

Marie Bysveen, SINTEF – Coordinator GATEWAY

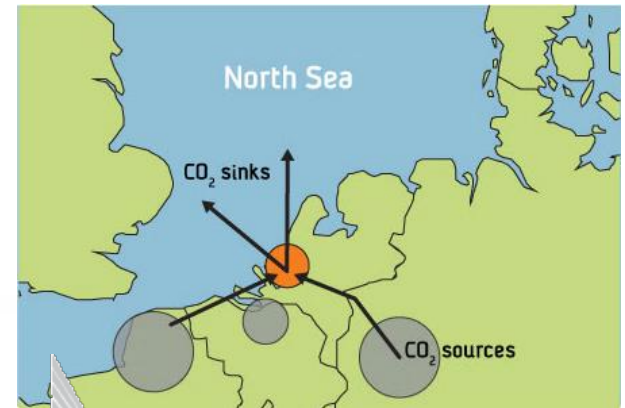
*PhD, Vice president research - SINTEF Energy Research*

*Coordinator EERA JP CCS*

*Member of H2020 Advisory Group for Energy (AGE)*

# Developing a Pilot case for a European CO<sub>2</sub> transport infrastructure

## GATEWAY



**Project facts**  
Started May 2015  
Duration 2 years  
Budget 787 k€  
6 Partners





UNIVERSITY OF LEEDS





'Developing a pilot case aimed at establishing a



European infrastructure project for CO<sub>2</sub> transport'

## Call topic

Topic: Supporting coordination of national R&D activities

Call : H2020-LCE-19-2014-2015/LCE-19-2014: Support the use of research outcomes by industry of a project resulting from synchronised funding processes by at least three MS

## Main aim

Accelerating a shift towards deployment of CCS, by developing a model case aimed at commencing an initial cross-border gateway connecting available CO<sub>2</sub> sources and sinks

## Facts

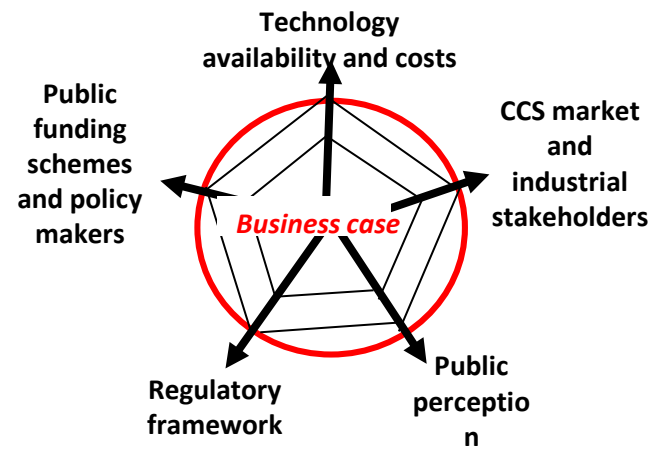
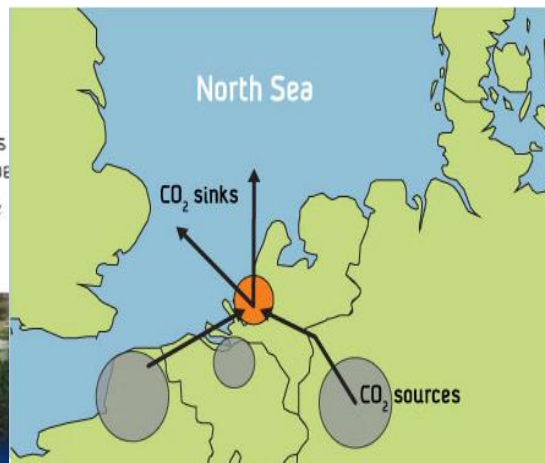
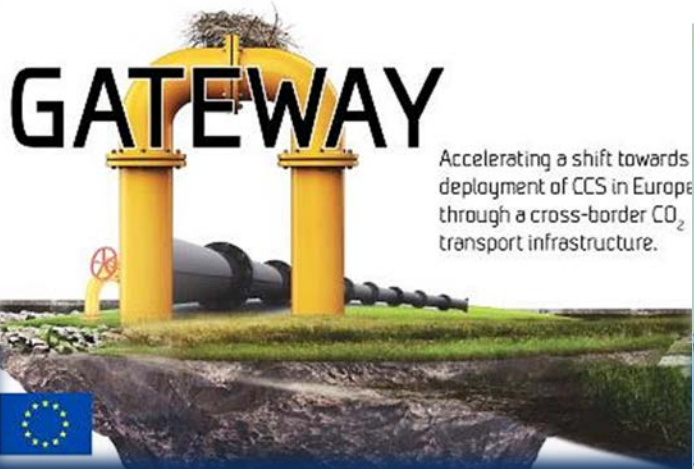
2 years (2015-2017), 6 partners (NO,NL\*2,DE,UK\*2), Coordinated by SINTEF Energy Research, 0.8 M€; Coordination and Support Action (CSA)



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# GATEWAY objectives

1. Provide a Pilot case for establishing European CO<sub>2</sub> transport infrastructure
2. Define a subsequent Project of Common Interest (PCI)
3. Align the stakeholders interests and engage member states strategies
4. Develop a business case for the Pilot Case project
  - address the risks and propose measures for de-risking
  - assess the funding needs and propose possible financing mechanisms







GATEWAY will :

Prepare for a large Berlin project to start make CCS happen in Europe



WP1 - Project management and coordination

WP2 – Derisking, innovation and techno economic validation

WP3 - Legal and statutory framework

WP4 - Pilot Case –defining a European infrastructure project for CO<sub>2</sub> transport – a PCI

GATEWAY

Communication plan

# Interaction with strategic initiatives, stakeholders, and decision makers



Pre-screening

Choice of Pilot case

Evaluation of Pilot case

Evaluation of business case

Evaluation of project plan

GATEWAY

Implementation plan

DG1

DG2

DG3

DG4

DG5

Pilot Case Development

Scenario development

Pilot Case definition

Pilot Case analysis

Business case development

Pilot Case project plan

Recommendations

Technology

Market analysis

Legal requirements

Public perception

Funding model

Identifying alternatives  
Defining KPI's

Screening and definition

Detailed analysis

Business plan

Planning actions

Pre-feasibility

Month (approx.)

1-6

6-10

10-20

20-23

20-23

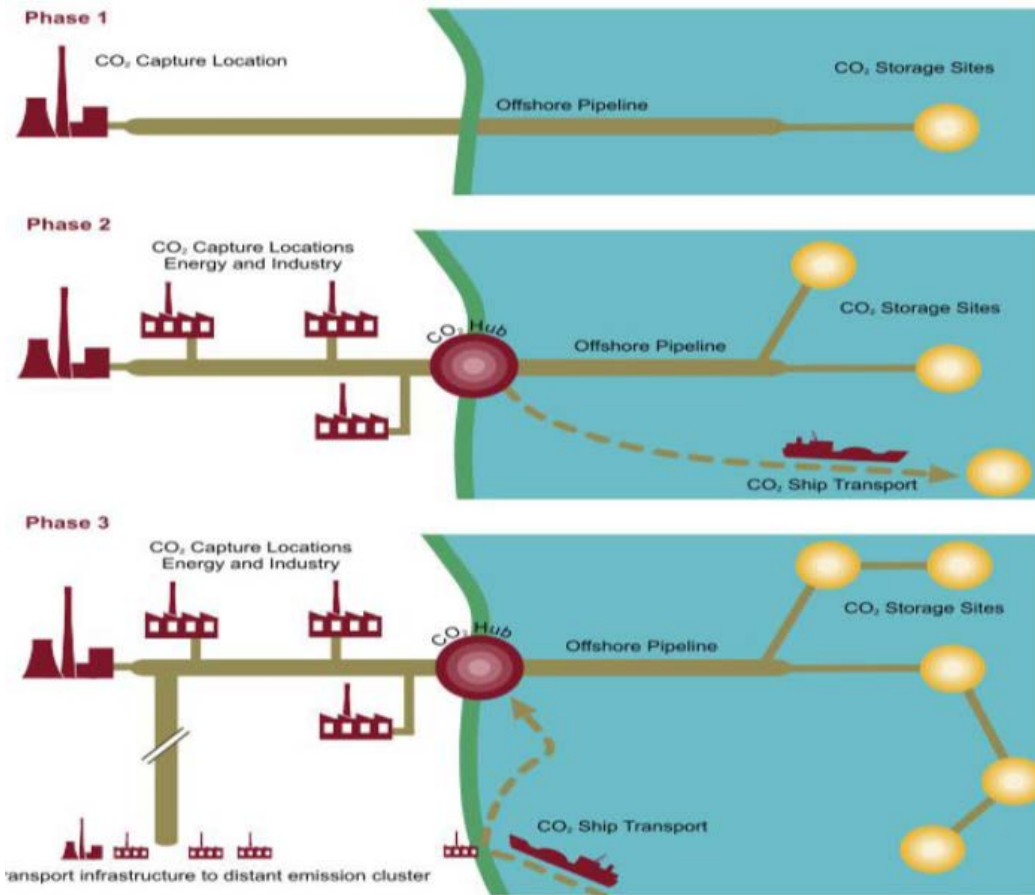
23-24



# An Executable Plan for enabling CCS in Europe



ZEP report September 2015



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# GATEWAY implementation plan



**Project Concept**

GATEWAY  
H2020 project

**Project Development**

European project  
of common interest  
PCI feasibility study

**Project Delivery**

European project  
of common interest  
PCI realization

## Project concept

Discovery

Scoping

Building business case

Idea generation

Project selection

Product  
analysis

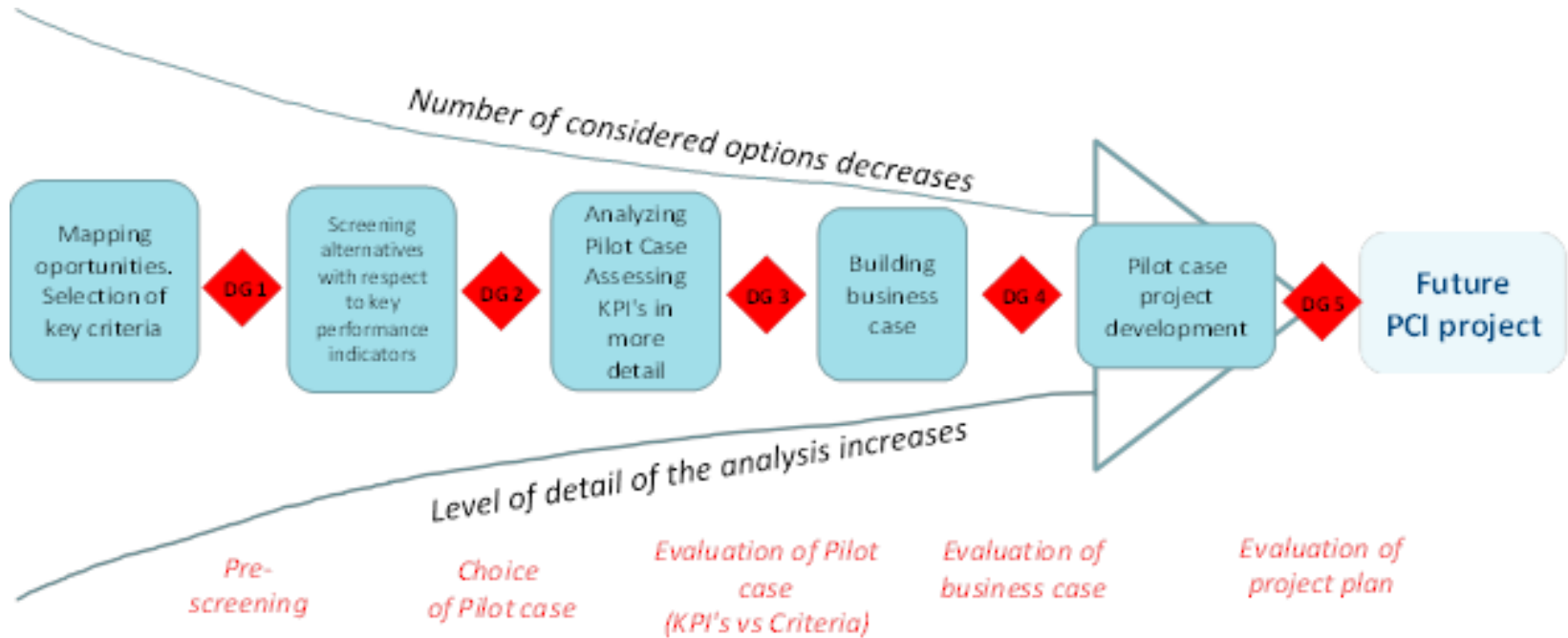
Building the  
business plan

Building the  
project plan

Feasibility review

# GATEWAY

Pilot case definition, Evaluation, Selection, and Refined definition



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## Project contact details

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## EXTRA SLIDES

# GATEWAY

## Presentation outline

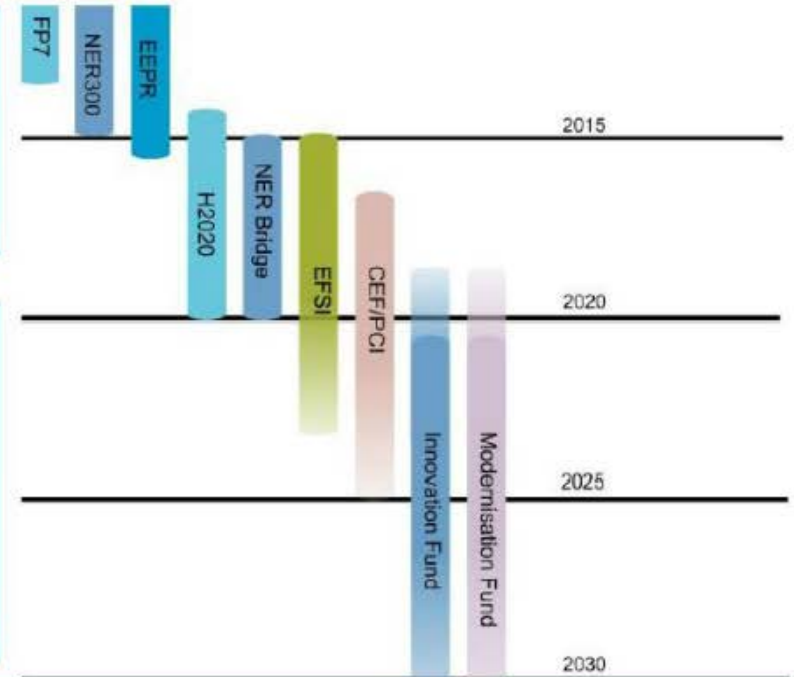
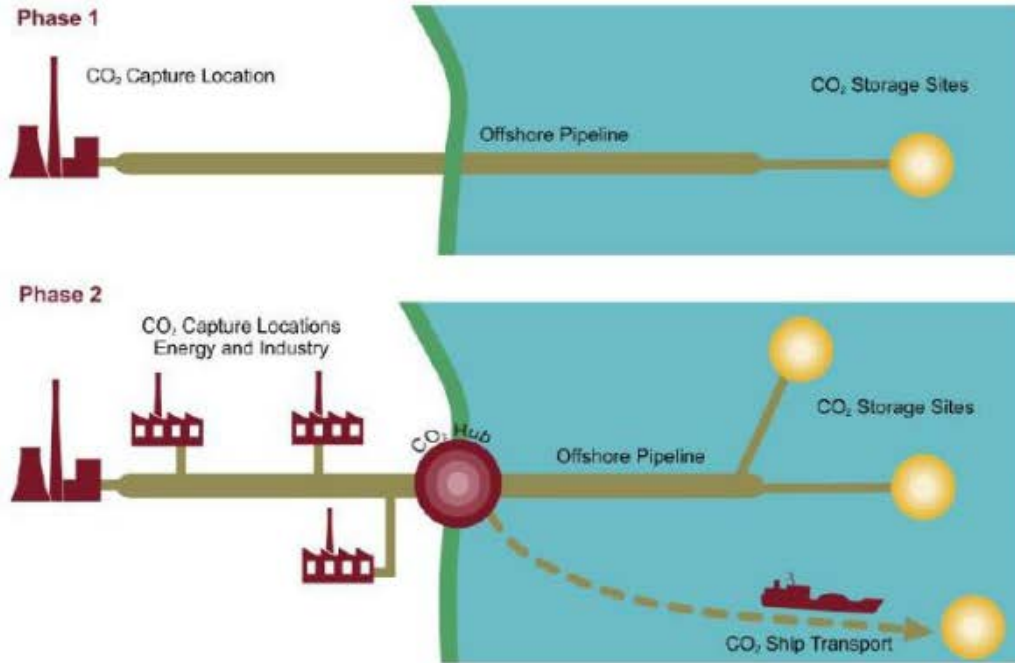
- This is GATEWAY
- Initial 4 alternative cases
- GATEWAY pilot case choice
- Discussion and feedback



European  
Commission

Horizon 2020  
European Union funding  
for Research & Innovation

# An Executable Plan for enabling CCS in Europe





## Project of Common Interest (PCI)

"primary European tool to accelerate deployment of infrastructure necessary for completion of the European energy market and ensure EU meet its goals of affordable, secure and sustainable energy."

"The Connecting Europe Facility shall enable Projects of Common Interest to be prepared and implemented within the framework of the trans-European networks policy in the sectors of transport, telecommunications and energy."

"Energy budget ~€5.85 billion to support Electricity Grid, CH<sub>4</sub> and Oil Distribution, CO<sub>2</sub> Transport to promote internal energy market, security of supply, sustainable development and environmental protection."

## PCI general criteria

1. Necessary for at least one of energy infrastructure priority corridors areas
2. Potential overall benefits outweigh costs
3. Project is situated or has significant cross border impact in at least two member states (or 1 Member State and EEA\*)

\* EEA, European Economic Area

\*\* CEF, Connecting Europe Facility

## PCI to receive

- accelerated 'one-stop-shop' permitting
- improved regulatory treatment
- financial support from CEF\*\* (instruments and grants available)

**Project Concept**

**Project Development**

**Project Delivery**

**GATEWAY  
H2020 project**

**European project  
of common interest  
study**

**European project  
of common interest  
realization**

**Project concept development**

**Discovery**

**Scoping**

**Building business case**





● Pilot case 1: CAR Pipeline

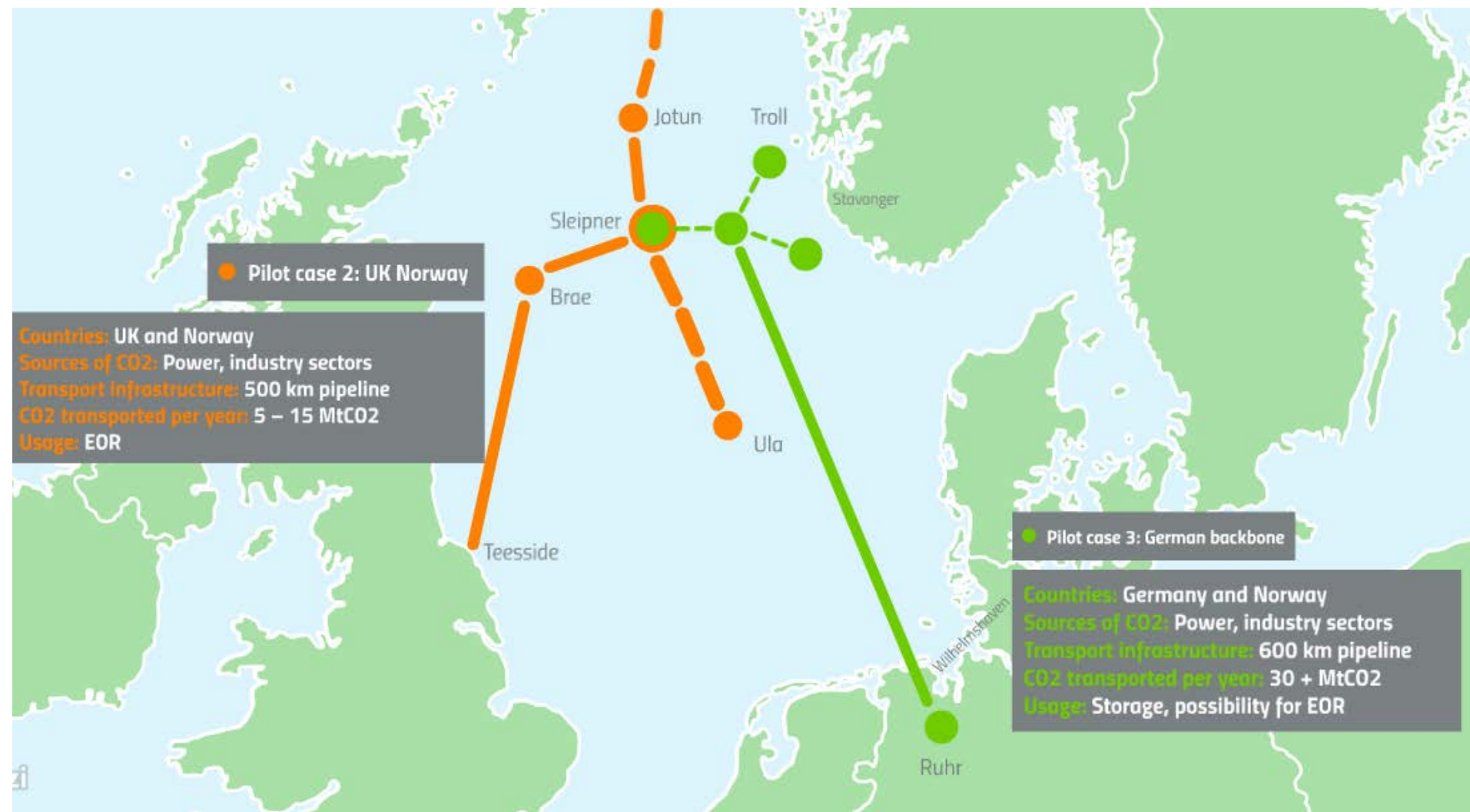
**Countries:** Belgium and the Netherlands

**Sources of CO<sub>2</sub>:** Power, Chemicals, refineries, waste incineration

**Transport infrastructure:** 140 km pipeline

**CO<sub>2</sub> transported per year:** 10 MtCO<sub>2</sub> (max)

**Usage:** Storage





● Pilot case 4: ROAD Extensions

**Countries:** UK, the Netherlands

**Sources of CO<sub>2</sub>:** Power, industry sectors and gas fields

**Transport infrastructure:** 100 km pipeline

**CO<sub>2</sub> transported per year:** 2.5 + 1.1 MtCO<sub>2</sub>

**Usage:** Gas production with CO<sub>2</sub> separation and storage

● Pilot case 1: CAR Pipeline

**Countries:** Belgium and the Netherlands

**Sources of CO<sub>2</sub>:** Power, Chemicals, refineries, waste incineration

**Transport infrastructure:** 140 km pipeline

**CO<sub>2</sub> transported per year:** 10 MtCO<sub>2</sub> (max)

**Usage:** Storage

Fizzy field

P15

P18

ROAD

Maasvlakte

Rotterdam

Antwerp

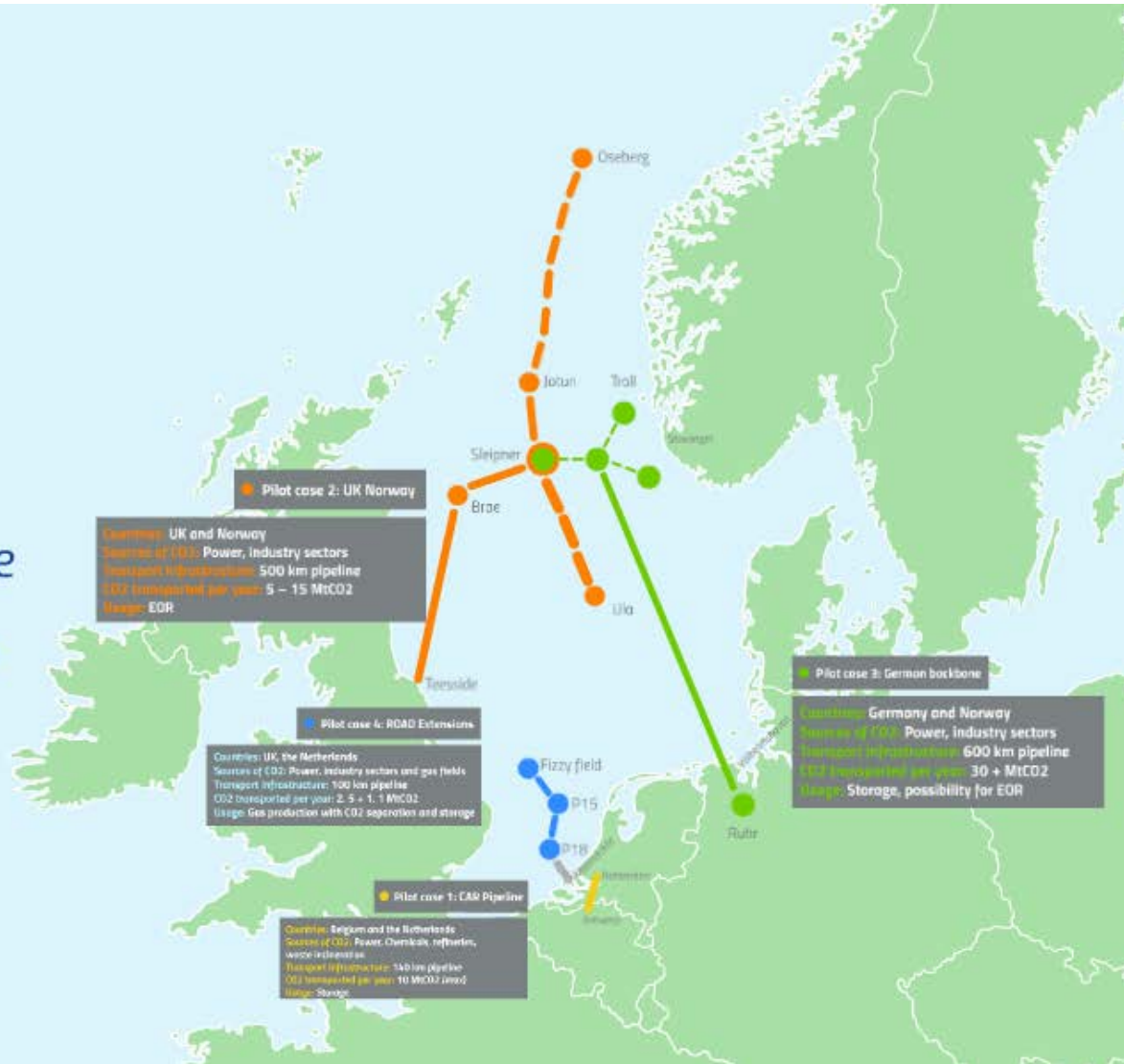
Ruhr

Wilhel

# GATEWAY's

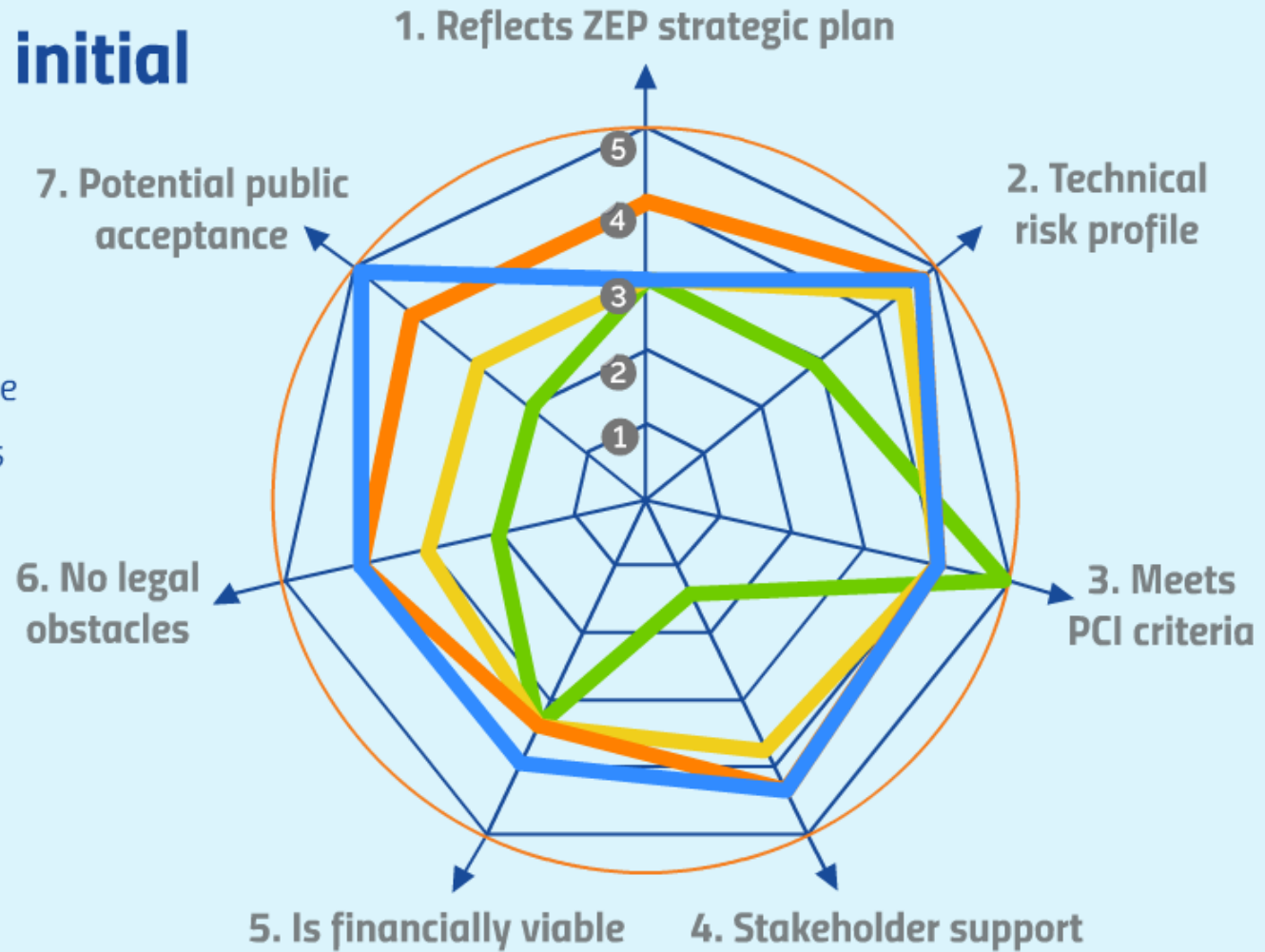
## 4 initial pilot cases

- Pilot case 1: CAR Pipeline
- Pilot case 2: UK-Norway
- Pilot case 3: German backbone
- Pilot case 4: ROAD Extensions



# Pre-screening of initial pilot cases

- Pilot case 1: CAR Pipeline
- Pilot case 2: UK-Norway
- Pilot case 3: German backbone
- Pilot case 4: ROAD Extensions

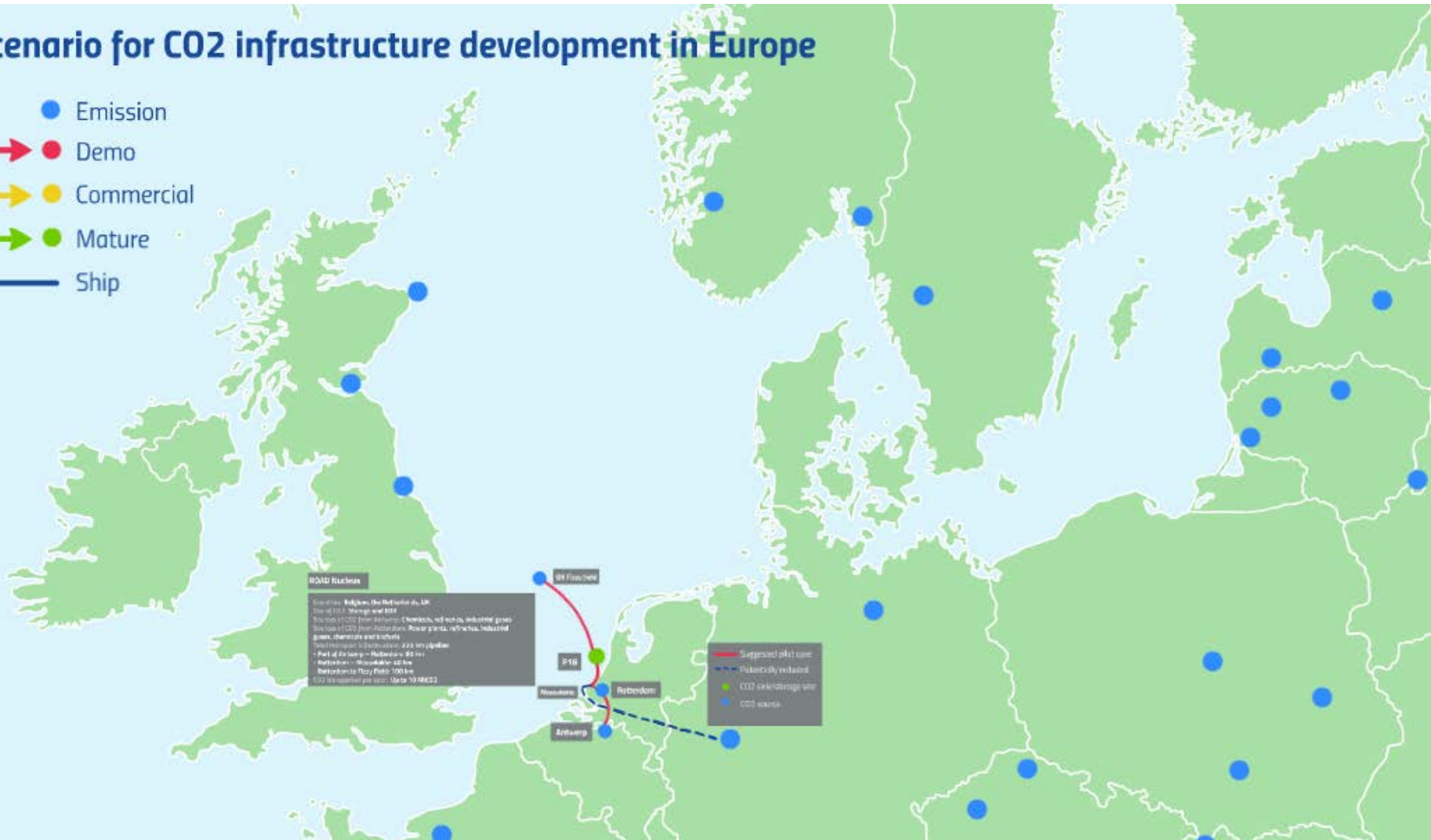






# Scenario for CO2 infrastructure development in Europe

- Emission
- ➔ Demo
- ➔ Commercial
- ➔ Mature
- Ship

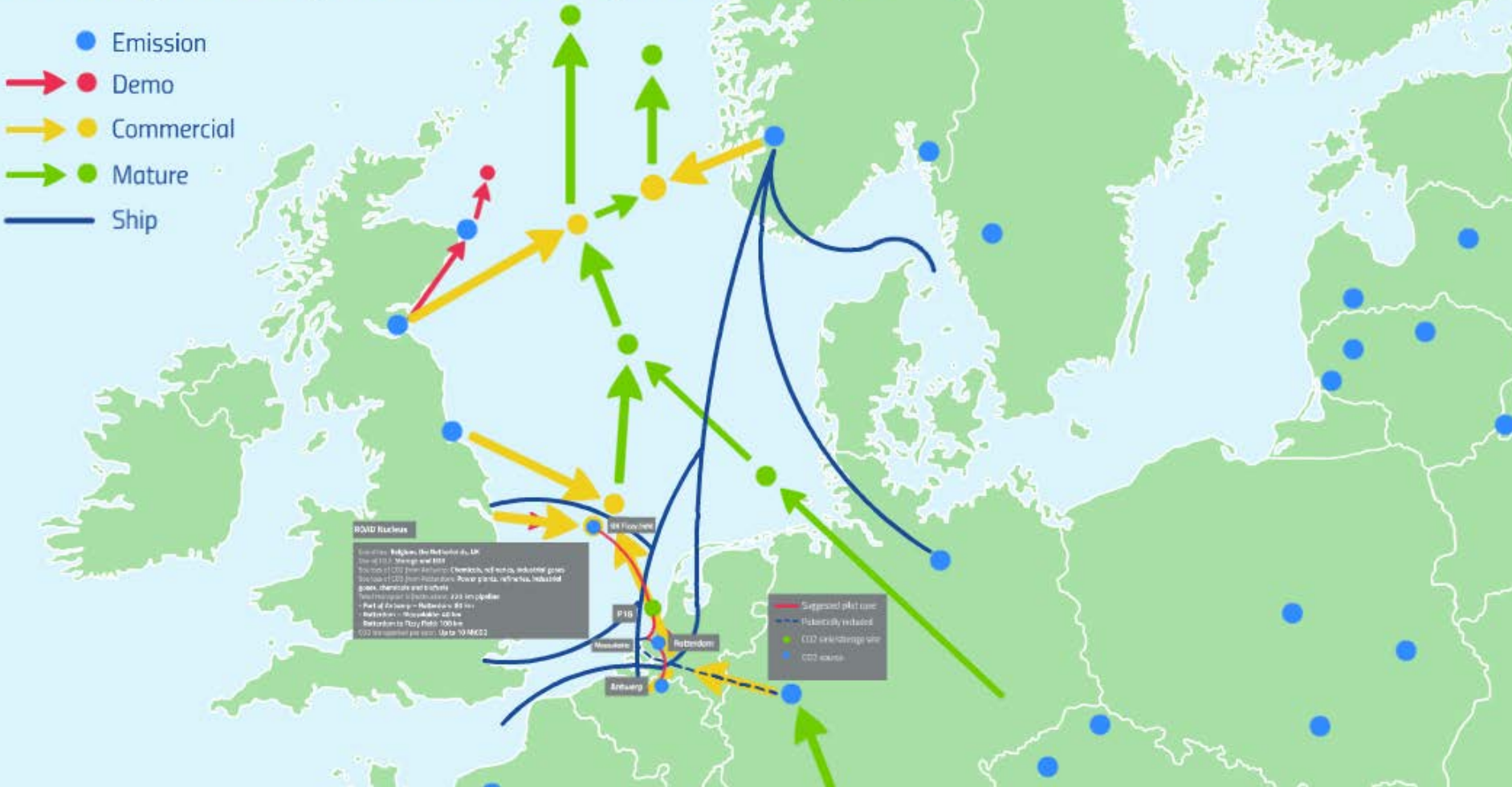


**ROAD Emission**  
 Location: Belgium, the Netherlands, UK  
 Size of 10.5 Mtpa and 800  
 100,000 Gt CO2 from various Chemical, oil refineries, industrial gases  
 100,000 Gt CO2 from refineries, power plants, industrial gases, chemical and others  
 100,000 Gt CO2 from refineries, power plants, industrial gases, chemical and others  
 Part of Emission Reduction 2030  
 Reduction: 100,000 Gt CO2  
 Reduction: 100,000 Gt CO2  
 100,000 Gt CO2

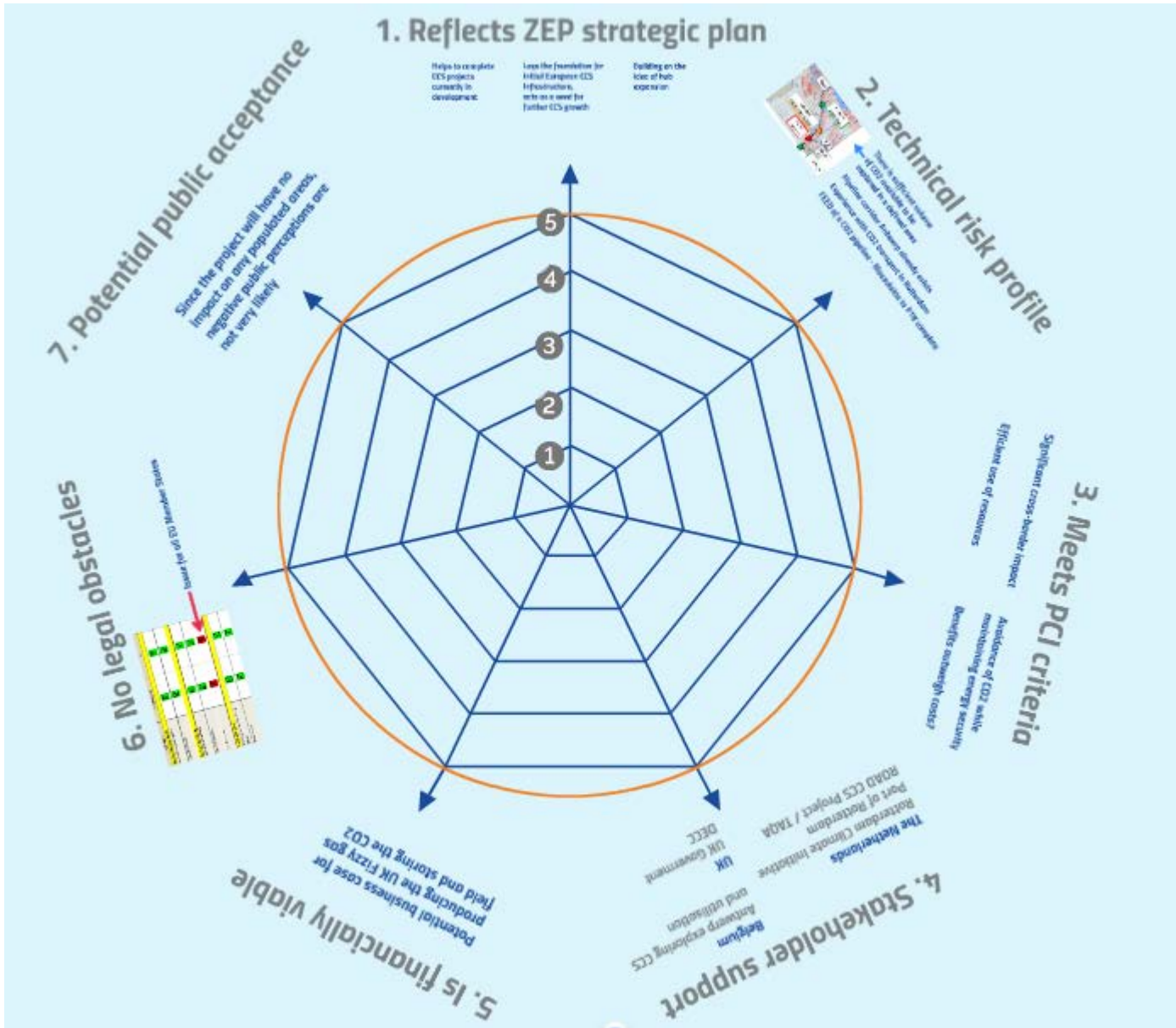
Proposed pilot line  
 Potentially reduced  
 CO2 sink storage site  
 CO2 source

# Scenario for CO2 infrastructure development in Europe

- Emission
- ➔ Demo
- ➔ Commercial
- ➔ Mature
- Ship







Number of considered options decreases

Building business case

**GATEWAY  
Pilot decision**

**Analysis**

- 1. Technology
- 2. Market
- 3. Legal framework
- 4. Public perception
- 5. Financial model

**FUTURE PCI PROJECT**

Level of detail of the analysis increases

- Pilot case 1: CAR Pipeline
- Pilot case 2: UK-Norway
- Pilot case 3: German backbone
- Pilot case 4: ROAD Extensions

# Discussion

Is the proposed Pilot case in line with the ZEP strategic vision for CCS delivery in Europe?

Could the development of the business case for ROAD Nucleus become the origin of a generic framework for CCS business case development?

We invite other potential PCI partnerships for discussion.

# GATEWAY



sustainable energy for everyone



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Queen Mary  
University of London



Horizon 2020  
European Union funding  
for Research & Innovation