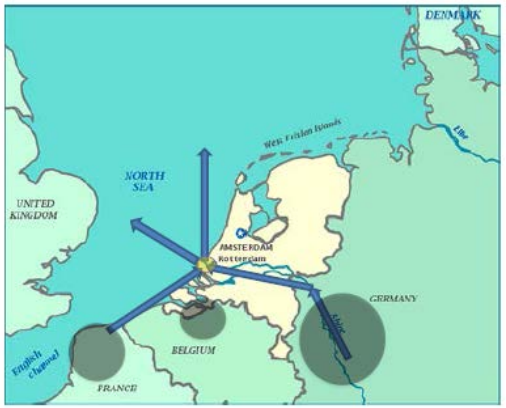
H2020-LCE-19-2014-2015

Supporting coordination of national R&D activities

CSA (Coordination and Support Action) type project



GATEWAY

Developing a Pilot case aimed at establishing a European infrastructure project for CO_2 transport

Marie Bysveen - Vice president research

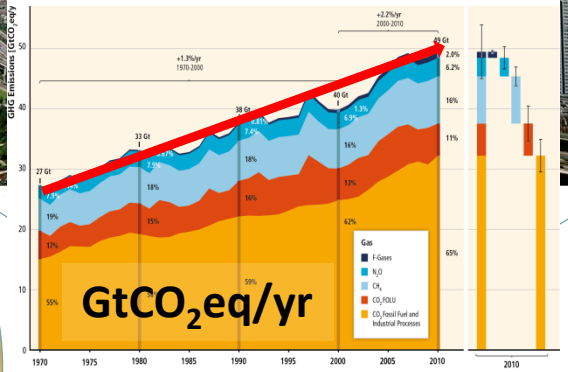
SINTEF Energy Research

2015-03-24, Brussels

Rationale

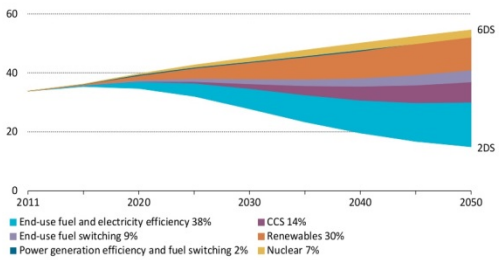
IPCC Climate Change 2014

GHG emissions continue accelerating



IEA's ETP 2014

CCS is vital part of all IEA's scenarios

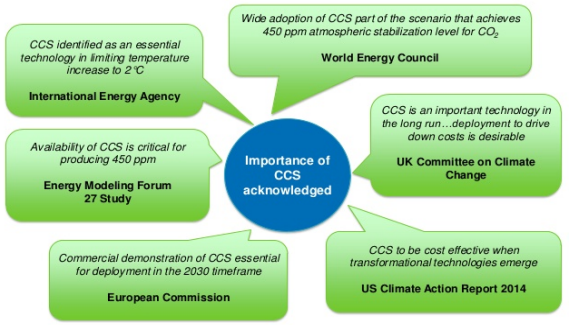


..and we to have the tools to develop a strategy and be proactive.

Accelerate CCS deployment in Europe

GLOBAL CCS INSTITUTE

Importance of CCS is acknowledged



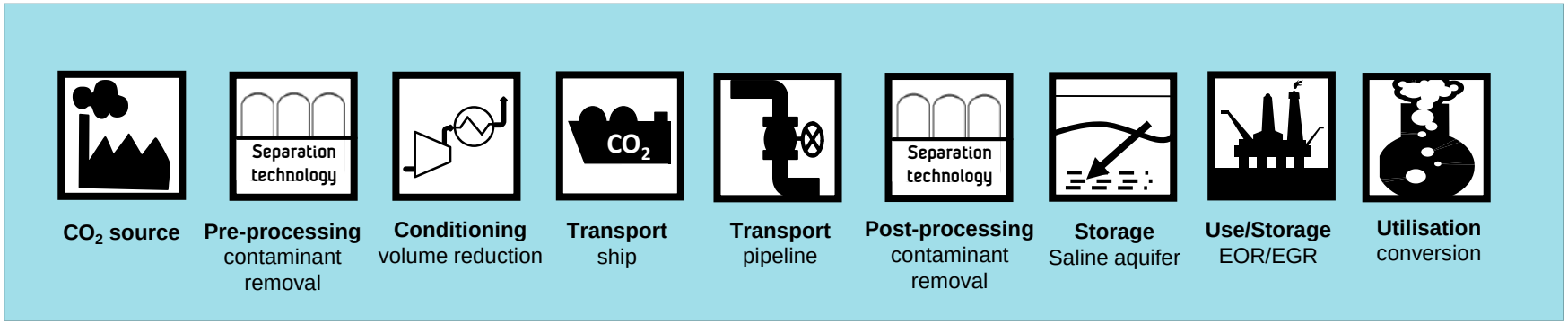
The task is: Getting CO_2 from EU sources to the storage locations in North Sea

Sources location and CO_2 volumes

How to get CO_2 from sources in Europe in simple, safe and cost effective way to a central storage in North Sea?

Storage locations and injection capacities

Operations needed



CO_2 source

Pre-processing contaminant removal

Conditioning volume reduction

Transport ship

Transport pipeline

Post-processing contaminant removal

Storage Saline aquifer

Use/Storage EOR/EGR

Utilisation conversion

Framing the problem

- Substantial differences in the type of both actors and factors affecting CCS project feasibility
- Numerous uncertainties associated with the actors and factors involved

Need to investigate the chain as an integrated system and as a part of global economic and political environment

Technology

Logistics & infrastructure

Economics

Environmental factors

Risk & safety

Public acceptance

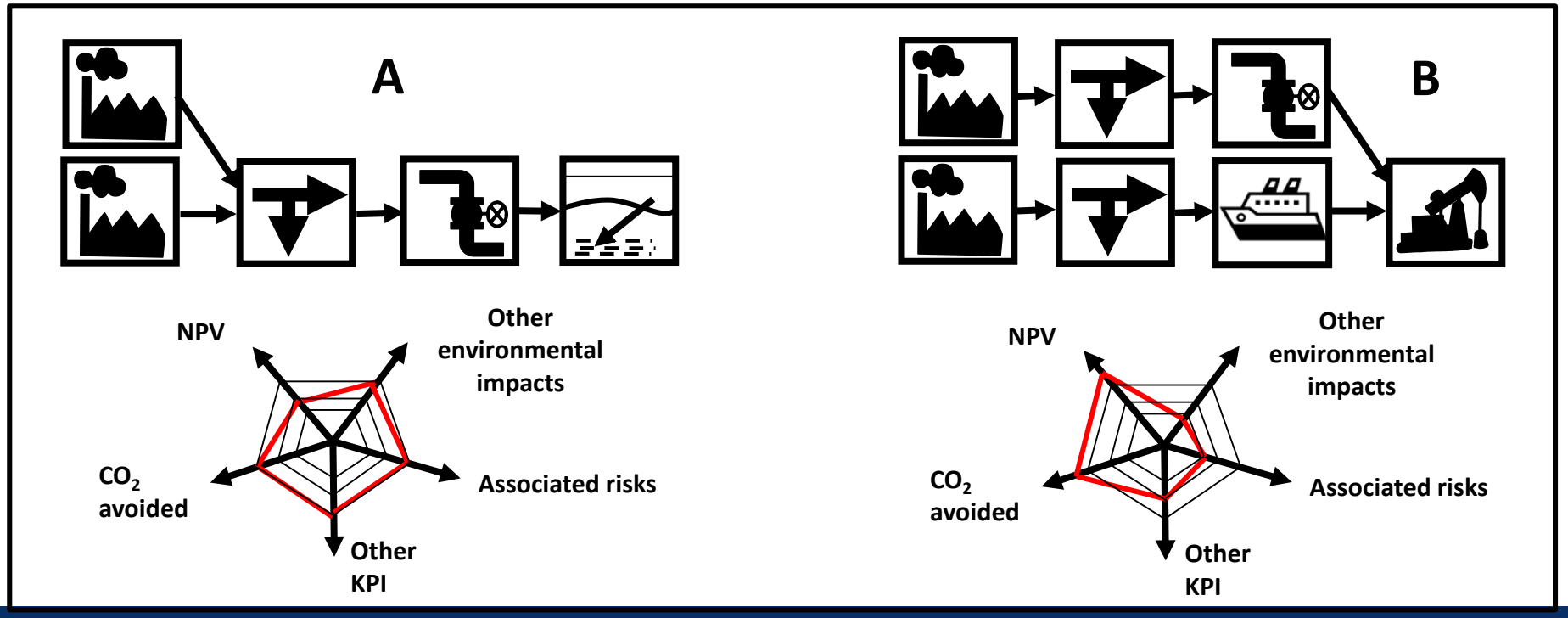
Policy & regulations

How does GATEWAY respond to this ?

Define a Pilot Case for European CO_2 transport infrastructure

- Based on evaluation and comparison of various transport chain alternatives
- Addressing the effects of governing factors and their cross-effects

By - integrated multi-criteria assessment



GATEWAY project facts

- Starts May 2015 – 6 partners – 2 years
- Thanks a to dr. Jens Hetand, SINTEF – for important role in proposal phase
- Key-words
  - Coordination of national R&D activities , CSA
  - Barriers for CCS in Europe – legal, technically, politically
  - Business development, energy law, technical derisking
  - Accelerate CCS development
- Partners
  - SINTEF (Norway)
  - TNO (Netherlands)
  - Julich (Germany)
  - University of Leeds (UK)
  - Progressive Energy Limited (PEL) (UK)
  - Ecofys (Netherlands)
- Interested, important stakeholders t - active engagement

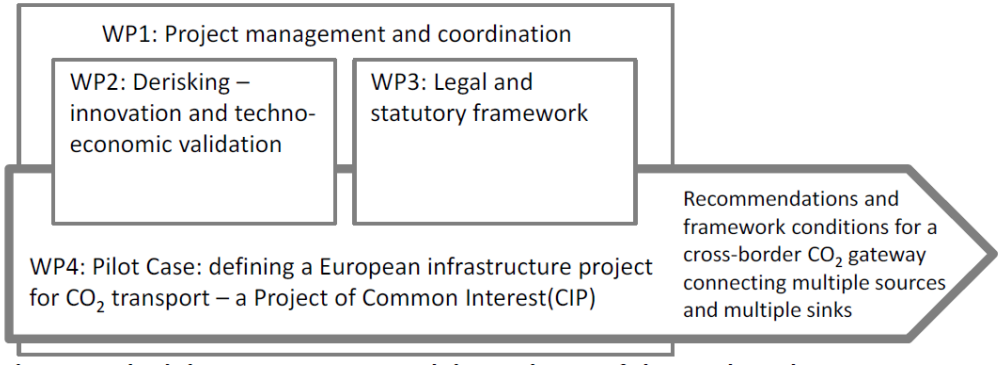
GATEWAY project

Provide a common strategic decision basis, enabling stakeholders to identify and implement measures that can accelerate development, up-take, and deployment of technologies needed for realisation of large scale CCS projects based on European CO_2 transport infrastructure

GATEWAY concept issues

- A bankable CCS case is difficult
  - Insufficient data on CO2 sinks
  - Extensive lead time for enabling new sinks
- Accelerate infrastructure deployment
  - Under known and unknown uncertainity
- Public investment needed
- Law and policy important
- Efforts to attract key players
- Private and public funding assessed – how to work together

Project structure



WP1: Project management and coordination

- Project coordination
- Project management
- Public relations and dissemination

WP2: Derisking – innovation and techno-economic validation

- Public perception of CO_2 infrastructures
- Key technology assessment
- Recommendation of targeted research and innovation actions

WP3: Legal and statutory framework

- Legal framework
- Statutes
- Model MoU and agreements

WP4: Pilot Case: defining a European infrastructure project for CO_2 transport – a Project of Common Interest (PCI)

- Case definition
- PCI prerequisites
- Outline strategies and scenarios
- Business Case development (prospectus)
- Synchronised funding from various sources. The Berlin model
- Recommendations

Deliverables

D1.1 *Communication plan applicable to the Pilot Case*.

D2.1 *Public perception of the Pilot Case*

- Part 1: Review of European public perception studies pertaining to CO2 transport
- Part 2: Design for assessing public perception of the Pilot Case

D2.2 *Assessment of key technologies*

- Part 1: Survey of key technologies making up the Pilot Case
- Part 2: Assessment of key technologies to be validated in real environments

D2.3 *Recommendation of actions derisking the Pilot Case via innovation and research.*

D3.1 *Legal framework for the Pilot Case*

- Part 1: Legal opinion concerning selected scenarios for the Pilot Case
- Part 2: Defining the legal framework of the base case for the Pilot

D3.2 *Statutes and viable ownership arrangements*

- Part 1: Recommended statutes and legal setting
- Part 2: Ownership assessment and placement
- Part 3: Plausible partnership arrangements for the perspective of law and policy
- Part 4: Communication plan covering legal issues

D3.3 *Model agreements*,

- ☐ Part 1: Memorandum of Understanding (MoU)
- ☐ Part 2: Agreement(s) for commercial arrangements

D4.1 *Pilot Case definition*.

D4.2 *Pilot Case scenarios*

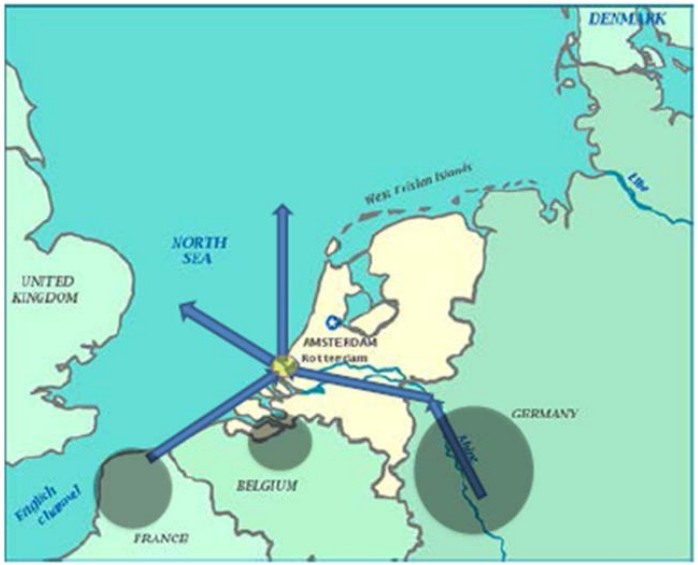
- Part 1: Implementing actions pursuant to the PCI prerequisites (Project of Common Interest) (Input from Task 4.2)
- Part 2: Outline strategies and scenarios (Various possible/Base case for the Pilot) (Lead: ULEEDS)
- Part 3: Survey of resources and timing (Lead: ULEEDS)

D4.3 *Prospectus: Business Case development*

D4.4 *Assessment of synchronised funding from various sourced. The Berlin model*

D4.5 *Recommendations. Next steps forward*.

North Sea Basin – CO_2 sources and sinks

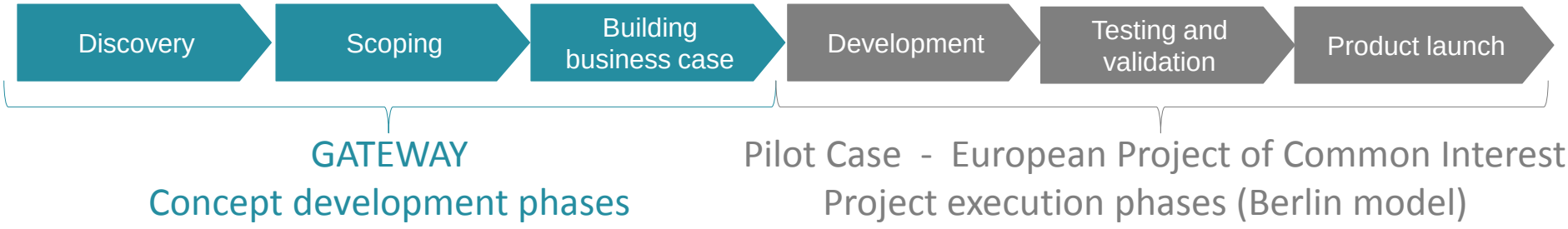


Power sector		Industry		Per cent of total: Power	Per cent of total: Industry	Total CO_2	
	Mtoe		Mtoe	%	%		Mtpa
DE	349.1	DE	114.1	41.0	13.4	DE	852.4
UK	190.5	FR	67.5	35.3	12.5	UK	539.6
PL	172.6	UK	66.2	39.0	15.0	IT	442.5
IT	132.6	ES	62.3	32.6	15.3	FR	406.3
ES	71.7	IT	60	21.4	17.9	PL	334.4
NL	66.2	PL	30.7	20.4	9.5	ES	324.2
FR	60.8	NL	27.2	25.9	11.6	NL	234.6
CZ	56	CZ	26.6	46.3	22.0	CZ	120.9

Creating the pilot case

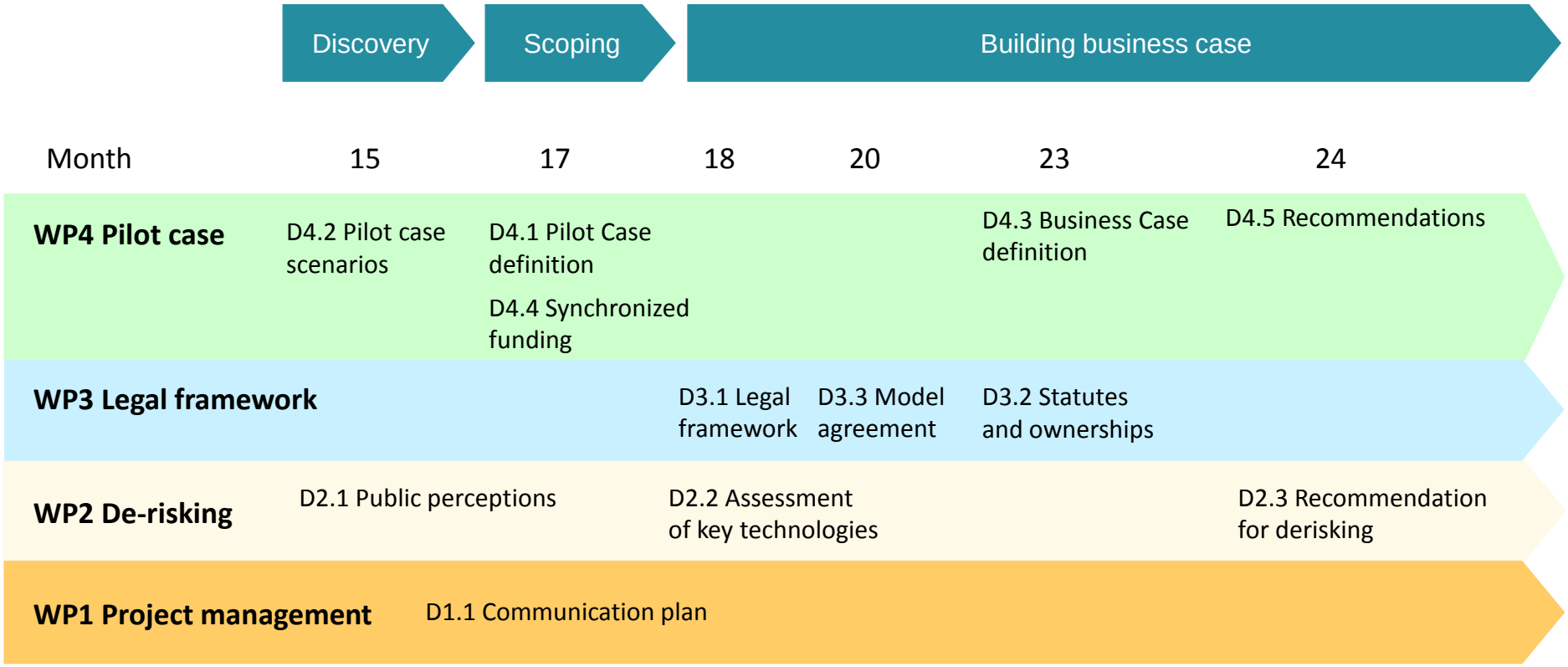
- 'Developing a Pilot case aimed at establishing a European infrastructure project for CO2 transport'
- Stakeholders = Consortium , industry, COM, RTOs, funding agencies, Member States..
- Work
  - Knowledge gathering
  - Outlining strategies
  - Scenario building
  - Consideration of lead times and cost assessment
  - Assess economic potential, timing, and organization towards deployment of CCS
- Recommendations for subsequent joint Berlin project
  - Synchronizing funding from multiple sources to start planning, construction, and operation of the gateway
  - Suggestions of possible business models
  - Suggestions for handling the risks and uncertainties during lifetime

Pilot Case project development – Phase-gating

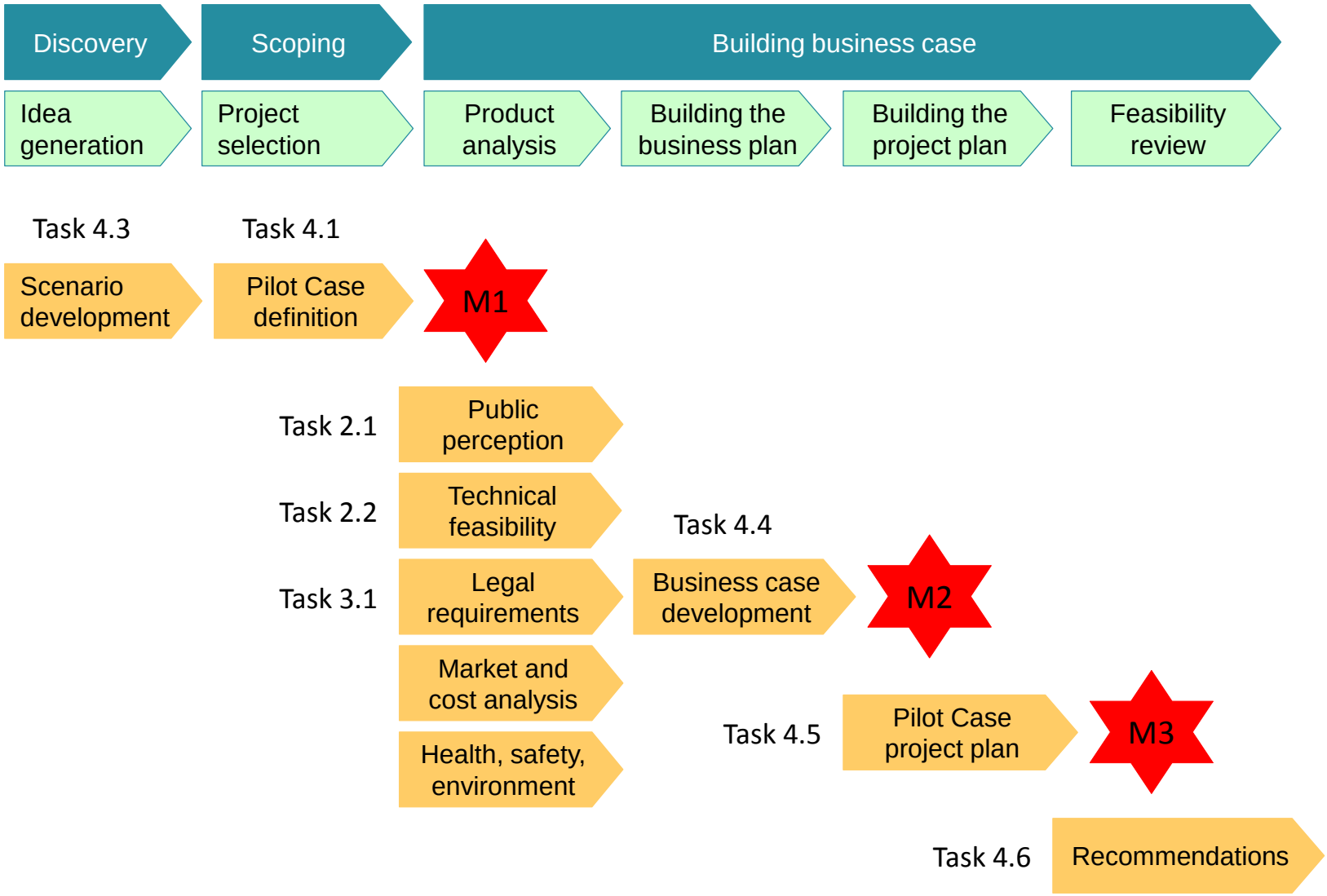


- GATEWAY project concept is based on adopting a phase-gate development process model
- Breaks up the process into series of phases that are sequentially reviewed
- At the end of each phase the project is evaluated against a number of criteria and decisions are made on further progress
- Provides a roadmap that moves the project from idea to launch effectively

GATEWAY phases - timeline



GATEWAY phases - timeline (2)



GATEWAY phase gate model

Phase 0: Discovery

Idea generation, brainstorming processes, and selection of project to og forward

Task 4.3: Outlining strategies and scenarios - scenario developement and analyses, selection of scenario for Pilot Case

Phase 1: Scoping

Business opportunities, communication with lead users and suppliers

Task 4.1: first Pilot Case definition; Task 4.2: PCI prerequisites

Phase 2: Building business case

Product analysis - study user needs, market analysis, technical feasibility, production and operation cost analysis, marketing and launch cost analysis

Task 2.1: Public perception issues, Task 2.2:Technicalassessment and Task 2.3: Recommendations for research and innovation actions; Task 3.1: Legal framework for Pilot Case; Task 3.2: Statuses, candidate owners, ownerships and partnerships arrangements, Task 3.3: MoU, liability, risk sharing, access, feed-tariffs, funding synchronisation, resolution of conflicts)

Business case developement – document defining the product and providing rationale for developing it

Task 4.4: Business case prospectus)

Building the project plan – scheduled list of tasks and events along with timeline and milestones

Task 4.5: Berlin model synchronised funding for the project)

Feasibility review – analysis of informations provided by previous steps, reviewing the rationale and making decision on moving on to the developement stage

Task 4.6: Recommendations)

Phase 3: Development

Phase 4: Testing and validation

Phase 5: Product launch

Summary

- BIG question - 'What does it take to make CCS happen in Europe ?'
- GATEWAY - High-level adressing of this question
- Will require collaboration from major stakeholders
- The role of ZEP and Network Technology - very welcome

Thank you for your attention

Important input to GATEWAY - fex

ZEP report - Business models for commercial CO_2 transport and storage

GATEWAY use the report as guideline and build on recommendations

Recommendations

- Having a policy framework in place is critical for timly CCS deployment
- Business models need to create market certainty and secure long-term cash flows
- Risk reward mechanisms is vital to balance the long post-closure no profit monitoring phase
- Understanding the CCS market in Europe

Focus in report

- Identifying applicable business models
- Identifying effective financing mechanisms
- Development of long-term strategic vison for CCS financing