Cement in a Changing Climate – Implementing Solutions and a European CO_2 Network

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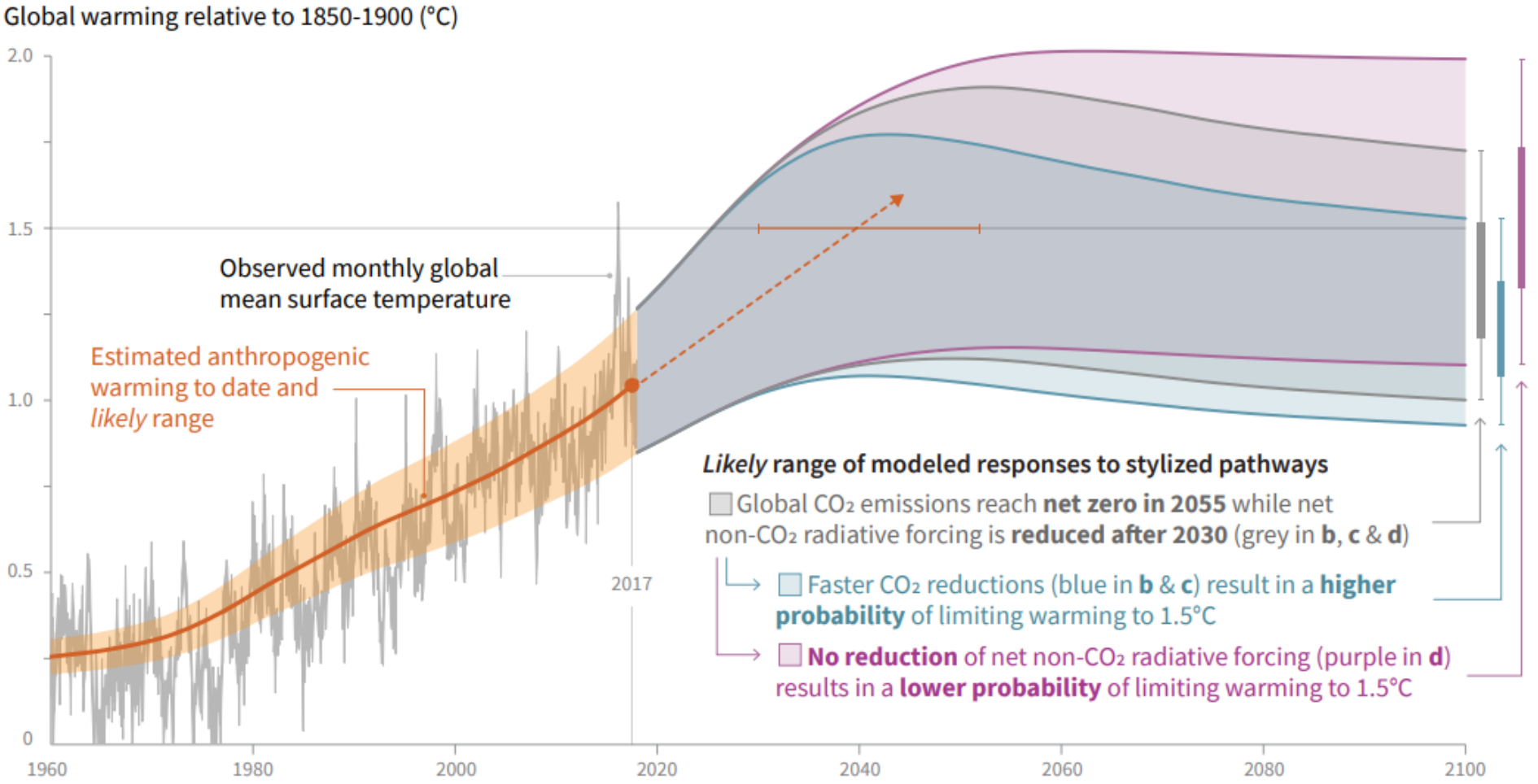
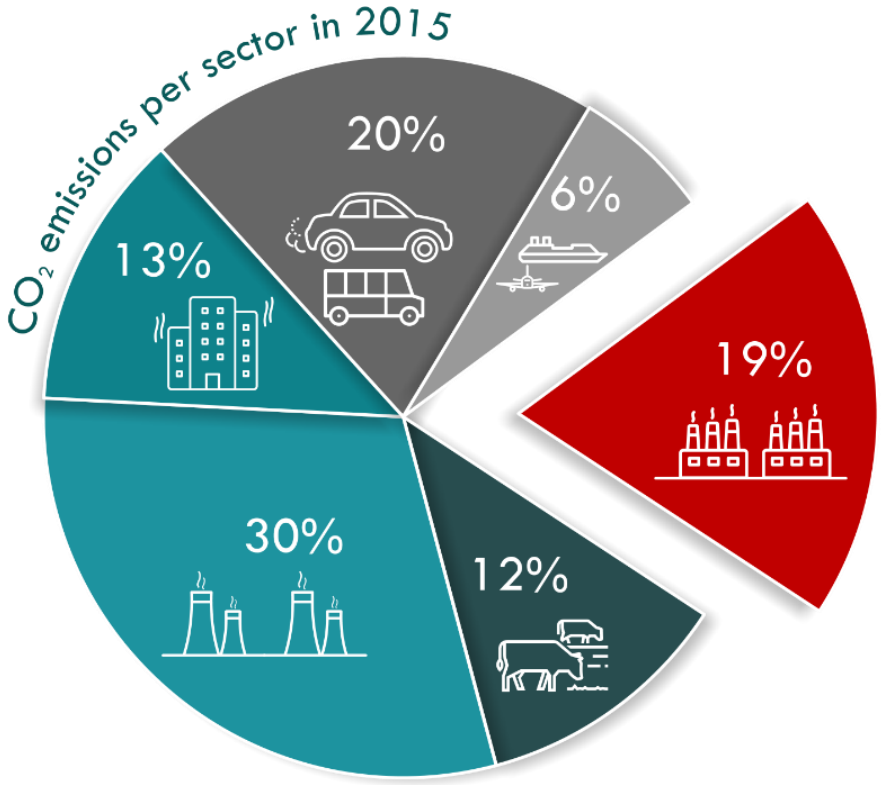
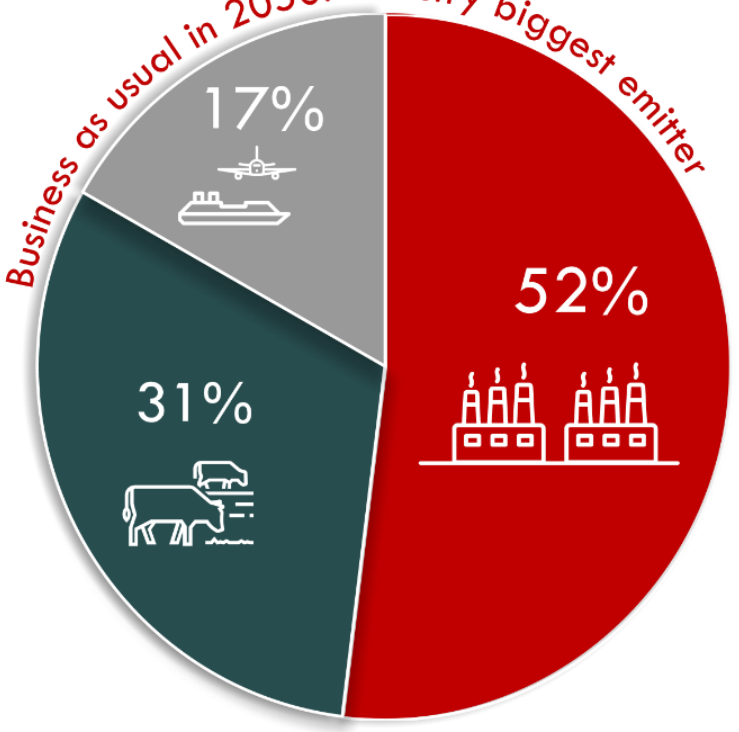
Establishing a European CO_2 Network

WHERE ARE WE NOW: IPPC, 1.5°C (2018)



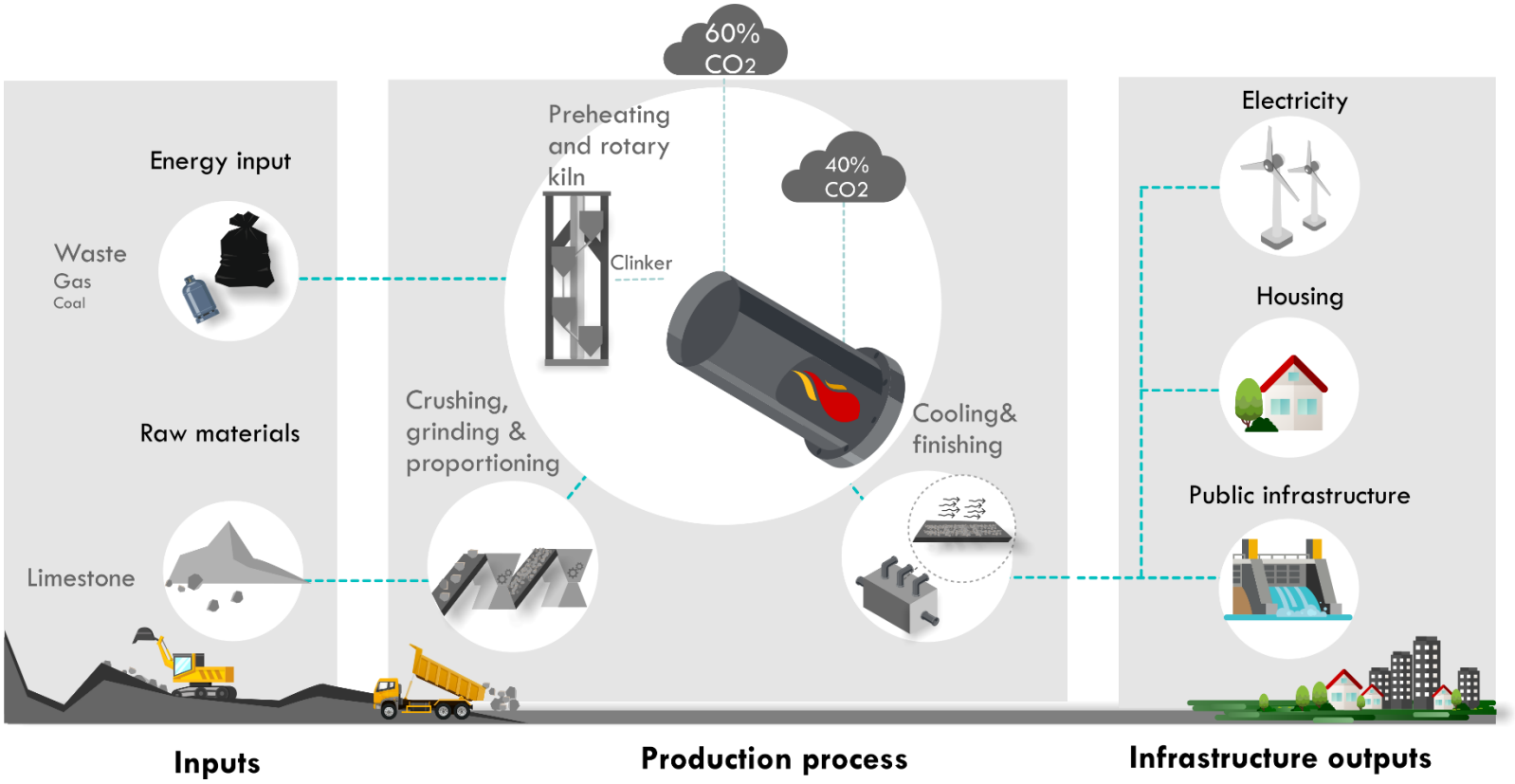
INDUSTRY EMISSION SHARE





MANY OPTIONS – ANY SOLUTIONS FOR CEMENT?

WHERE CEMENT EMITS



WHAT ARE THE DECARBONISATION SOLUTIONS FOR CEMENT

Efficiency	–	Lower resource and energy input
Electrification	–	40% max. CO_2 abatement + 132TWh renewable e
Change of Chemistry	–	No more Portland but other cementitious product

Carbon Capture

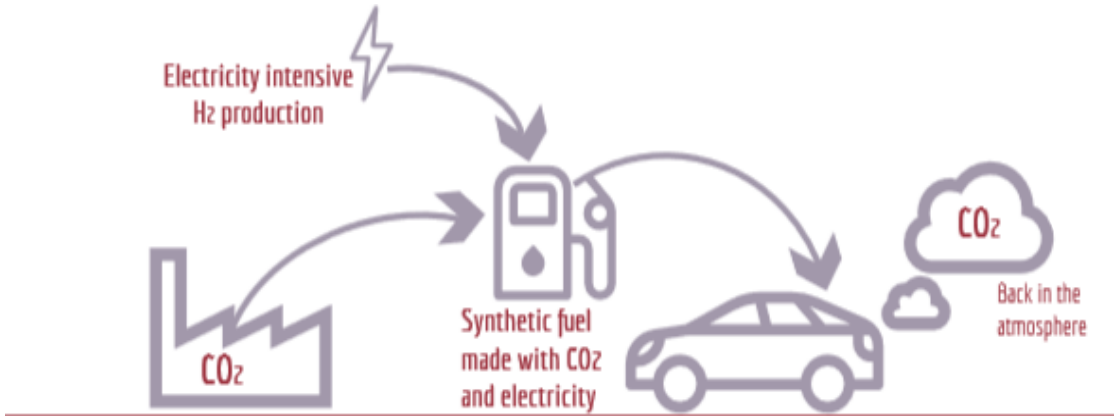
- CCUS – Carbon Capture Use & Storage
- CCS – Carbon Capture Storage

BELLONA EUROPA

CCU VS CLIMATE

Resource Intensive

Rapidly Re-Emitted

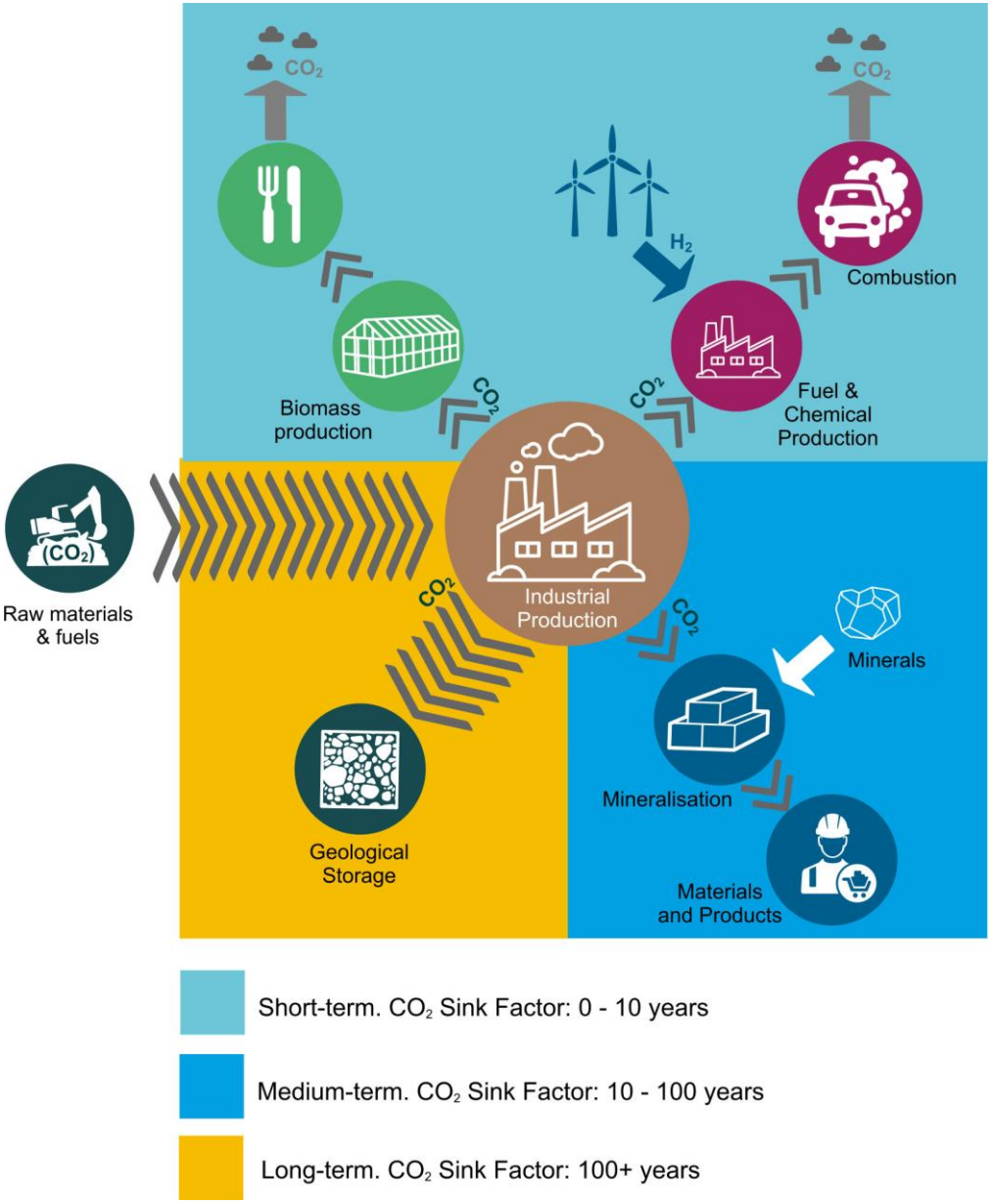


Emission Savings are in the Fuel, not the CO_2 Source

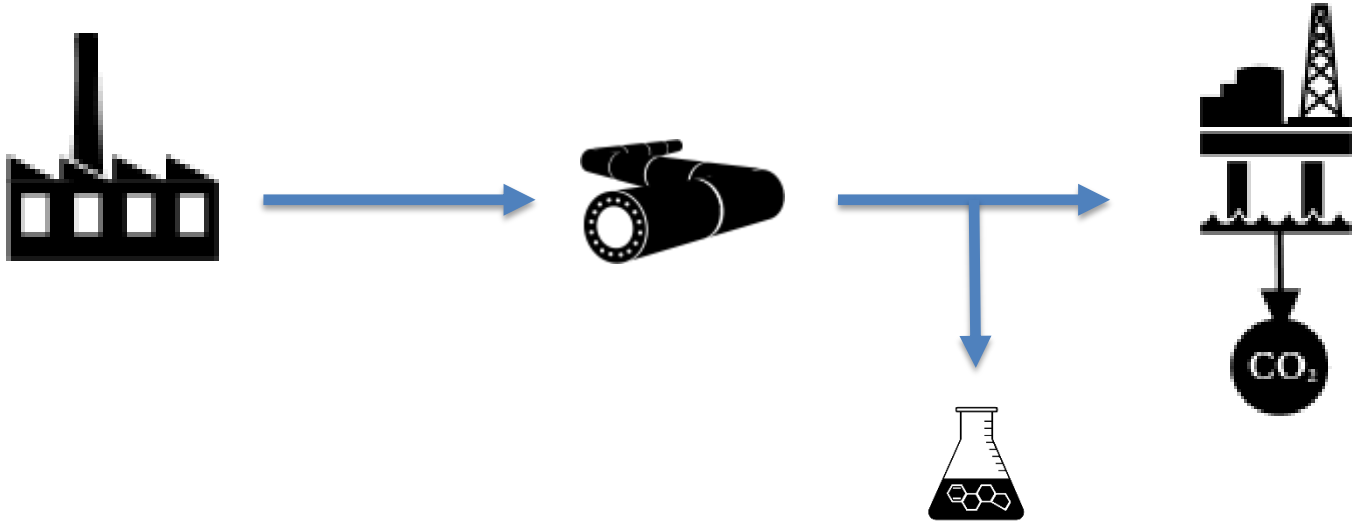
CCU FUELS AIM TO KEEP ICE ALIVE

CC – U? – S!

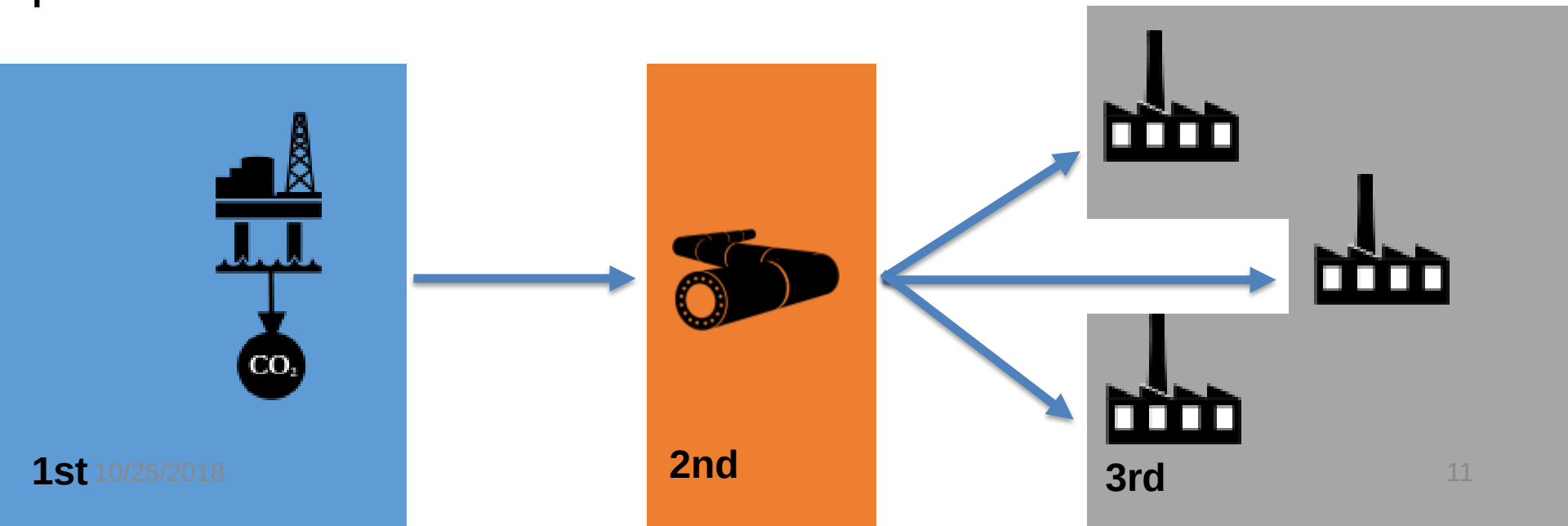
Keep the S In CCUS



The CC(U)S value chain…

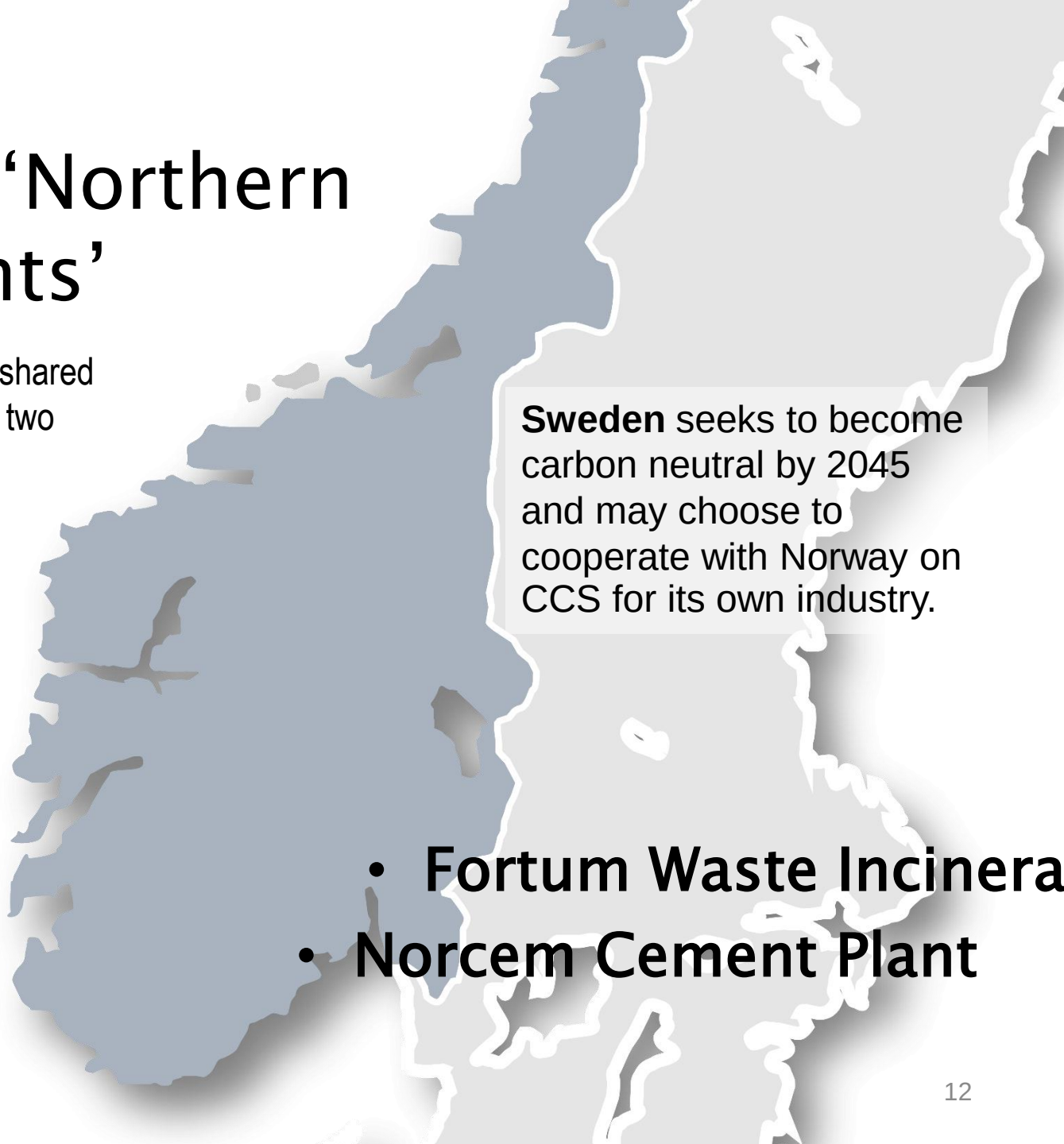


Reviewing the investment and delivery profile of each part of the CCUS chain turns this on its head



Nordics & 'Northern Lights'

It's the first full-industry-scale shared CO_2 network in the world with two industry capture projects and opportunities to expand.



Sweden seeks to become carbon neutral by 2045 and may choose to cooperate with Norway on CCS for its own industry.

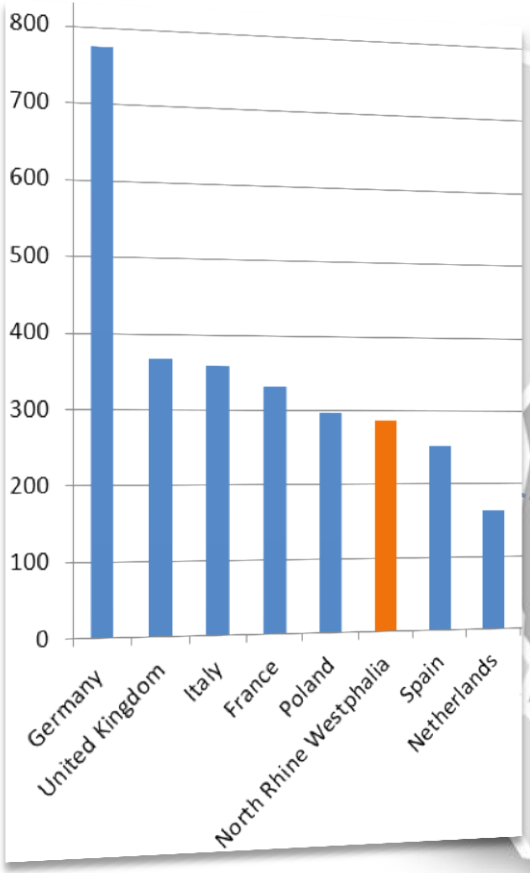
- **Offshore Storage**
- **Fortum Waste Incinera**
- **Norcem Cement Plant**

Europe's biggest emitting regions in need for CO2 transport and storage

Port of Rotterdam set to become region's Gateway for CO2 storage.

20% of Dutch Emissions in Rotterdam.

Germany's **waterways** allow for a flexible transport of captured CO_2 to Hubs on the shores of the North Sea.



Bremerhaven

Emden

The ports of Emden and Bremerhaven could become important **CO_2 transhipment locations**

North Rhine Westphalia

Europe's biggest cluster of point source emissions, **North Rhine Westphalia** needs access to a CO_2 network to deeply decarbonise

SHARING MEANS SAVING MONEY

Netherlands
Transport & Storage

Abatement Scenarios	Low	Mid	Mid Newbuilt	High
CO2 abated (Mt)	476	654	654	964
Mothballing*	133	216	120	474
Injection	1 499	2 740	4 154	3 382
Offshore Transport	740	764	764	1 404
Onshore Transport	366	366	366	376
Onshore compression (20 bar to HP)	1 490	2 072	2 072	3 072
Total Cost	4 229	6 158	7 477	8 707
€/tCO2	**8,9**	**9,4**	**11**	**9,0**

*costs during transition period of infrastructure before being re-used for CO2 transport

4.1 - 4.2 billion Euro

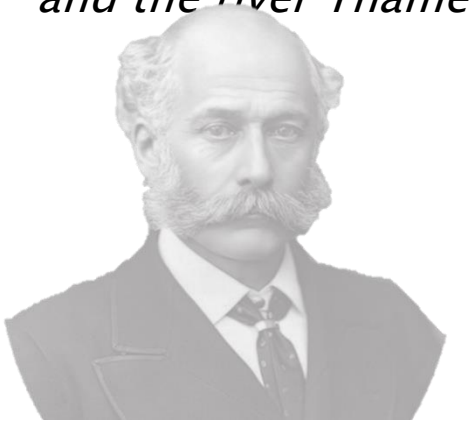
8.0 - 9.5 billion Euro

CO2 Transport & Storage for 60 $MtCO_2$ per year from the German industry via pipeline or ship for offshore storage.

Nord Stream 2 to import additional 55 billion m^3 of gas, the equivalent **of 106 $MtCO_2$/year**, ignoring further GHG emissions from flaring and leakage.

CO_2 NETWORK AS A PUBLIC GOOD

In the early 19th century, London planned to expand its sewage system, yet faced widespread public opposition. Particularly wealthier people, living uphill, did not see why a general sewage system was needed and hence did not want to pay to improve the property of private individuals 'downhill'. In fact, ***sewage was not seen as a public good****, and so the government initially considered it improper to use public money.* ***It took several cholera epidemics, thousands of deaths, and the 'Great Stink' of 1858 for London to finally modernize and upgrade its sewage system****, at last stopping the unchecked dumping of human waste into the city and the river Thames.*



"[The principle] was of diverting the cause of the mischief to a locality where it can do no mischief."

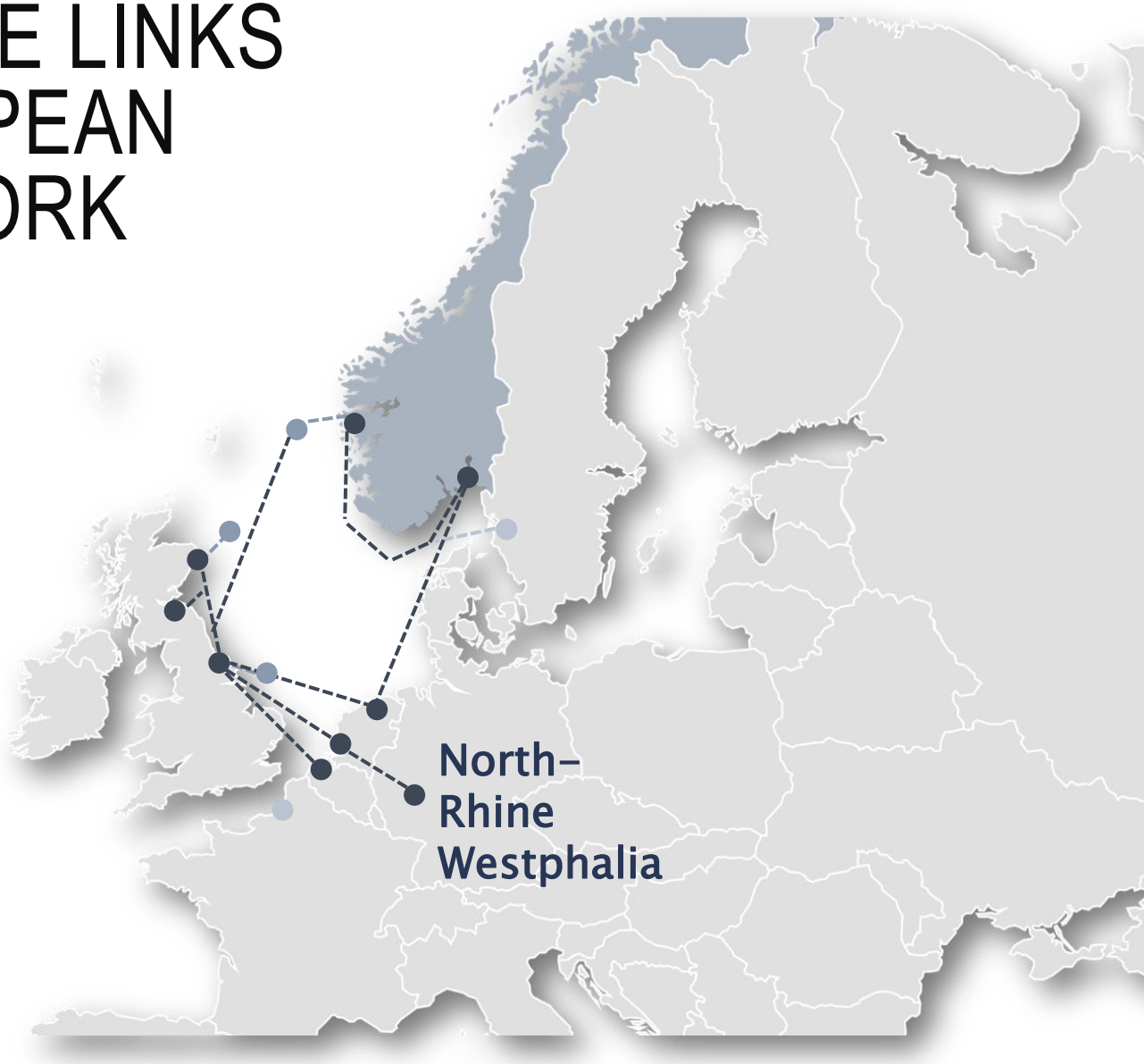
Sir Joseph Bazalgette, Civil Engineer

JOINING THE LINKS TO A EUROPEAN CO2 NETWORK

Cement pioneers deep decarbonisation of process industry

Clusters allow for lower cost and greater access to small(er) plants

Regional/European focus opens up new channels of cooperation and financing



EVERYBODY WINS

CCS provides a feasible path for ***industry*** to deeply decarbonise. It protects already made investments and existing assets, from which value is currently realised, and where growing value and products need to be generated in the future.

With CCS as a corner stone of a *Just Transition* for industries, ***labour unions*** ensure that jobs in heavy industry and dependent sectors remain in Europe even under increasingly strict climate obligations. It safeguards the welfare of Europe's workers.

Governments at a local and national level are able to fulfil their obligations under binding international targets and towards their constituents by protecting their health, their jobs, and the environment and climate.

By supporting a shared CO_2 network, the ***civil society*** ensures that no industry emissions are considered 'unavoidable' and forces industry to deeply decarbonise. With no excuses left, industry decarbonisation will not be delayed further.

WHAT IS NEEDED & WHAT TO DO

A CO2 network will not simply appear, you need PROJECTS & FINANCE.

Find & Make Allies

Cooperate with Industry partners, Unions, Policy-Makers (local, national, European)

Establish policy frameworks and finance instruments that suit your needs

Projects of Common Interest; Innovation Fund; Regional & National Mechanisms

Develop and Deploy Projects

Industry-scale demo projects need clear, detailed plans (location, size, costs)

Think Strategic

Develop Projects where they can set you up for the long term

Thank you!

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