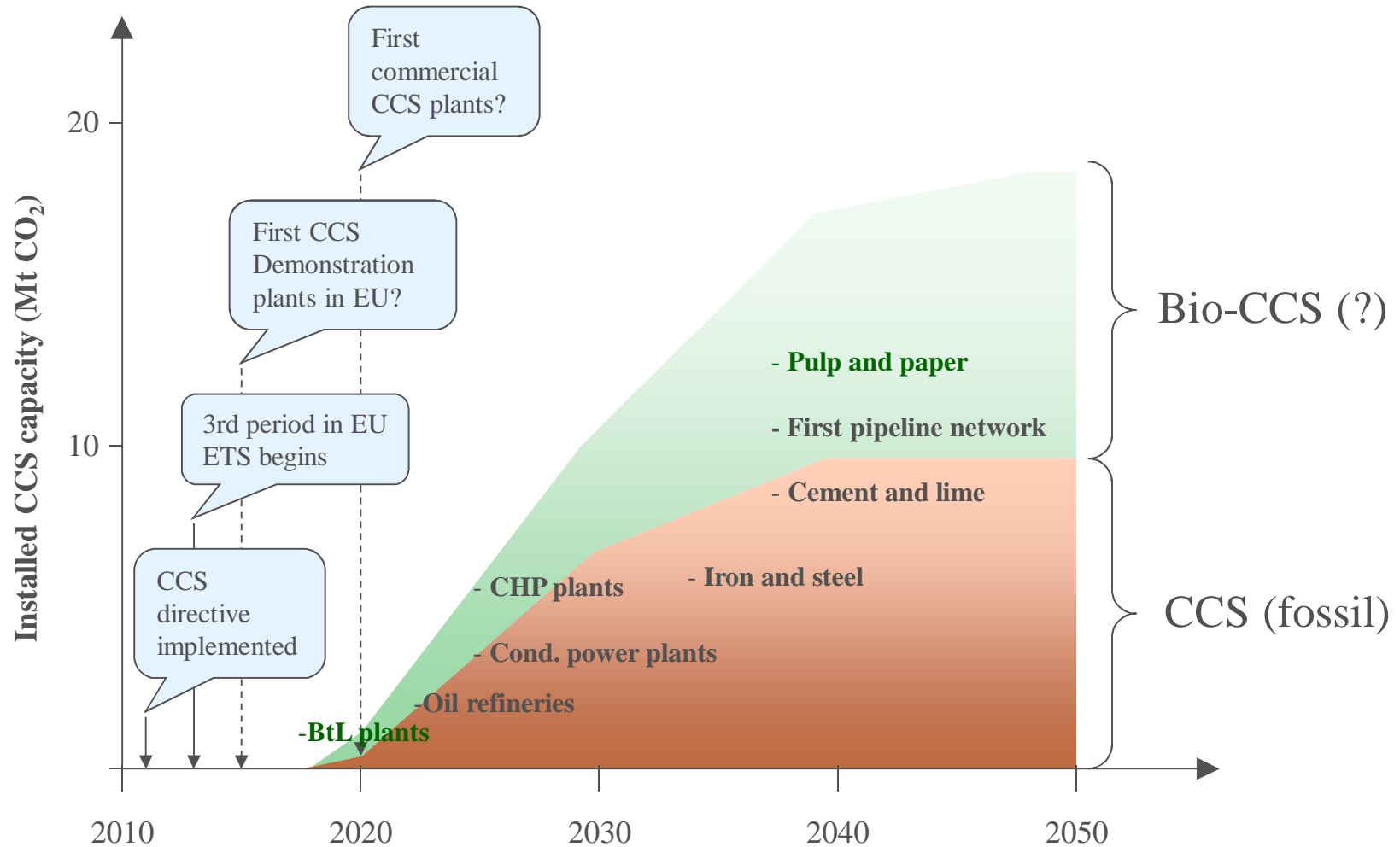


Biogenic CO<sub>2</sub> emissions





# Roadmap for application of CCS in Finland



# CCSP – Carbon Capture and Storage Program

17 industrial partners, 9 research partners, 5a ~20M€

## Key technology areas:

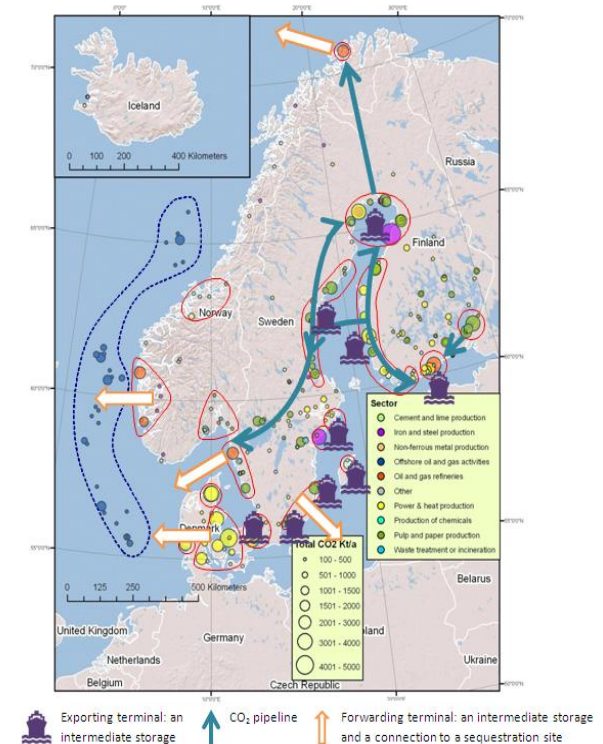
- CCS in CHP systems
- CCS related to multi-fuel and Bio-CCS
- CCS solutions for oil and gas and for iron and steel industry
- Acceptability

## Long term breakthroughs:

- CLC (Chemical Looping Combustion)
- Mineral carbonation

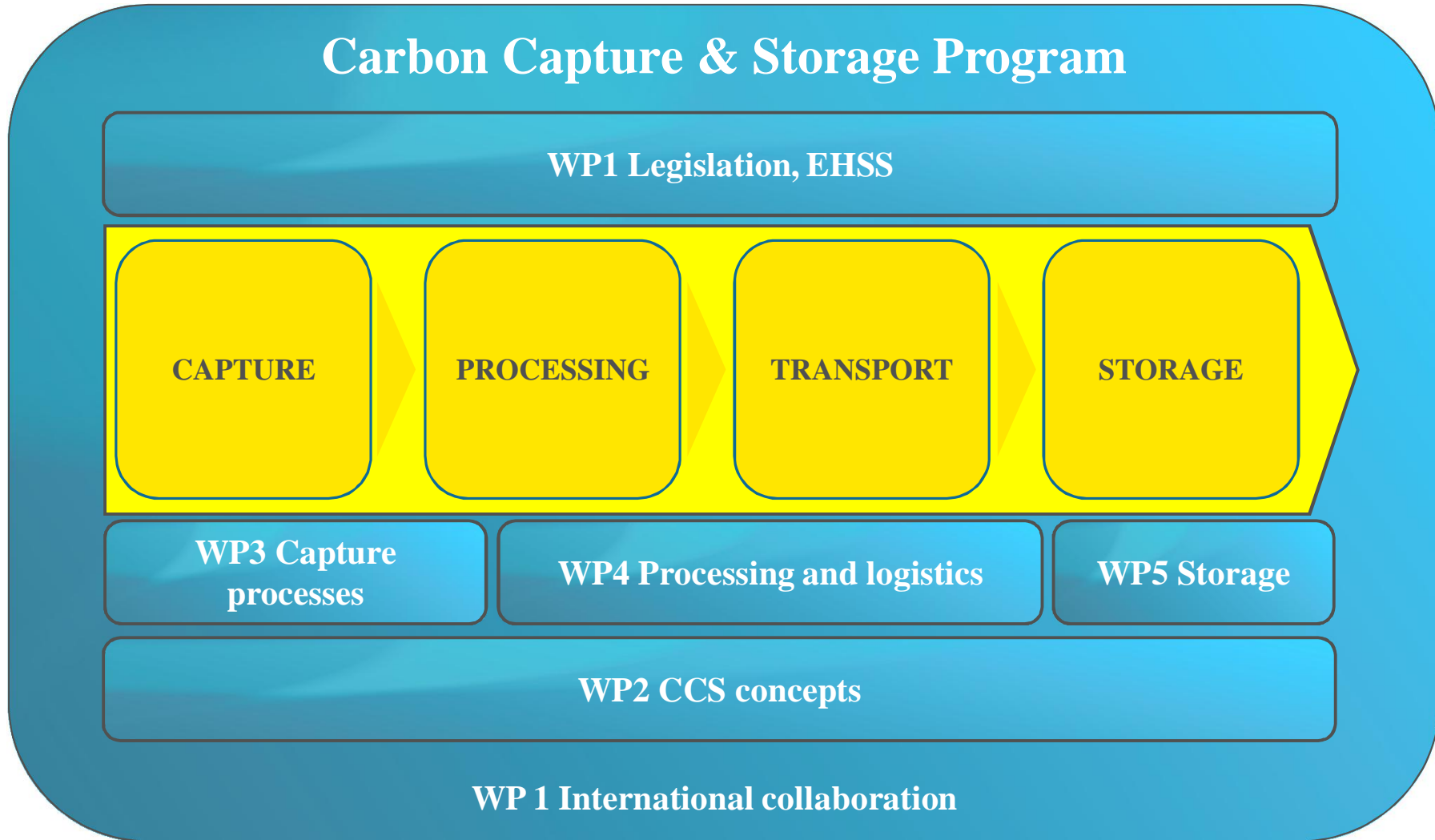
## Pilot SHOK programme for international collaboration:

IEA GHG Programme, ZEP, EERA CCS Programme, IEA CCS Office, MEFOS, Sintef, IVL, EU FP7 projects, Baltic Sea Region collaboration, bilateral project collaborations, EASAC



The overall objective of the Program is to develop CCS related technologies and concepts that would lead to essential pilots and demonstrations starting by the end of the Program i.e. ca. 2014-2015 targeting then to commercial concepts available from ca. 2020 onwards

# Carbon Capture & Storage Program





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THANK YOU FOR YOUR ATTENTION

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