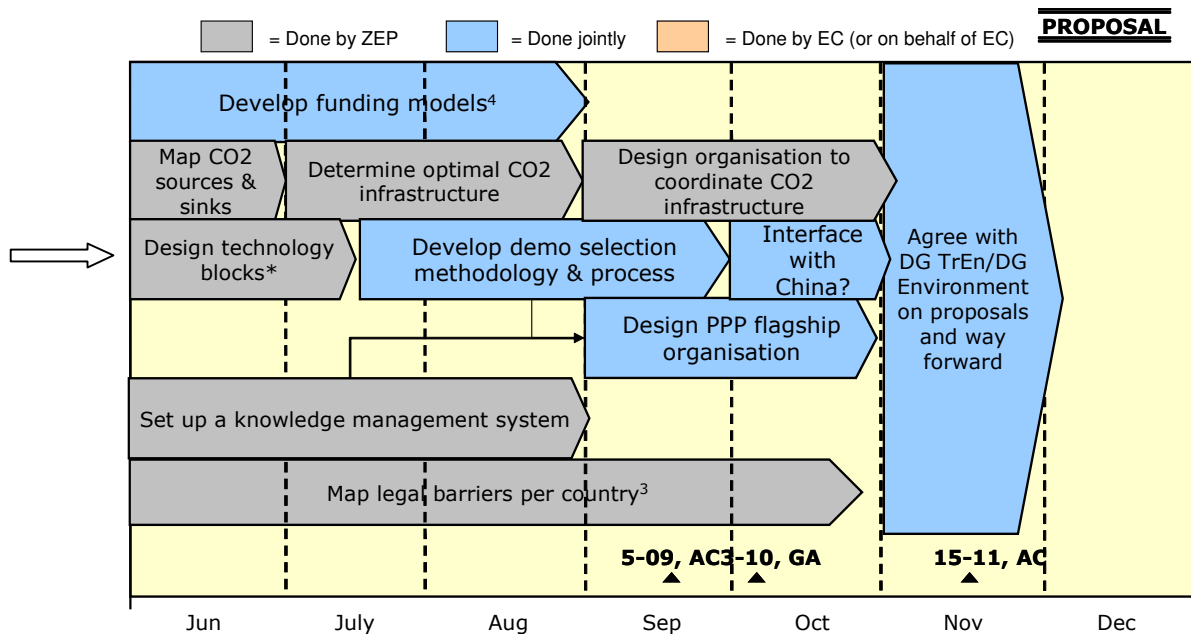


Terms of reference ETP ZEP Working Group “Design Technology Blocks ”

1 BACKGROUND

At the “Kickoff meeting ZEP D&I task forces” March 2nd 2007, 6 working groups were installed. To get a well known coherent set of demo projects spread over Europe, a so called “EU Flagship programme” is proposed in May 2007. The planning of the different working groups, their coherence and their position in the Flagship programme is presented herebelow. These working groups will give input to choose demo plants and give recommendations for implementation.



Planning ZEP D&I taskforce/Flagship programme

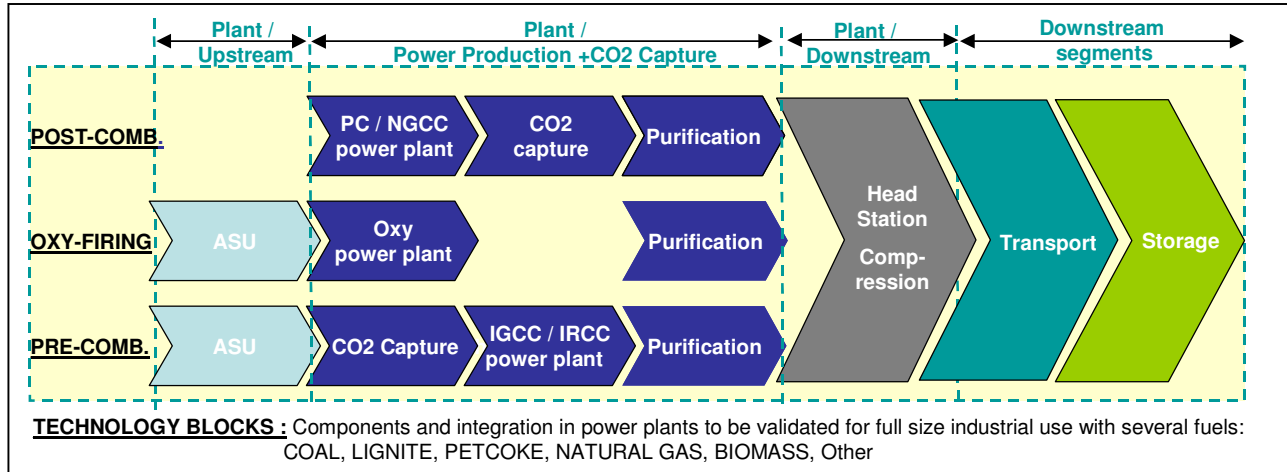
Below you will find the Terms of Reference of the Working Group “Design Technology Blocs”. This group is newly created, as a temporary sub-set, and support of the Working Group “Demo selection methodology & process” following a recommendation accepted by the Advisory Council on June 13th.

The leader and members of this group will be chosen from current members of the various WG’s of the D&I taskforce and will be also open to candidates from the Technology taskforce, as technology specialists are needed to define those technology blocks.

The team members list will have to be approved by the co-leaders of the TFs D&I and Technology.

2 PURPOSE

To provide a list, a definition, and the functional specifications of the main technology blocks needing industrial validation along the CCS value chain as presented in the figure herebelow:



3 OBJECTIVE

The objective of the work is to provide the base information needed by the Working Group “Demo selection methodology & process” to design a selection system that will take into account the intrinsic value brought by the integration of each proposed technology block in a specific demonstration project. The table below illustrates this objective:

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

4 SCOPE

The scope of the work within WG “Design Technology Blocks” includes the following tasks:

- To provide with a list of all main technology blocks and their links, needing industrial validation in the context of an integrated CCS value chain
- To define those technology blocks in terms of technical maturity, potential value to reduce the costs of CO₂ capture and storage or improve its reliability. Design a rating grid and system for the technology blocks.
- To define the functional specifications of those technology blocks in terms of boundary (in/out) condition limits to obtain validation (Power level, Flowrate, pressure, temperature, purity, and overall CO₂ removal efficiency)
- To define orders of magnitude of the investments needed to validate each of the technology blocks

5 CONSTRAINTS

Resources

This task force needs urgent attention as it will be the cornerstone allowing a realistic selection process to be designed and framework envelop of the budget needed to achieve comprehensive validation of the CCS value chain main components. The task force will need recognised industrial specialists in different fields, ranging from large air separation units to gasification, combustion, purification, turbine and compression technology but also CO₂ transport and storage. Manpower support from the other taskforces is therefore immediately essential if we are to succeed in the proposed short timeframe.

Communication

Communication will be ensured through the co-leaders of the the two Task Forces “Technology” and “Demonstration and Implementation”, respectively Lars Stromberg (Vattenfall), Dirk Goldschmidt (Siemens), Niels Peter Christensen (GEUS), for T. and Gijs van Breda Vriesman (Shell), Graeme Sweeney (Shell), Johannes Heithoff (RWE) for D&I. Early understanding and acceptance will have to be obtained from the Coordination Group and Advisory Council.

6 METHODOLOGY AND PLANNING

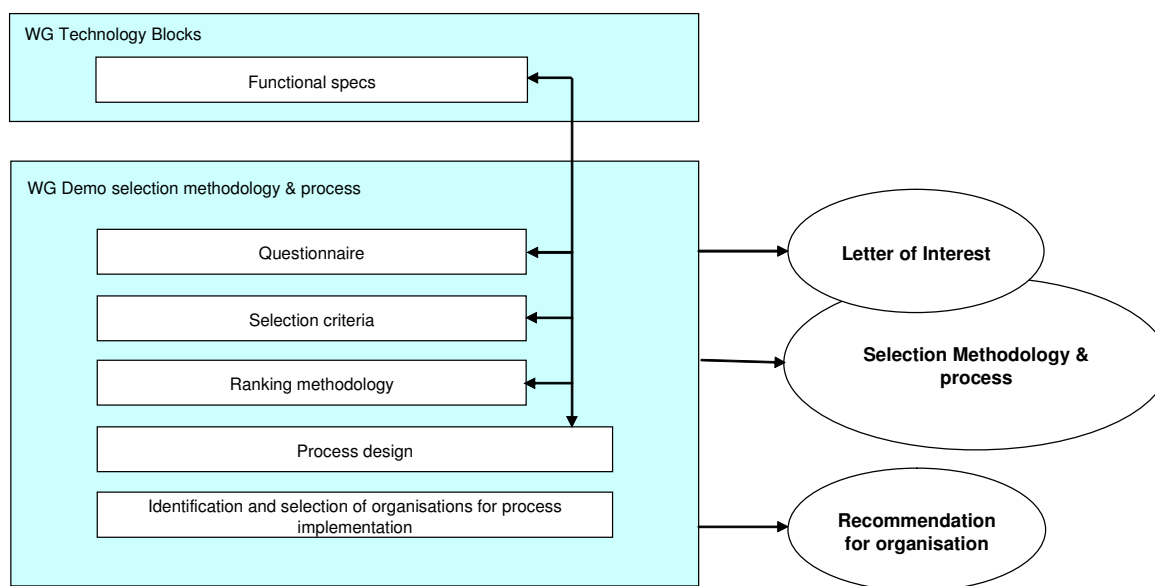
The objectives of this working group have to be achieved within a very short period of time and a preliminary definition of the technology blocks is expected for review on July 17th for the next plenary meeting of the TF Demo and Implementation in The Hague.

The process will start with the staffing of the team which should be completed and approved by June 22nd. Two WG working session should be organised thereafter, ideally week 27 + 28 and preliminary list of technology blocks compiled for July 17TH.

The WG will then proceed, after the vacation period, with the in depth definition of the technology blocks rating grid, functional specifications and budgetary evaluation.

Meetings	When	Report	Communication
WG Meeting	Week 27	Minutes	TF-co leads
WG Meeting	Week 28	Minutes	TF-co leads
TF Meeting	July 17	Technology Block listing	CG / AC
WG Meeting	Week 36	Minutes	TF-co leads
WG Meeting	Week 37	Minutes	TF-co leads
TF Meeting	?	Rating grid + Functional Specs	CG / AC
WG Meeting	Week 38	Minutes	TF-co leads
TF/CG/AC	?	Final conclusions	CG/AC

Above schedule is extremely aggressive but realistic, provided a motivated team supports it. Essential links will have to be kept with the WG on Demo selection which will need early inputs from the team according to the scheme here below:



Interaction of the Working Groups “Design Technology Blocks” and “Demo selection methodology & process”

7 DELIVERABLES

The deliverables are listed below:

- Technology blocks listing (July 17th)
- Technology blocks evaluation in terms of maturity and potential (Sept 07)
- Rating grid proposal (Sept 07)
- Technology Blocks functional and interconnection specifications (Sept 07)
- Technology Blocks investments costs for validation (Sept 07)