EUROPEAN COMMISSION
Community Research

LARGE CCS PROJECTS MEETING AND WORKSHOP

AGENDA and DYNAMIS Presentation
Brussels - Belgium
September 5, 2006

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Meeting Agenda

1.	Welcome to the Large CCS Projects Co-ordination meeting and WS	A. Perez Sainz
	✓ Background,objectives and targets	
2.	The Commission's holistic view on CCS development in Europe	P. Dechamps
3.	DYNAMIS Recap- deliverables	N. A. Rökke
4.	Review of major EU project objectives and results, how can the project interact/contribute/liaise with DYNAMIS (10 min each)	
	✓ ENCAP	L. Brandels
	✓ CASTOR	P. LeThiez
	✓ CACHET	Rich Beavis
	✓ CO2GEONET	N.J. Riley
	✓ CO2REMOVE	E. Elewaut
	✓ CO2SINK	G. Borm
5.	Discussion	Moderator: EU/Dynamis
Lunch (12.15-13.15) outside meeting room		
6.	Review of industrial/national projects/incentives, how can DYNAMIS contribute to progressing the initiatives - streamlining- interaction (15 min each)	
	✓ ZEIGCC – RWE	K. J. Wolf
	✓ TBO/Heidrun/Draugen – Shell/Statoil	B. Berger
	✓ DF1 and DF2 - BP	Rich Beavis
	✓ Schwartze Pumpe- Cottbus – Vattenfall	L. Strømberg
	✓ E.ON – IGCC plans	Robin Irons
	✓ GE- IGCC with capture – Poland	Bart Stoffer
	✓ COACH/NZEC	F.Kalaydjian
	✓ TOTAL Lacq- Oxy-fuel	L. de Marliave
7.	Coffee Break 15.15-15.45	
8.	Discussion (in lieu of item 4 and 6)	Moderator:EU/Dynamis
9.	Conclusion and follow-up (16.45)	EU/Dynamis
10.	Close	

on-going projects

Project Acronym	Type of Action	Title	EU funding (M€)	Coordinator	Duration (months)	Start	No of Partners	No of countries
CO2SINK	IP	In-situ laboratory for capture and sequestration of CO_2	8.7	Postdam Research C	60	1/4/04	14	8
ENCAP	IP	Enhanced capture of CO_2	10.7	Vattenfall	60	1/3/04	33	9
CASTOR	IP	CO_2 from capture to storage	8.5	IFP	48	1/2/04	30	12
CO2GEONET	NoE	Network of excellence on geological sequestration of CO_2	6	BGS	60	1/4/04	13	7
ISCC	STREP	Innovative in-situ CO_2 capture technology for gasification	1.9	Univ. of Stuttgart	36	1/1/04	14	7

FP6 Third call –Dec. 2004
New Projects

- **Preparing for large scale H2 production from decarbonised fossil fuels including CO2 geological storage (IP) (HYPOGEN PHASE1)**
  DYNAMIS (4 m€ - coordinator SINTEF

- **CO2 capture and hydrogen production from gaseous fuels (IP)**
  CACHET (7.5 m€ - coordinator BP)

- **The monitoring and verification of CO2 geological storage (IP)**
  CO2REMOVE (8 m€ - coordinator TNO)

- **Advanced separation techniques (4 STREPs)**
  CLC GAS POWER, C3-Capture, DeSANNS, HY2SEPS (7.6 m€ for the 4)

- **Mapping geological CO2 storage potential matching sources and sinks (STREP)**
  EU GeoCapacity (1.9 m€ - coordinator GEUS)

ABOUT 70m€ COMMITTED UNDER FP6
– FOR A TOTAL RTD EFFORT OF ABOUT 140m€

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A step towards the first HYPOGEN plant, producing hydrogen and electricity with near zero emissions

Nils A. Røkke
Co-ordinator DYNAMIS

Outline

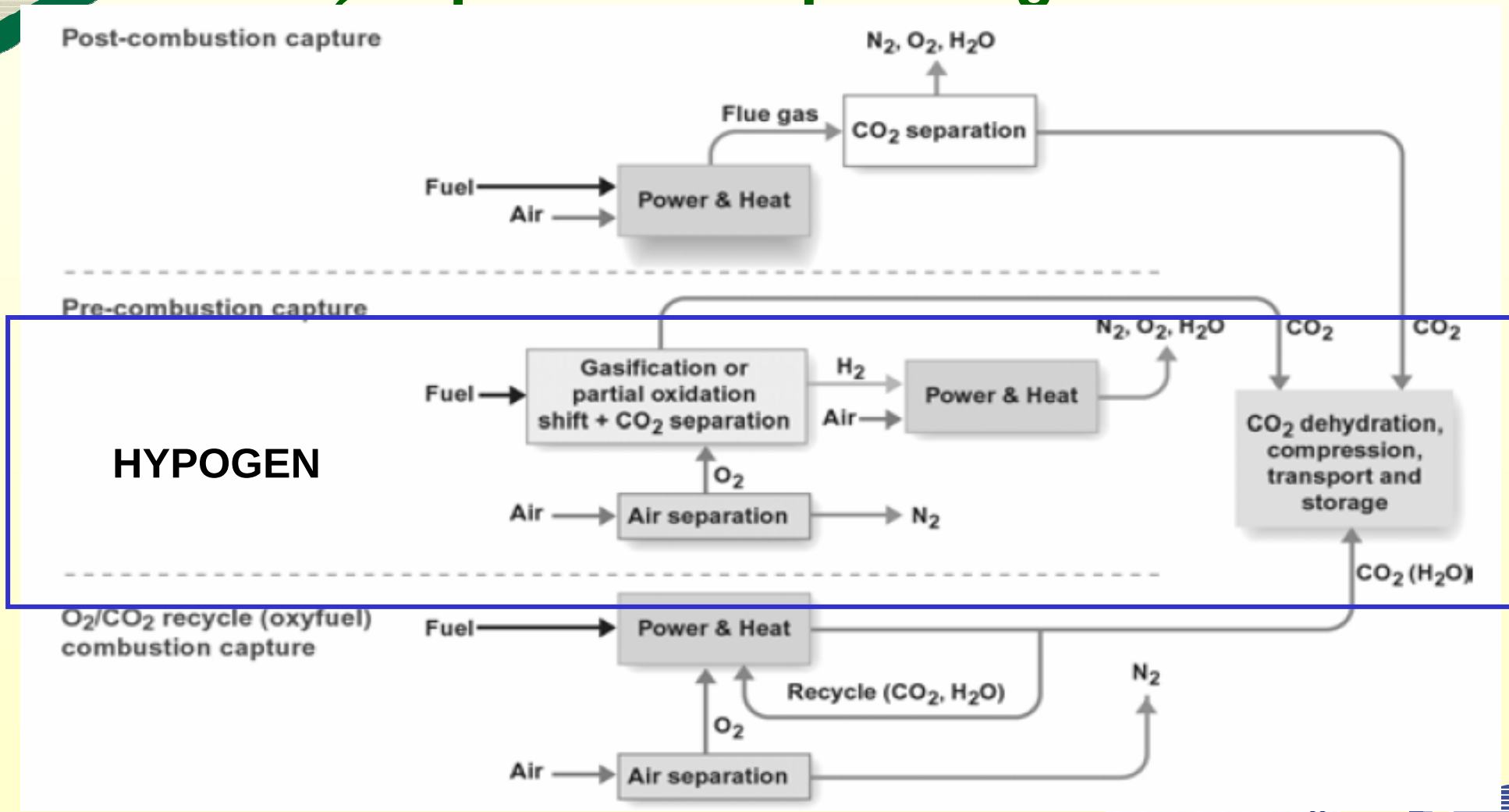
- Background
- The roadmap towards HYPOGEN
- Description of Dynamis, deliverables
- Dynamis in accordance to other EU-projects
- Suggested actions for co-operation schemes

What we target to achieve in/by this meeting

- What are the projects, information about the projects- who are the main players
- Unified view of the various CCS actions
  - ✓ Timelines, decision gates and resources
- Information exchange schemes
- Establish links and hopefully bodies/actions to ensure coherence
- Make best use of the resources
- Comprehend the views into a common position versus the ZEP visions- report to GA

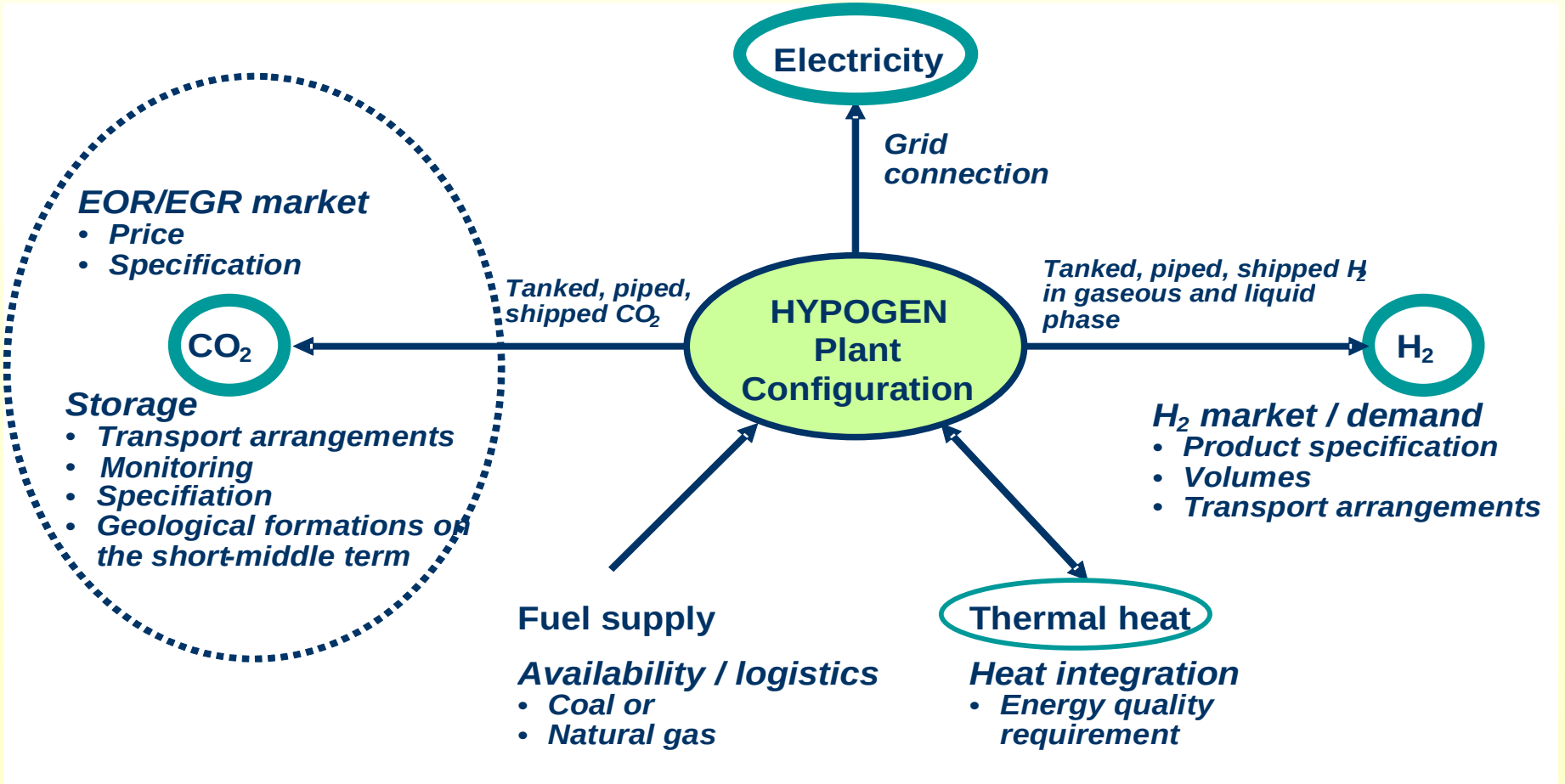
Background

CO_2 capture from power generation



Background

HYPOGEN – HYdrogen POwer GENeration



Background

HYPOGEN – HYdrogen POwer GENeration

- The Quick-start Programme of the European Initiative for Growth:
  - Hydrogen Economy as one of the key areas for investment in the medium term (2004-2015)
  - HYPOGEN and HYCOM

- HYPOGEN – 1.3 billion €
  - Develop the first large scale test facility for production of hydrogen and electricity from de-carbonised fossil fuels, with geological storage of CO2.
  - In operation in 2012

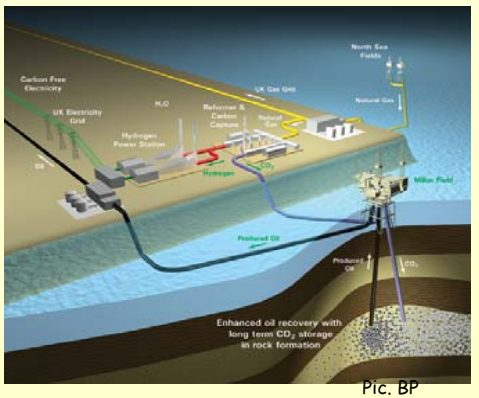
HYPOGEN overall timeline & budget

- Phase 0 Feasibility Study by JRC (2004)
- Phase 1 Measures within FP6, DYNAMIS (2006-2008) 7.5 M€
- Phase 2 Pilot Scale Demonstrations (2008-2010) 290 M€
- Phase 3 Demonstration Plant Construction (2008 – 2012) 800 M€
- Phase 4 Operation and validation (2012-2015) 200 M€

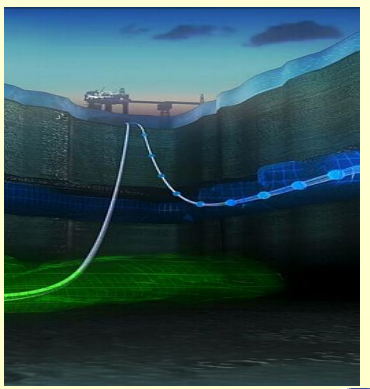
SUM **~1300 M€**


Pic. Siemens


Pic. Vattenfall



Pic. BP


Pic. Statoil

Phase 0

Outcome HYPOGEN pre-feasibility study

Recommendations for next phase:

- Investigate technologies for natural gas AND coal
- Apply commercial technologies → minimizing the risks
- Flexibility (H_2 vs. Electricity)
- Address risk of CO_2 storage
- Site selection of HYPOGEN → close to market
- Adequate financing solutions should be investigated and developed in an early phase of the programme

Phase 1

Dynamis – feasibility study

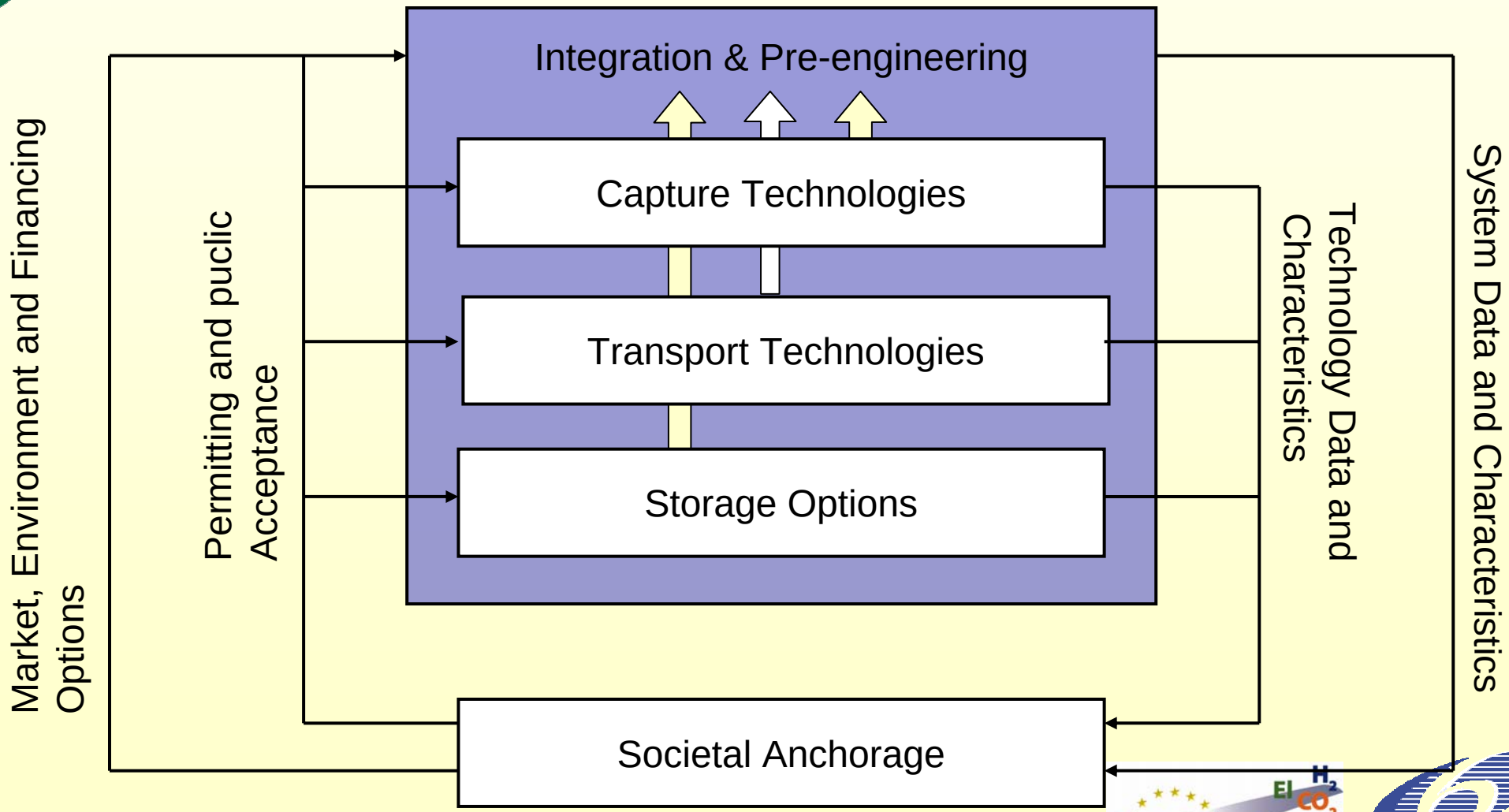
- Investigate viable routes for large-scale cost-effective combined H_2 and electricity production with integrated CO_2 capture and storage, probably combined with EOR.

Project metrics;

- Start-up March 2006
- 30 partners – 8 EU member states, 1 associated country, 1 other
- 14 RTD providers, 7 technology providers, 8 energy providers and 1 financing institution
- SINTEF Energy Research co-ordinator
- 7.4 M€ of which 4 M€ funded by the European Commission

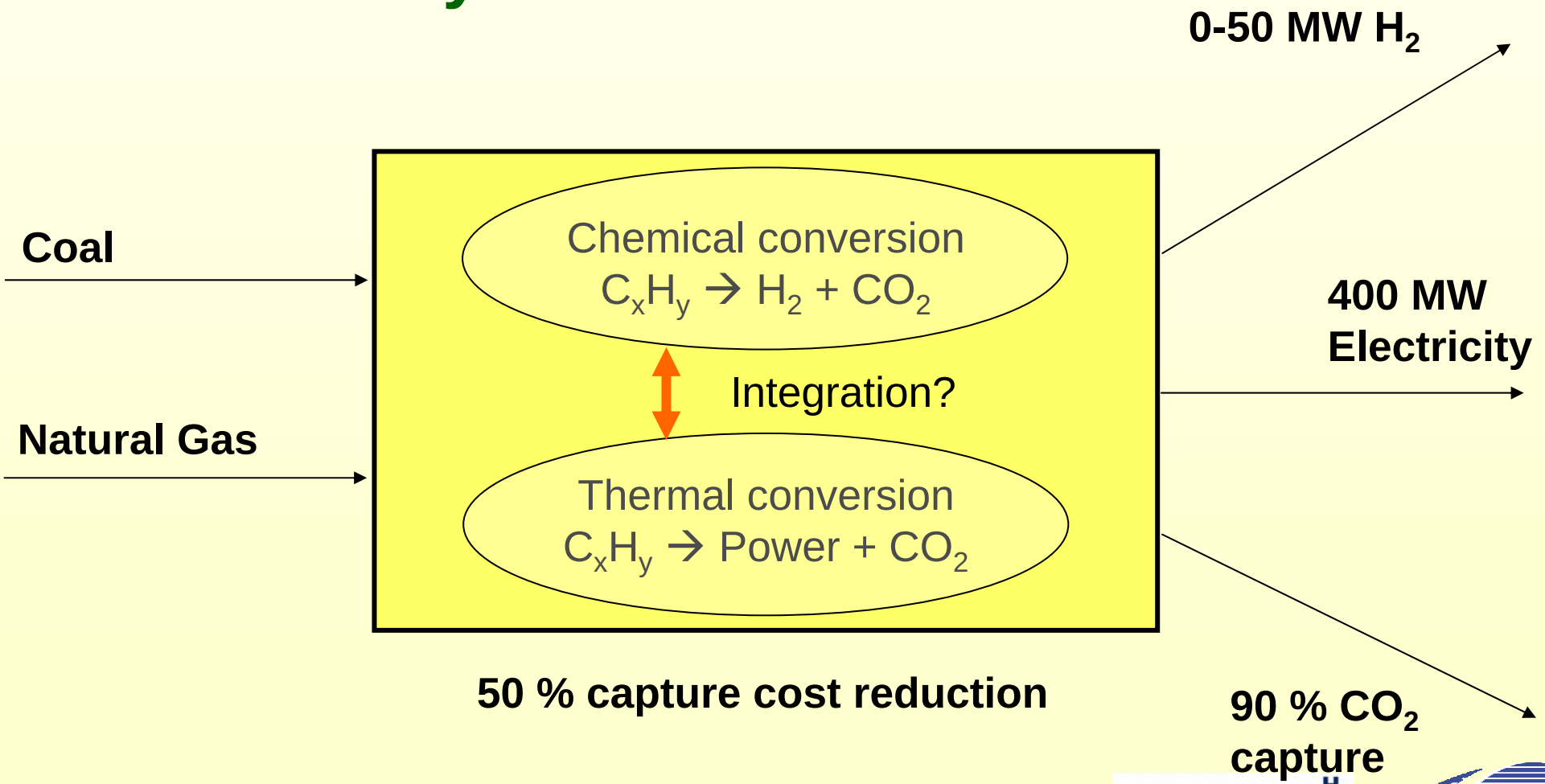
Phase 1

Dynamis – Sub-projects



Phase 1

Dynamis → HYPOGEN



DYNAMIS - Objectives

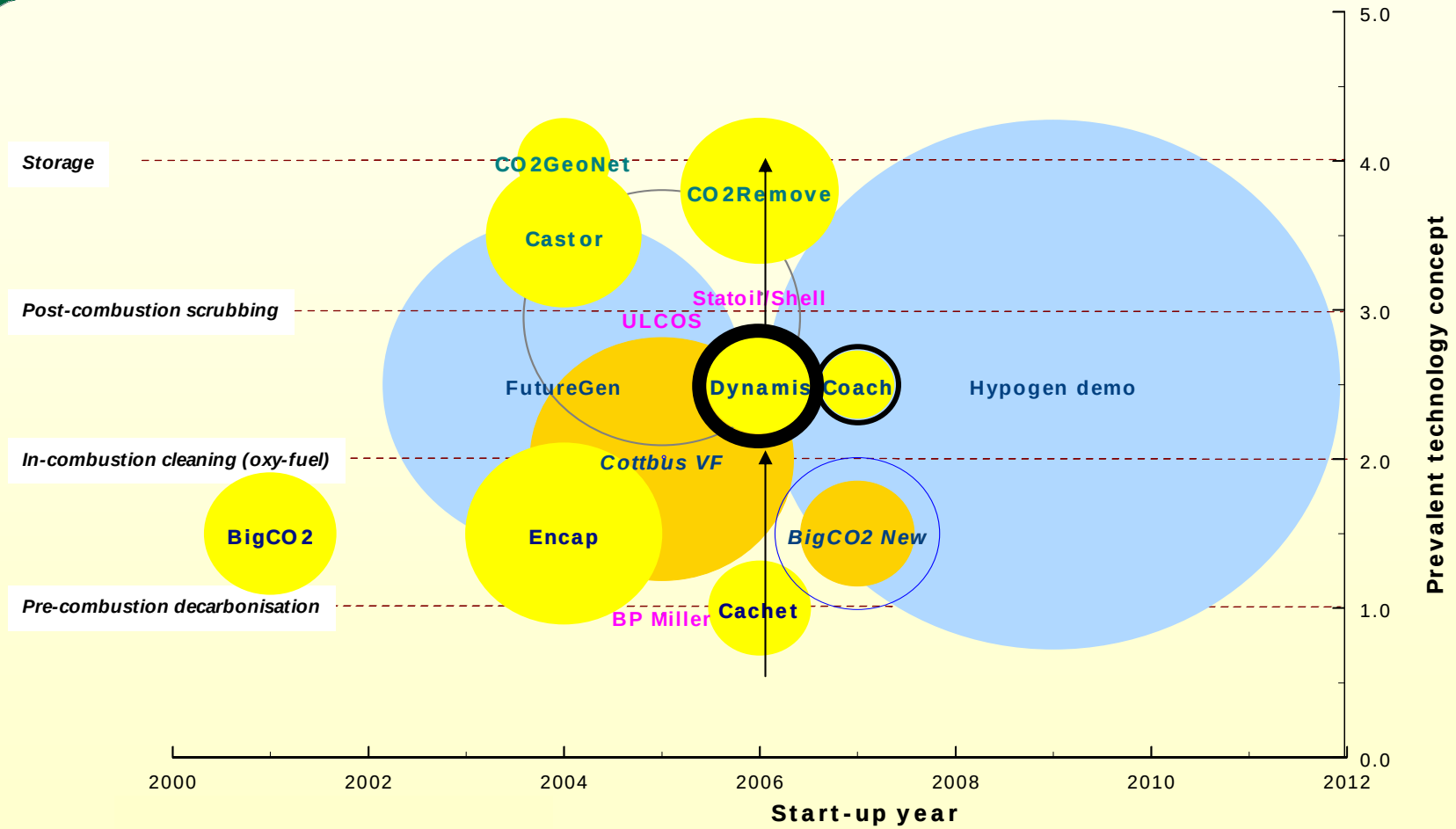
Target (2012):

1. **400 MW power generation using advanced flow technology with hydrogen-fuelled gas turbines**
2. **0-50 MW H_2**
3. **90% CO_2 capture rate**
4. **50% capture cost reduction**

Emphasis:

1. **Decarbonised fossil fuel power generation**
2. **H_2 separation export of piped, tanked or liquid hydrogen**
3. **New power cycles**
4. **Reliable storage of CO_2**
5. **Societal anchorage**

CCS projects by start-up year and size



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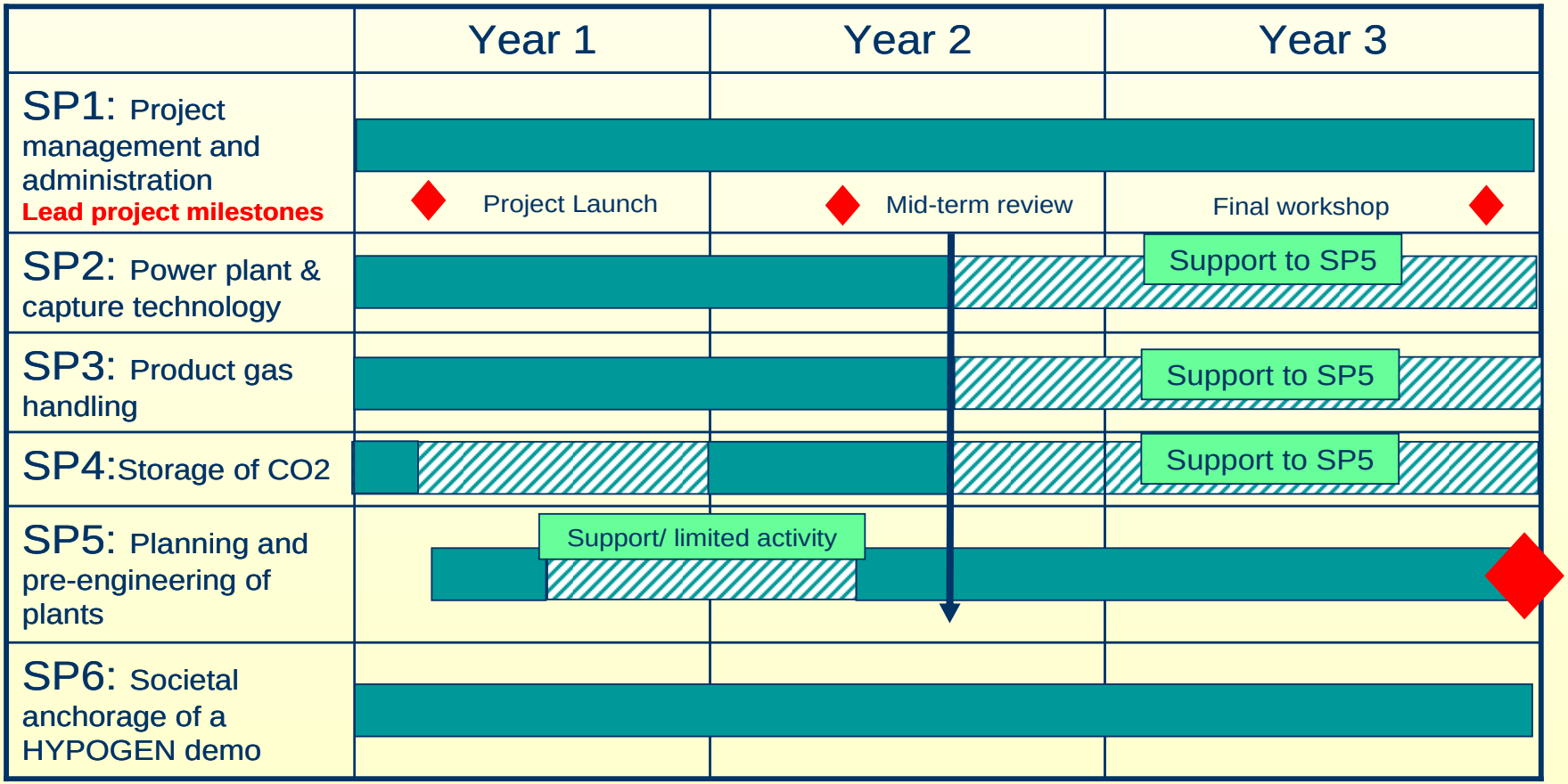
DYNAMIS Overall Project Schedule



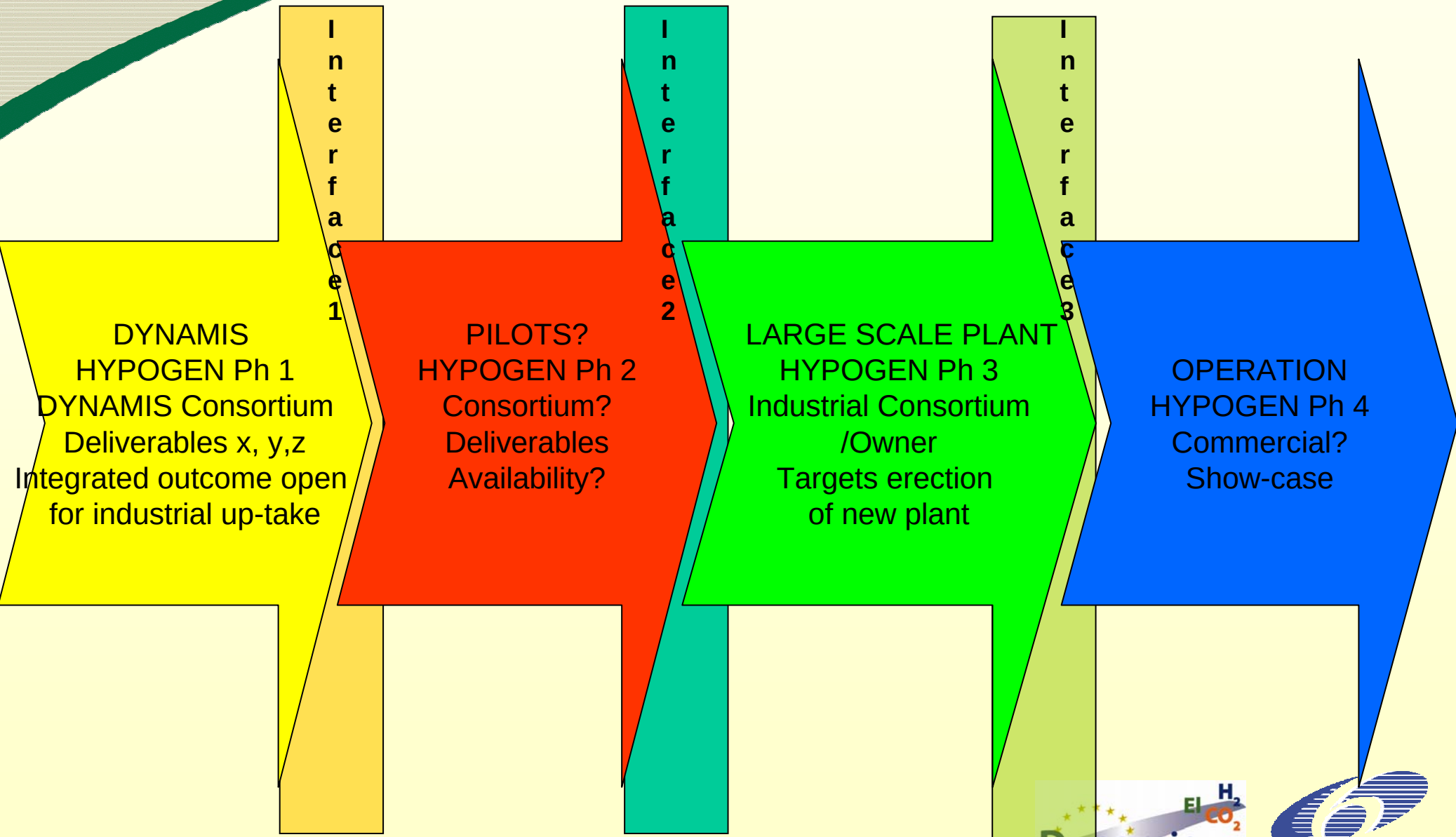
What will DYNAMIS deliver?

- A coherent view of
  - Options for CCS plants in Europe
    - Fuels
    - Preferred Technology
    - Example locations
    - Storage and EOR possibilties
    - Financing schemes
    - Regulatory restraints and possibilities
  - Non-technical barriers
    - Societal views of a Hypogen demonstration
- A pre-engineering basis suitable for uptake in the next phase of Hypogen

How can we make DYNAMIS delivering the right deliverables?

1. What is your project/initiative about
    1. What is the project plan in terms of desicion gates and required funding?
    2. Where, who and when?
2. What needs to be in place to make your initiative happen?
3. How can DYNAMIS help your initiative or vice versa to promote a concerted action in Europe towards CCS deployment?
    1. Realising Hypogen via pilots or full scale demo
    2. Timescales versus DYNAMIS
    3. Hydrogen – key or pacing in a CCS context
    4. Structure of DYNAMIS outcome to ensure commercial up-take in your project

DYNAMIS shall be flexible!


2005/06
2008/09
2011/12
2015/16
20XX->
Interface 1
Interface 2
Interface 3
DYNAMIS
HYPOGEN Ph 1
DYNAMIS Consortium
Deliverables x, y,z
Integrated outcome open
for industrial up-take
PILOTS?
HYPOGEN Ph 2
Consortium?
Deliverables
Availability?
LARGE SCALE PLANT
HYPOGEN Ph 3
Industrial Consortium
/Owner
Targets erection
of new plant
OPERATION
HYPOGEN Ph 4
Commercial?
Show-case

Ideas to promote co-operation and exchange

- Semi-annual alignment project meetings
  - ✓ Progress
  - ✓ Streamlining schemes (if req'd), progressing innovative ideas, make best use of shared information
- Establishing an industrial contact group towards DYNAMIS with appropriate steps to ensure required IPR management/control
- DYNAMIS access to your projects – open for your views

- Can be done immediately:
  - ✓ Links from respective web pages
  - ✓ Creating an extended newsletter list encompassing key people in the various initiatives