

ZEP – Skyggegruppemøte

Oslo 27 August 2007

Paal Frisvold, Bellona Europa

Agenda

Velkommen

Teknologier for CO₂-fangst.

EUs program for etablering av 10-12 demonstrasjonsprosjekt for CO₂-håndtering

- Oversikt over mulige kriterier for utvelgelse av demonstrasjonsprosjekter.

Finansiering av demonstrasjonsprosjektene

- Mulige finansieringsmodeller for demonstrasjonsprosjektene.

Veien videre

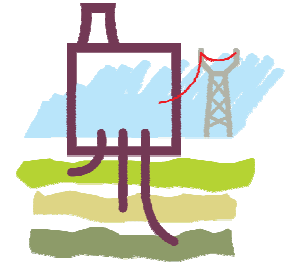
- Orientering om Europakommisjonens arbeid. I løpet av 2007 vil kommisjonen publisere to dokumenter om juridiske rammebetingelser og finansielle insentiver.

Allmenn kommunikasjon

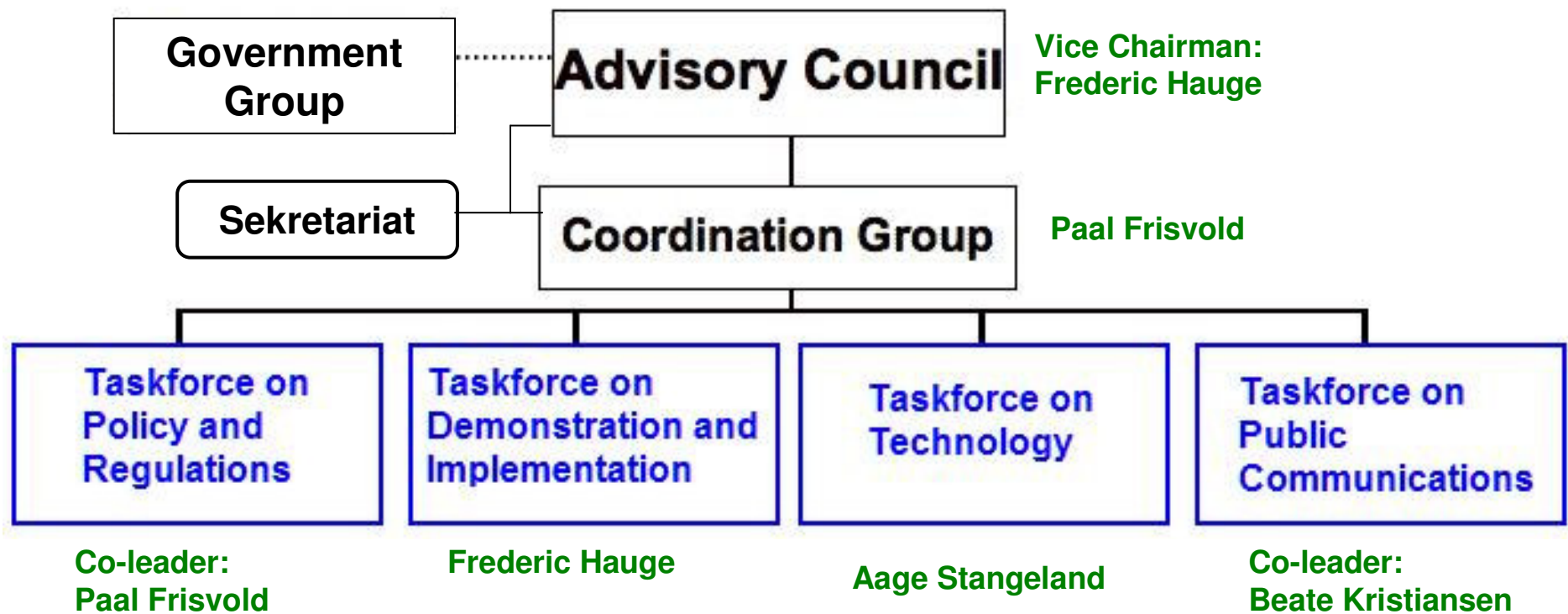
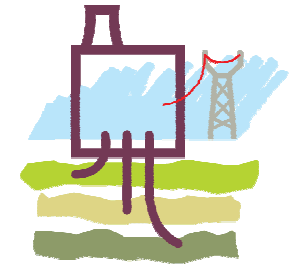
- Status for arbeid med allmenn kommunikasjon i ZEP-plattformen.

Diskusjon

Ordet er fritt, og vi oppfordrer møtedeltagerne til å komme med innspill på hva vi bør fokusere på i det videre arbeidet med ZEP.



ZEP - struktur

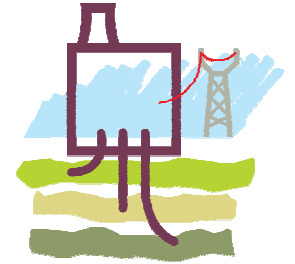


Status for CCS i EU



Skyggegruppemøte

Oslo 27 August 2007

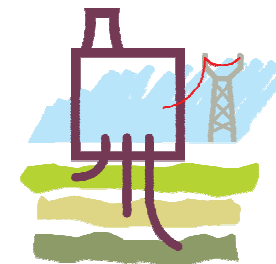


Teknologier for CO₂-fangst

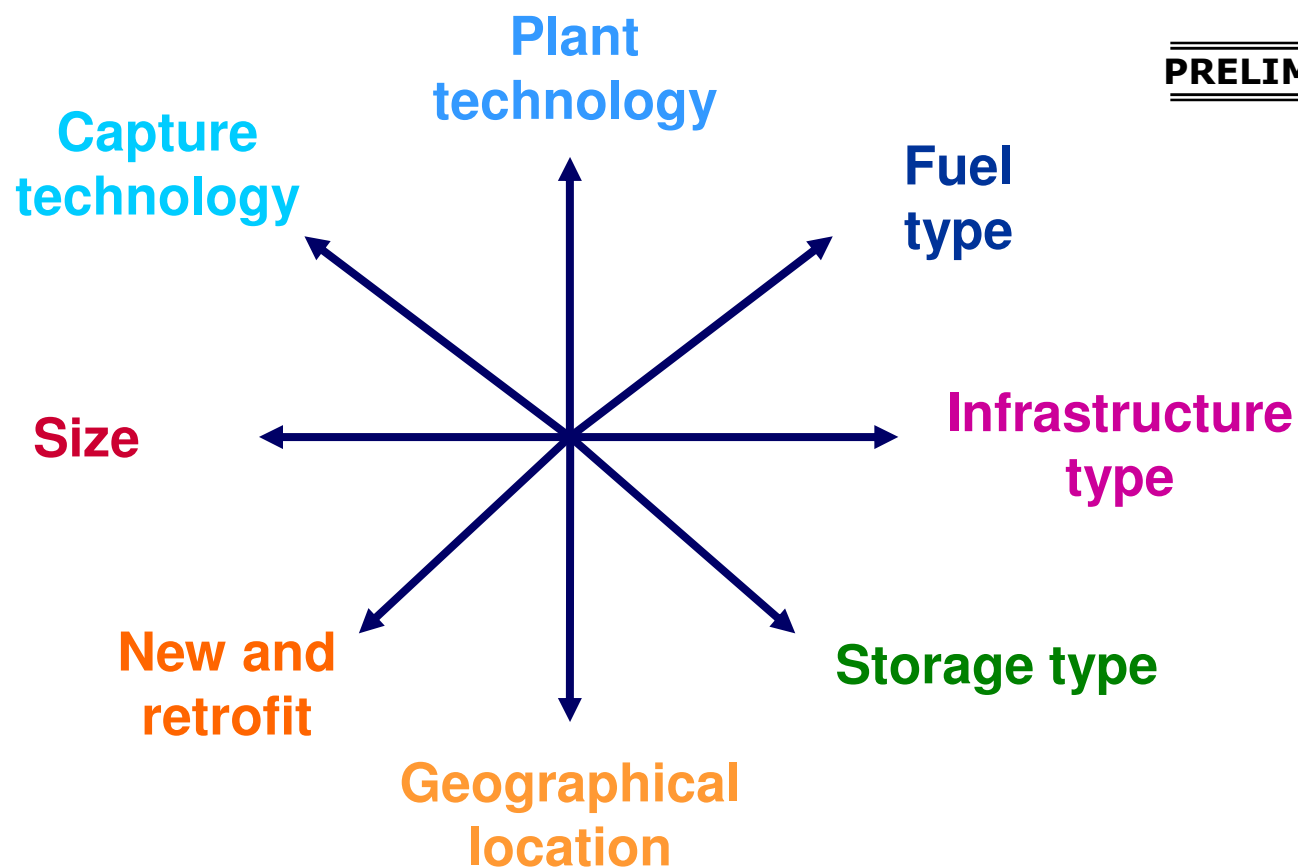
- Status for ZEP's arbeid

Aage Stangeland, Bellona

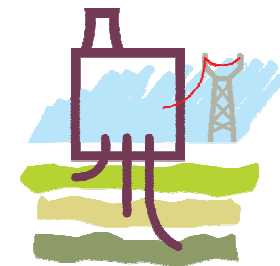
Parametere som skal testes i Flaggskip-programmet



PRELIMINARY

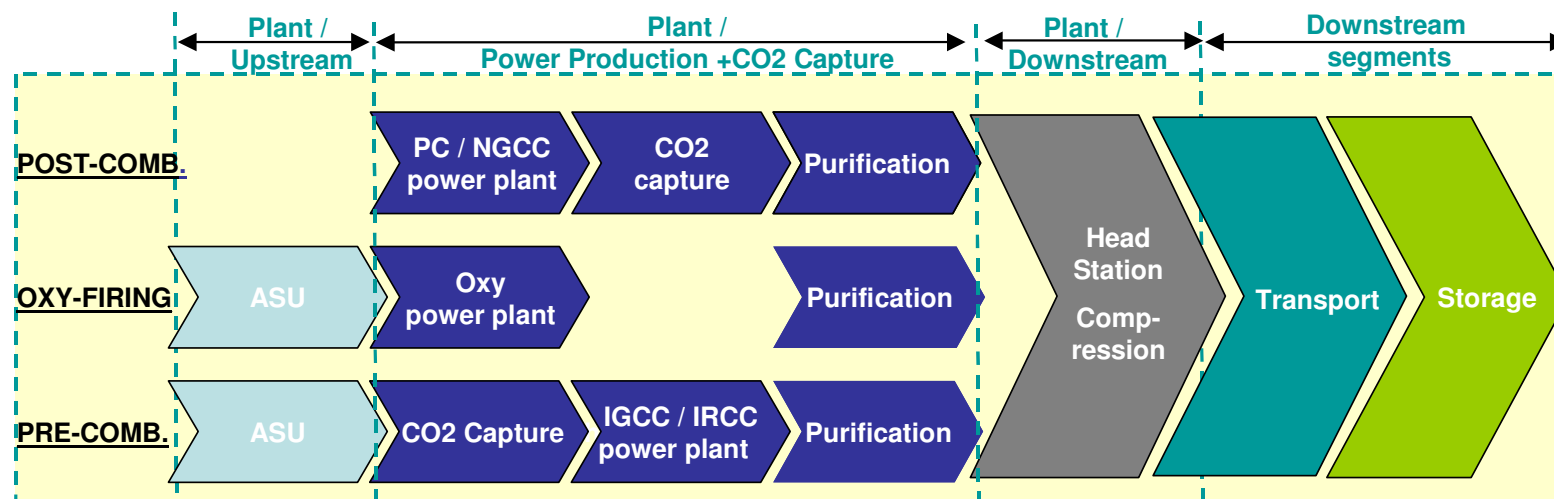


WG Design Technology Blocks



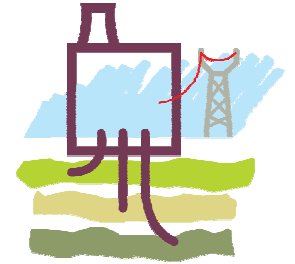
Hensikt med arbeidsgruppen

- Vurdere teknologier aktuelle for Flaggskip-programmet
- Utvikle forslag til metode og prosess for utvelgelse av demo-prosjekter
- Arbeid avsluttet innen utgangen av september
- For aktuelle teknologier:
 - Beskrivelse av funksjonalitet
 - Kravspesifikasjon



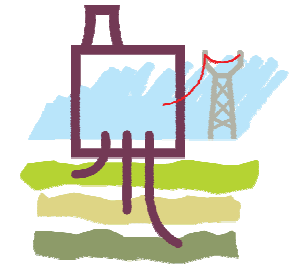
TECHNOLOGY BLOCKS : Components and integration in power plants to be validated for full size industrial use with several fuels: COAL, LIGNITE, PETCOKE, NATURAL GAS, BIOMASS, Other

Objective



- To define the **functional specifications** of those TB in terms of boundary conditions to obtain validation (Power level, flowrate, pressure, temperature, purity, and overall CO₂ removal efficiency)
- To identify in those TB's:
 - technical **maturity**
 - **potential value** to reduce costs of CO₂ capture and storage, improve reliability, reduce risk.
- To define orders of magnitude of **budgets** needed to validate each technology blocks at large scale CCS demo plants.
- ZEP to be proactive:
 - Design a **rating grid** for TB's and **scoring system** for Demo Plants
 - Give EU advise on type of demo projects that are needed

Målsetning



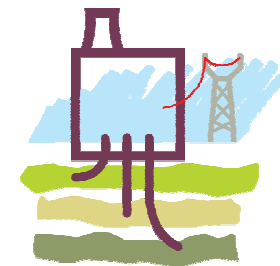
What does a particular project contribute?

Example:

Technology blocks	Min points	Max points	Scores		
			Demo 1	Demo 2	Demo 3
Large scale air separation	1	5	5		2
Validate integration possibilities of ASU in power unit	1	3	3		
Post combustion capturing (Amine)	1	10		6	
Post combustion capturing (Ammonia)	1	10			
Oxy firing burner type 1	1	5	5		
Oxy firing burner type 2	1	5			
Hydrogen Turbine	1	10			8
CO2 purification		5	1	5	3
Total score			14	11	13

Illustrative

Technology Blocks listing



➤ **Technology Blocks for CCS Demo Plants were grouped into 4 families:**

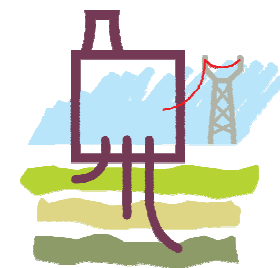
- Oxy-combustion
- Post-combustion
- Pre-combustion
- Transport infrastructure and storage

➤ **The 3 families concerning *capture* were referred to fuel types as follows:**

- Solid fuels:
 - coal,
 - lignite,
 - anthracite,
 - Mixtures/co-firing with petcoke, biomass, peat
- Liquid & gaseous fuels
 - oil,
 - natural gas,
 - Off gas (vent gas),
 - residues from oil industry

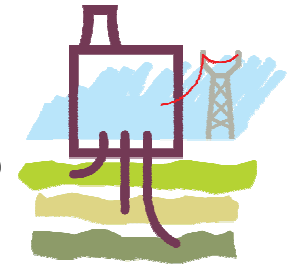
Work Group Status





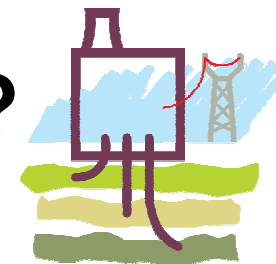
Outline of the Flagship program

The EU demo projects are needed to reduce various risks to validate CCS

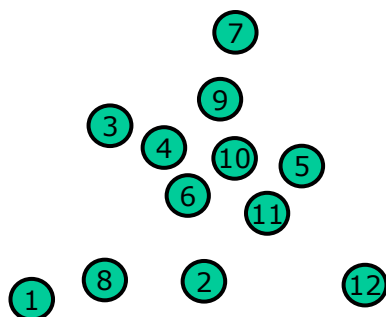


	Responsibility	Managed by	What does it consist of?
Technological risk	■ Companies/ consortia	■ Companies	■ Availability of technology ■ Scaling up of technology ■ Scoping and shaping the technology (storage areas)
Commercial risk	■ Companies/ (inter)national governments	■ Companies/ banks	■ Cost effectiveness of a technology ■ Fundability of a CCS project to build confidence for full scale roll out ■ Effectiveness of new partnerships
Political risk	■ (inter)national governments	■ (Inter)national governments/ ZEP taskforce/ Companies	■ National support for underground storage ■ International support for bringing CCS under the ETS

Why an EU Flagship programme?

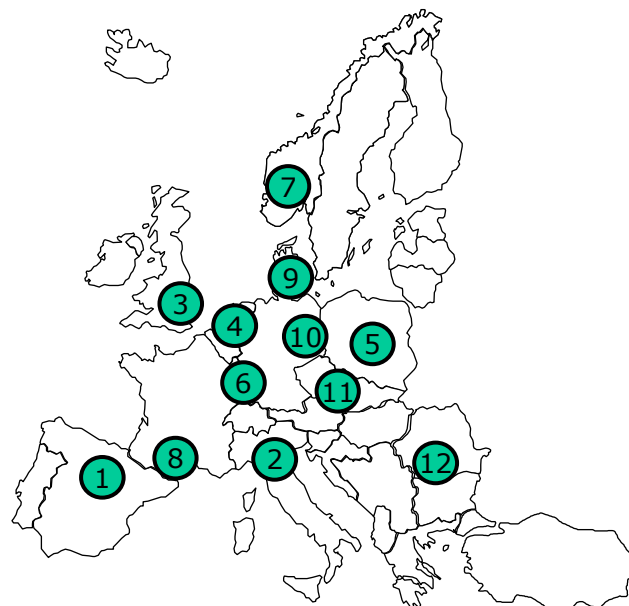


ZEP taskforces



“a series of independent demo projects, to verify technology”

EU Flagship programme

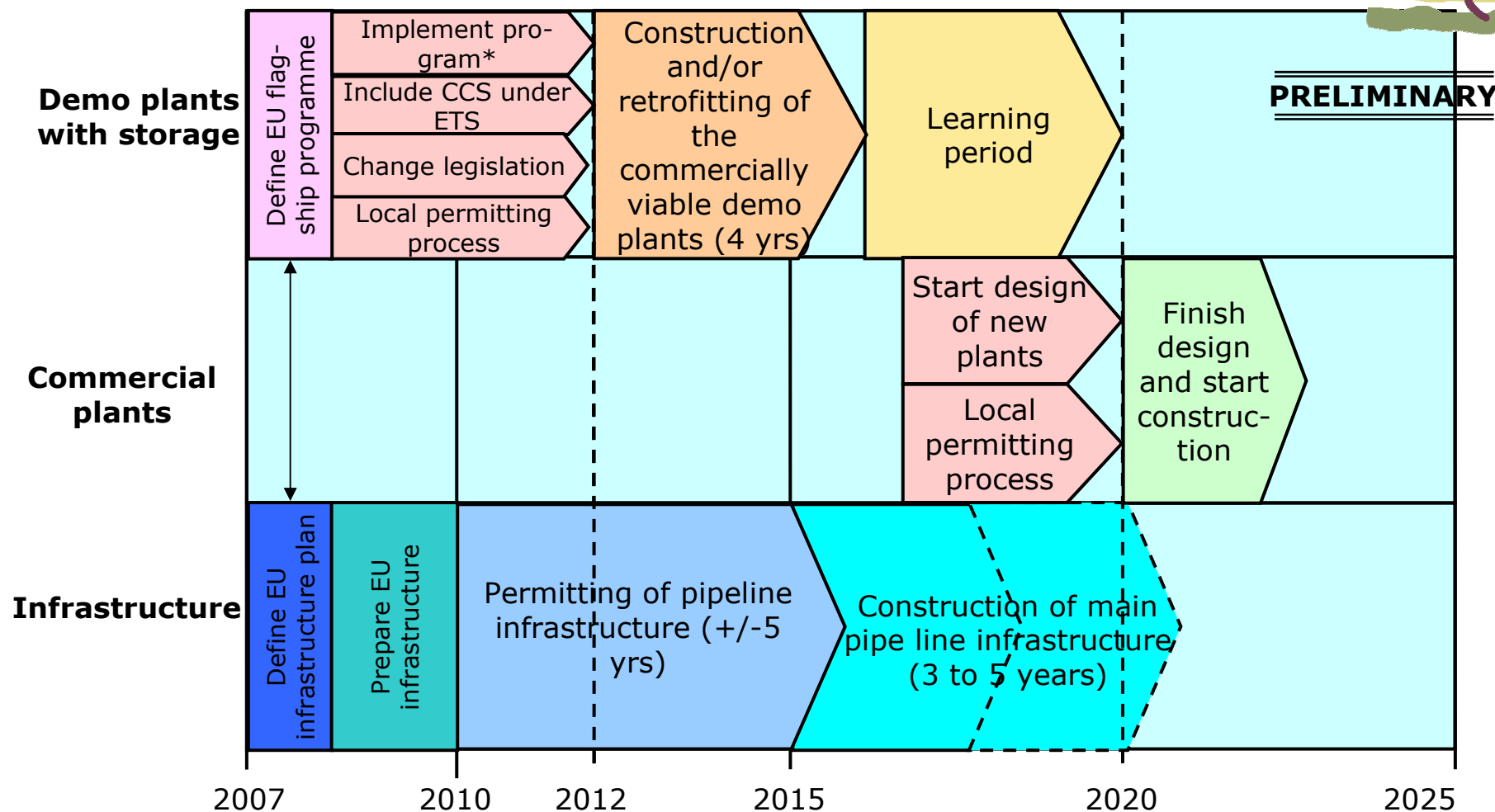
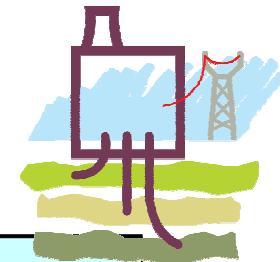


DRAFT

“a well known coherent set of demo projects spread over Europe”

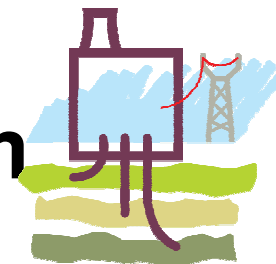
- *Visibility* – easier to communicate
- *Momentum* – create a step change
- *Knowledge* – quicker transfer/learning
- *Spread* - Ensure geographical & technological spread
- *Funding* - Ensure effective use of public funding

Achieving commercially viable CCS in 2020 will be challenging and rewarding

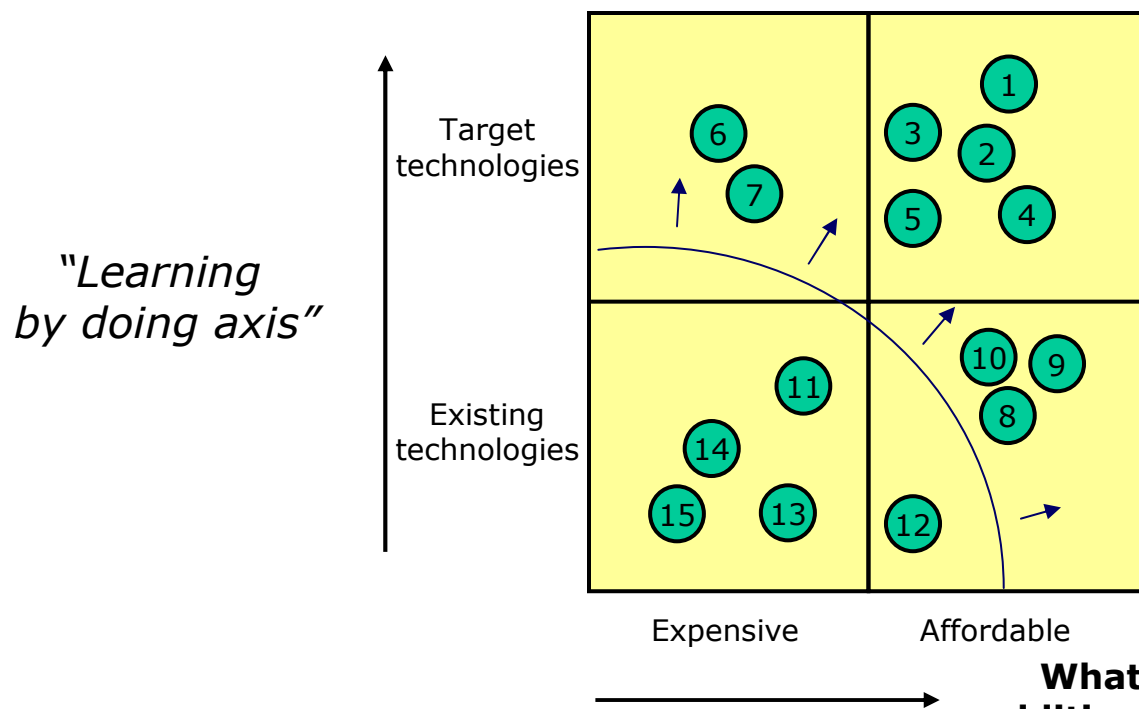


* includes: setting up a public private organisation, organising several "calls" for submission of expression of interests, selecting the projects and setting up processes that monitor the projects (See slide later in the pack)

The demo's will be evaluated on two dimensions for inclusion in the program



How many technology blocks are validated?

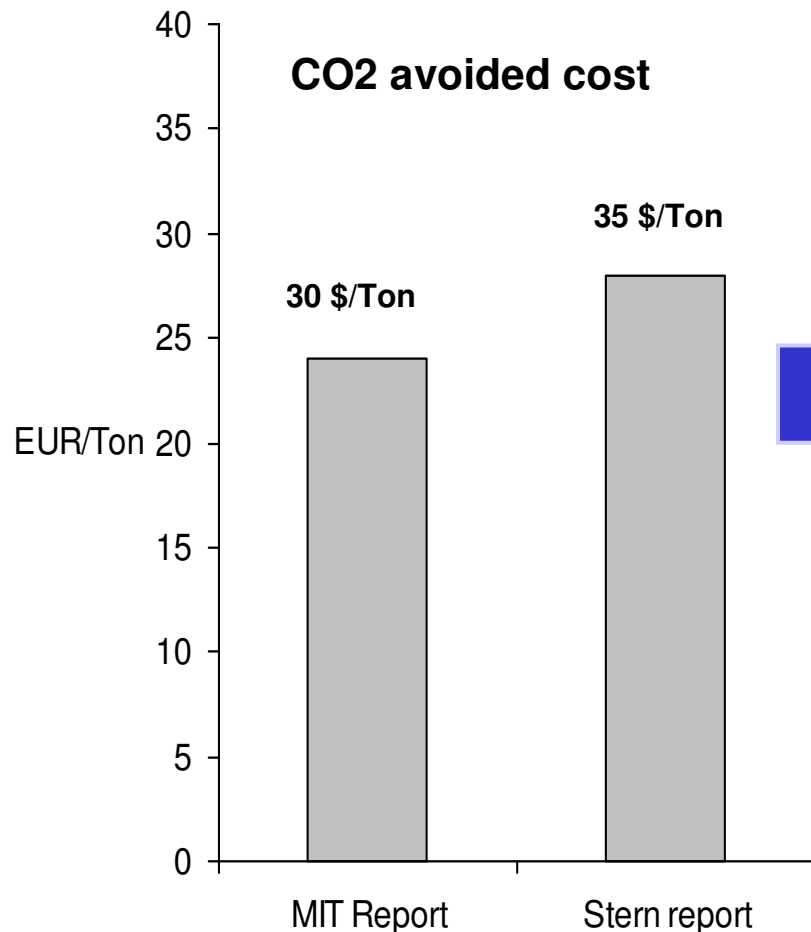
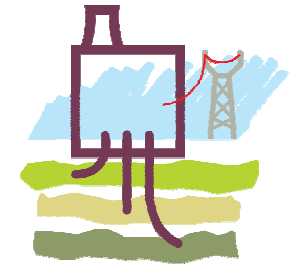


DRAFT

"Making it affordable axis"

*Additional cost = extra cost for generating power + CCS avoided cost

The demo's should show how the cost can be limited to €24 – 28/Ton



What should be the Flagship's target for additional cost?

DRAFT

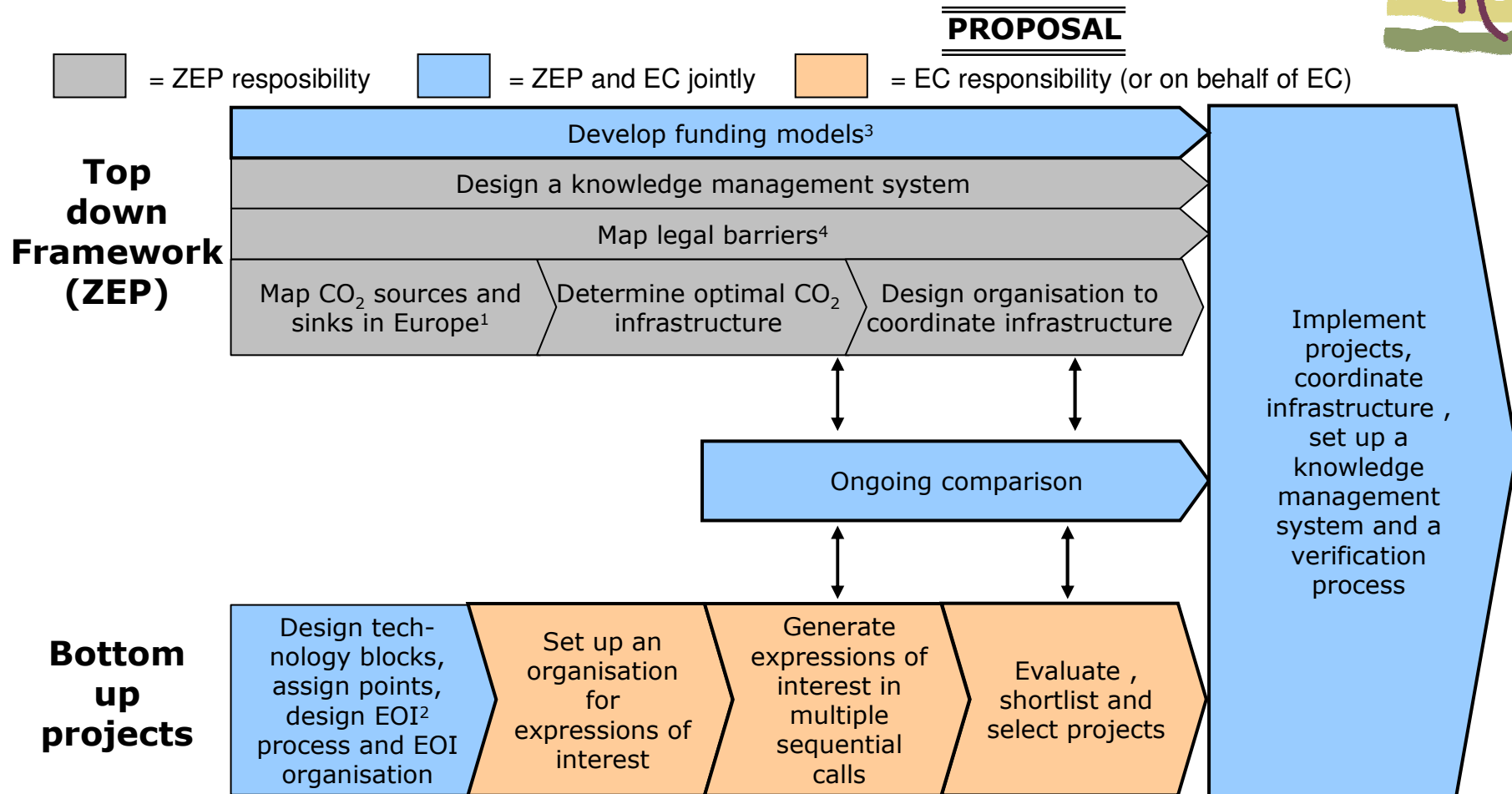
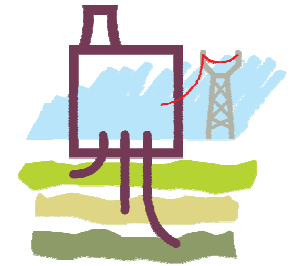
- Bottom up, a value of €24/Ton is calculated based on capturing and compression cost of €20/Ton and € 4/Ton transportation & storage costs*
- Top down, a value of €28/Ton is calculated, based on how much GDP loss is achieved if measures are currently taken**

The proposals for demo plants should show the potential to reduce the cost to €24 – 28 /ton

*Future of coal (MIT, 2007), EUR/USD 1.25 (average 2006)

** Stern report

The flagship is a simultaneous top down and bottom up approach



1. Power, steel, aluminum, cement, refineries and base chemicals (to be initiated by EC)

2. EOI = Expressions of interest in a demo plant

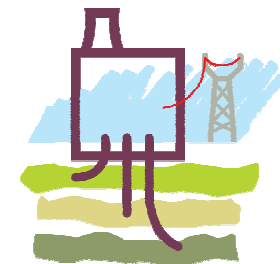
3. Together with the subgroup business models of the policy and framework taskforce

4. Based on the work of the policy and framework taskforce

Source: ZEP Taskforce D&I, Flagship program

Skyggegruppemøte

Oslo 27 August 2007



Regelverk, finansiering og veien videre

Paal Frisvold, Bellona Europa

Veien fremover



Communication on “Legal Facilitation Framework”

An impact Assessment Study on when and how to introduce CCS in Europe

i) Revidere eksisterende regelverk som i dag er til hinder for CCS:

- Vanndirektivet
- Avfallsdirektiv (Landfill og Waste Shipment)

ii) Regelverk og retningslinjer for lagring (inkl. Transport/infrastruktur): Sikker, stabil og pålitelig

- Demonstrere lagringspotensial
- Overvåke (monitor)
- Rutiner for å detektere lekkasjer og tetting av evt. lekkasjer
- Ansvar for lagringssteder over tid (liability)

iii) Oversikt og kostnader for “kilde til lagring” (matching study):

- Kartlegging av medlemslandene
- Utfordring: Tyskland

Innføring av obligatorisk CO₂-håndtering i Europa

- Hva skal reguleres?
 - Kull, gass, all fossilt brensel,
 - Hvilke installasjoner (størrelse)
- Juridisk virkemiddel: IPPC (BAT) eller eget direktiv?
- Hva vil dette koste industrien?
- Lagringskapasitet?
- Tidshorisont:
 - 2020 for alle nye kraftstasjoner
 - 2020+ for etterinstallering
- Innflytelse på energimarkedet?

Communication on financing and financial incentives for CCS projects

- Finansieringsinstitusjoner: EIB, Verdensbanken, EBRD, NIB
- ETS: Kvotehandelsdirektivet
 - 2015: 40-60 € vs. 15-20 € (pr tonn CO₂)
- Supplement:
 - Bruk av inntekt fra auksjonering av kvoter (61 mrd € pr. år hvorav 28 fra kraftindustrien)
 - Doble kreditter til CCS
 - Feed-in tariffer
 - Decarbonised Electricity Certificates (DECs)
 - CO₂-avgift?
- Statsstøtte
 - Regelverk for statsstøtte under revisjon
- 7. Rammeprogram
- PPP? / “Umbrella programme” (*préjugé favourable*)