

# Expert Workshop on Synergies between HYPOGEN and the Hydrogen Economy

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*AGENDA and DYNAMIS Presentation*  
*Brussels - Belgium*  
*January 18, 2006*

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# Workshop Agenda

## Chair: – Manuel Sanchez Jimenez- DG RTD

- 09:00 Welcome address: *Wictor Raldow, European Commission, DG RTD K2*
- 09:20 Mobilising proficiency: Which role is DYNAMIS set to play towards HYPOGEN?, *Nils A. Rokke, SINTEF, Co-ord. DYNAMIS*
- 09:50 Development of a European hydrogen economy: What are the main challenges?, *Reinhold Wurster, LBST, Co-ord. Hyways*
- 10:20 Expected purity level of hydrogen to be fed into a European hydrogen infrastructure, *Philippe Queille, Air Liquide R&D Deputy Director*
- 10:50-11:20 Coffee break

## Chair: Estathios Peteves – JRC

- 11:20 Presentation of the implementation plan of the HFP , *Philippe Mulard, TOTAL, HFP Advisory Council*
- 11:50 Presentation of strategic documents of the ZEP TP , *Arve Thorvik, Vice President, EU Affairs, Statoil, Member of ZEP Advisory Council*
- 12:20 Bridging the gap between the technology platforms for power and hydrogen, *Nick Otter, Alstom Power*
- 12:50 Discussion
- 13:20-14:20 Lunch

## Chair: Jens Hetland - SINTEF

- 14:20 Future power generation concepts: In which direction is Europe prone to go?, *Werner Renzenbrink, Manager New Power Plant Technologies, RWE*
- 14:50 Initial steps towards an emerging European hydrogen economy; How strong is the link between HYCOM and the HYPOGEN demonstration, and how could synergies prevail?, *Nick Owen, Ricardo/Robert Steinberger, Planet Energie Roads2HYCOM*
- 15:20-15:50 Coffee break

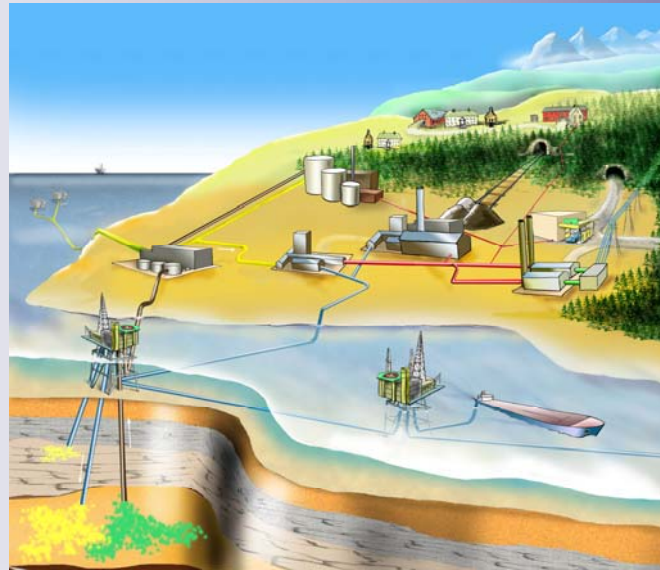
## Chair : DYNAMIS

- 15:50 Thematic discussion and actions to follow up
- 16:50 Summary and conclusions

# Synopsis of LARGE CCS Project meeting 5 Sept. 06

- H<sub>2</sub> issue needs to be resolved
  - Ownership for fossil-fuel H<sub>2</sub>
  - Dynamis as vehicle for bridging FCH and ZEP
- HYPOGEN needs to be placed/revitalised within the CCS and H<sub>2</sub> strategies of Europe
- All EU CCS projects are interconnected with DYNAMIS- need to create a forum for exchange (findings, lessons learnt..)

# Which role is DYNAMIS set to play towards HYPOGEN?



Nils A. Røkke  
Co-ordinator DYNAMIS



# 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
- DYNAMIS
  - First phase of the HYPOGEN initiative

# EU - DYNAMIS/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€**



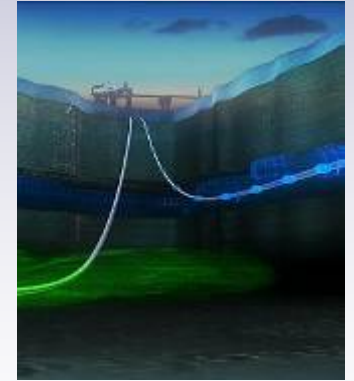
Pic. Siemens



Pic. Vattenfall

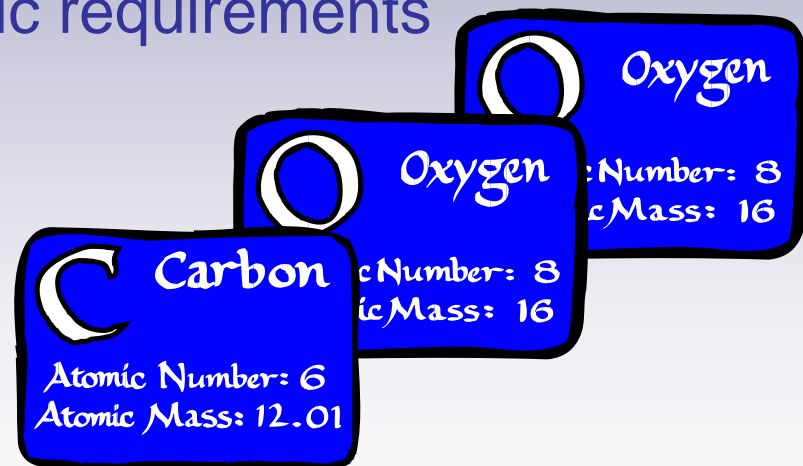
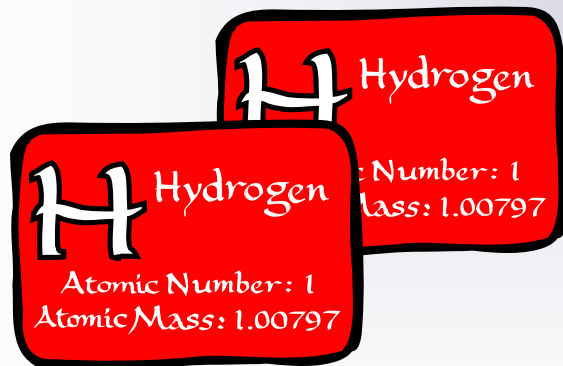


Ill. Statoil

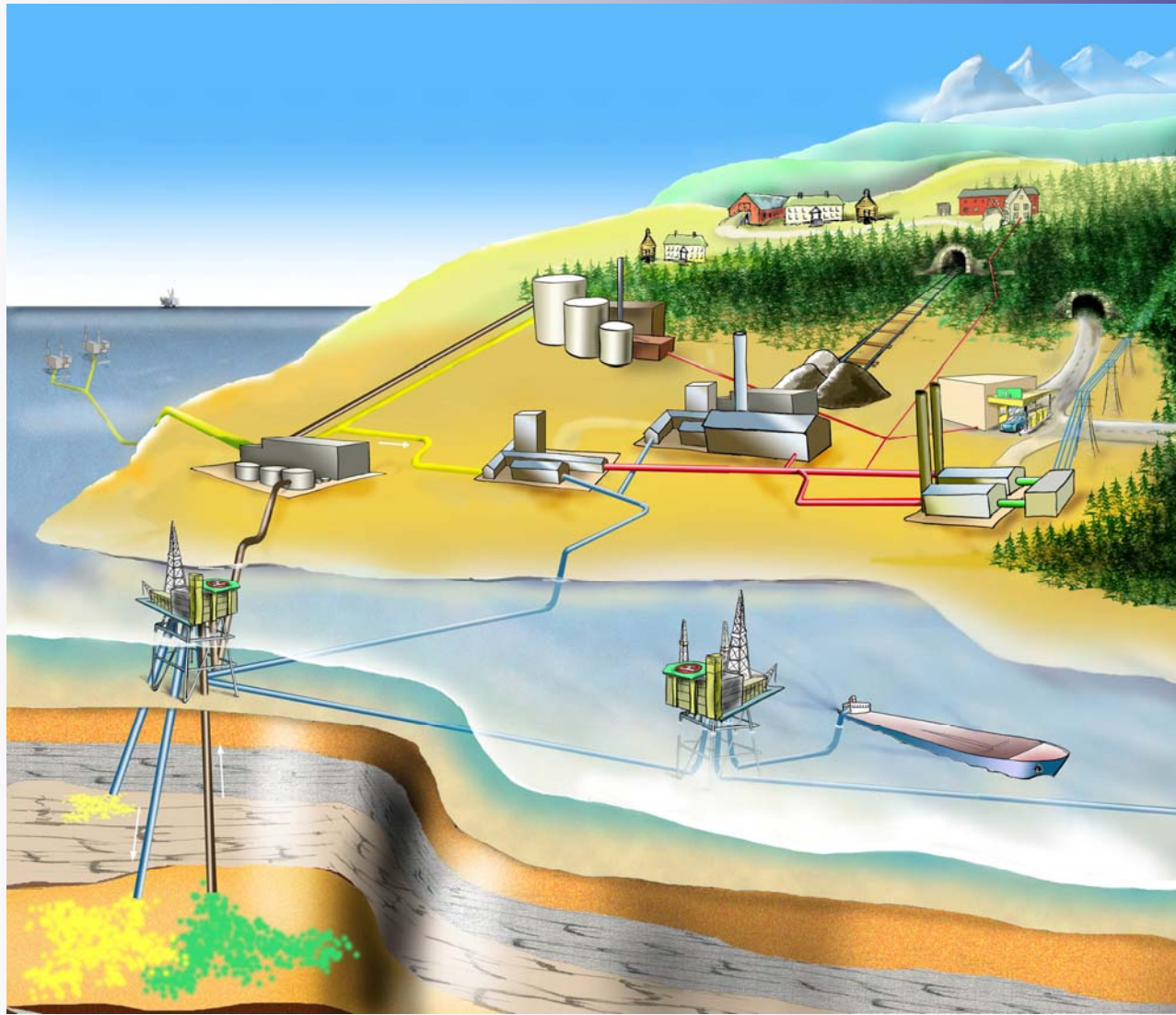


# DYNAMIS in Short

- Key words for DYNAMIS
  - Decarbonised power production
  - H<sub>2</sub> separation and production
  - Novel power cycles
  - Safe storage of CO<sub>2</sub>
  - Societal anchorage including judicial, funding and other public requirements



# The DYNAMIS and HYPOGEN Vision





# The DYNAMIS Consortium

**ENERGY PROVIDERS**




STATOIL  
bp  
HYDRO

**R&D PROVIDERS**



SINTEF  
ifp  
British Geological Survey  
NATURAL ENVIRONMENT RESEARCH COUNCIL  
NTNU  
TNO  
BGR  
ISI  
GEUS  
ECOFYS  
Institute for Energy

**MANUFACTURERS, ENGINEERING, FINANCING**



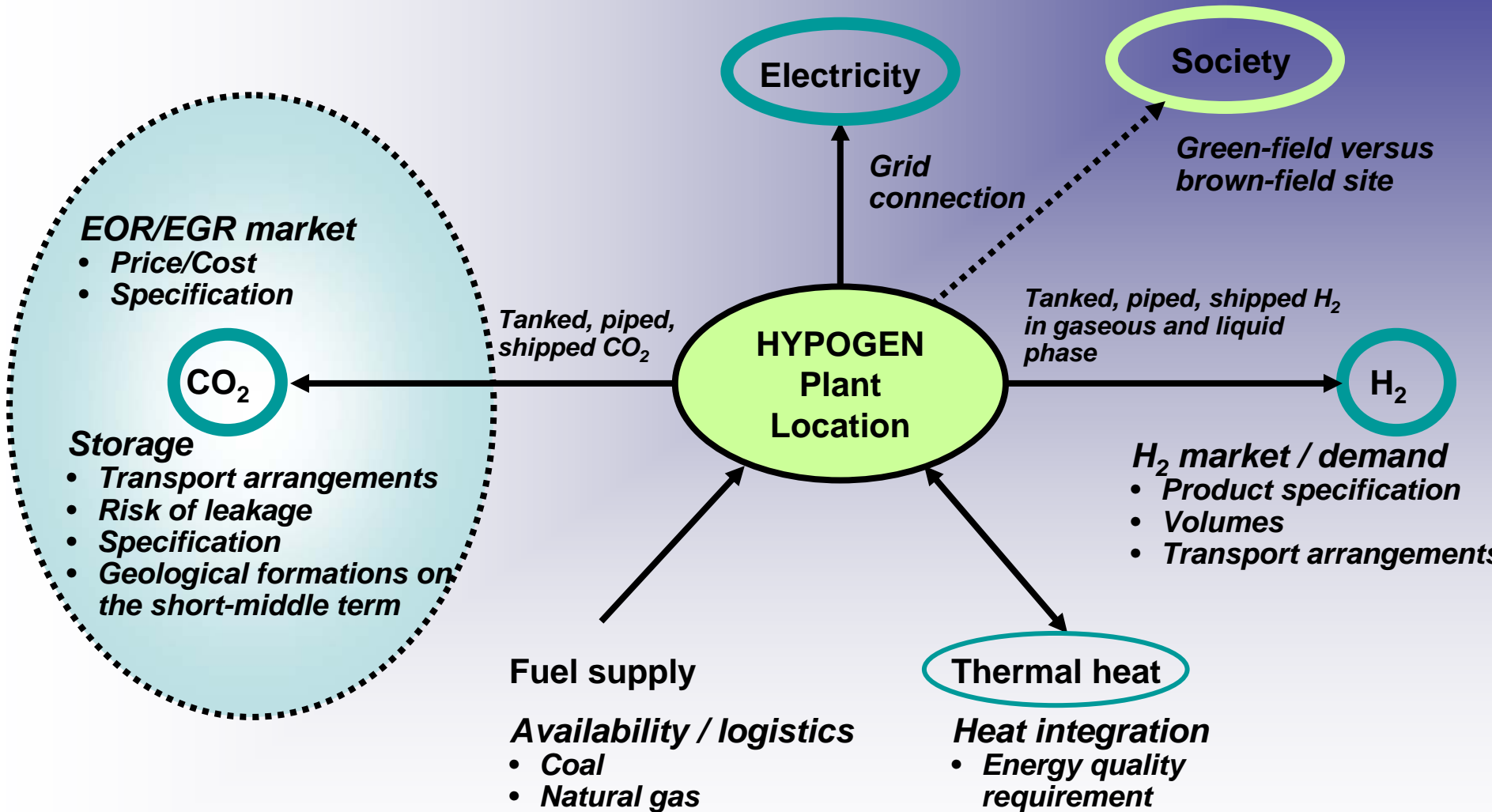
ALSTOM  
AIR LIQUIDE  
Schlumberger  
SOCIETE GENERALE

**POWER COMPANIES**



e-on  
endesa  
VATTENFALL  
Enel

# HYPOGEN Plant

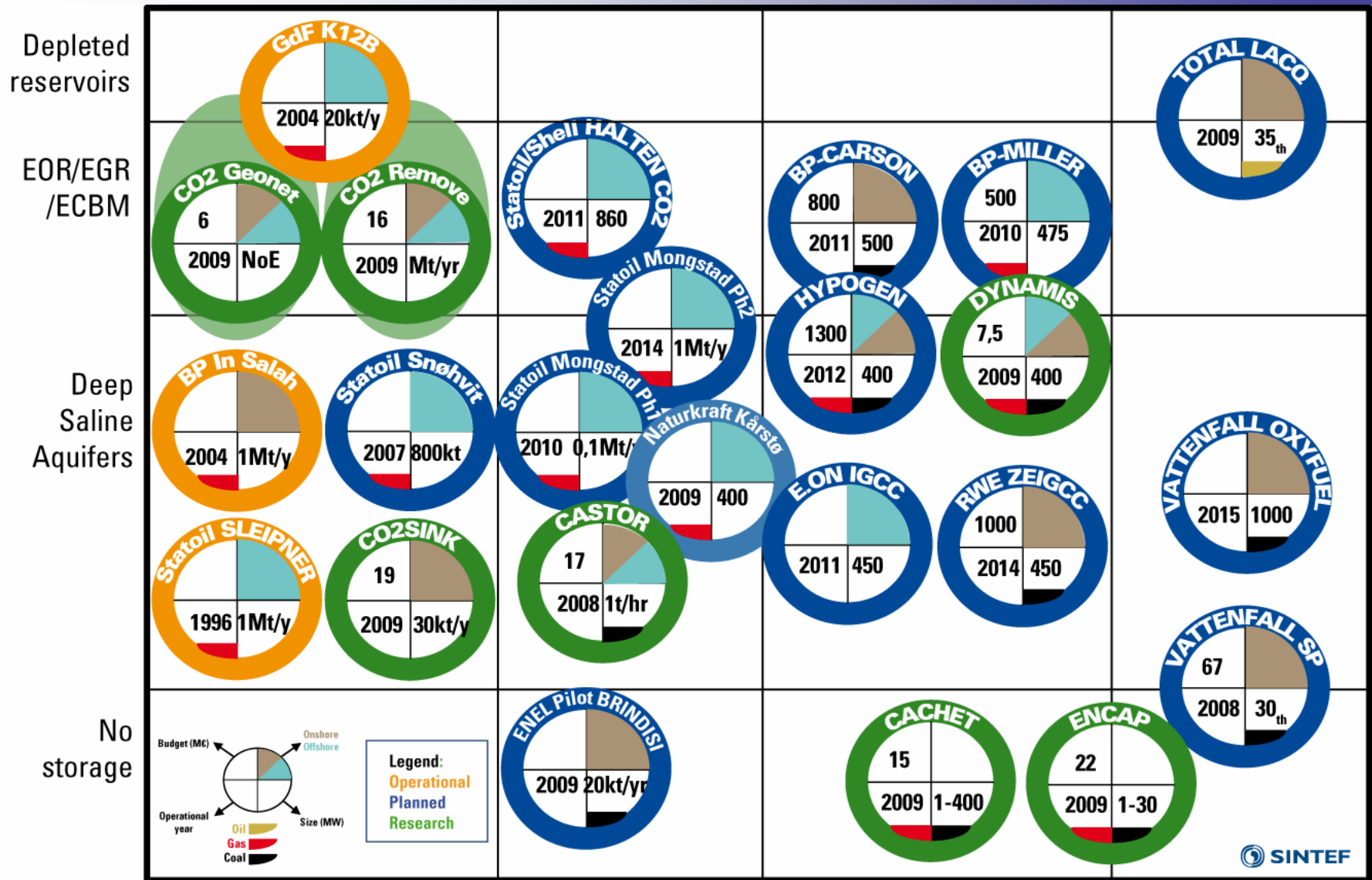


# *What will DYNAMIS deliver?*

- ☞ A coherent view of
  - ☞ Options for CCS plants in Europe
    - ☞ Fuels
    - ☞ Preferred Technology
    - ☞ Example locations
    - ☞ Storage and EOR possibilities
    - ☞ 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

DYNAMIS was called for  
in 2004 and started in  
2006- what has  
happened inbetween?

# CCS Projects mapping



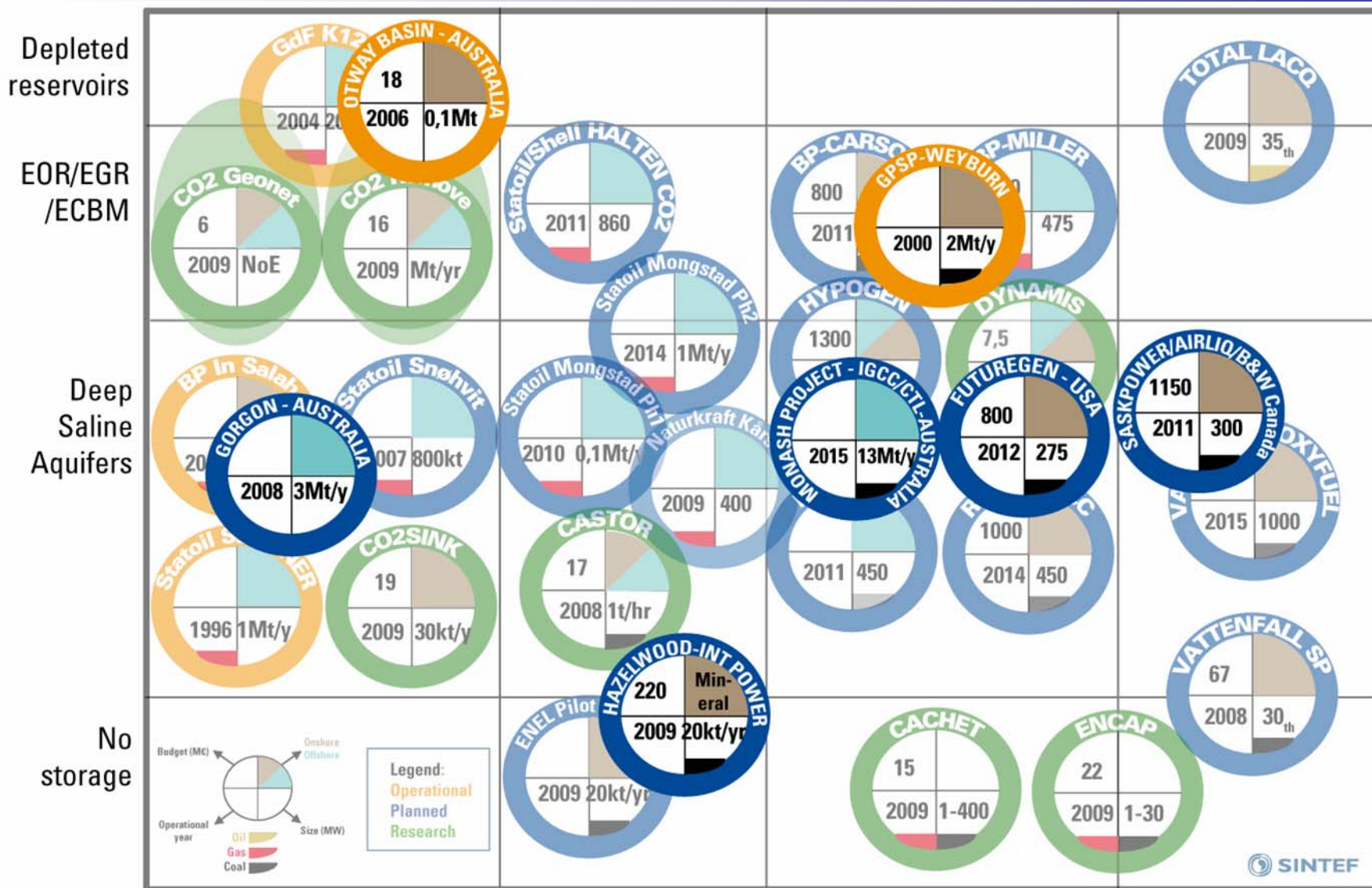
Gas separation or no Capture

Post Combustion

Pre-Combustion

Oxy-fuel

# US, Australia and Canada – Major projects



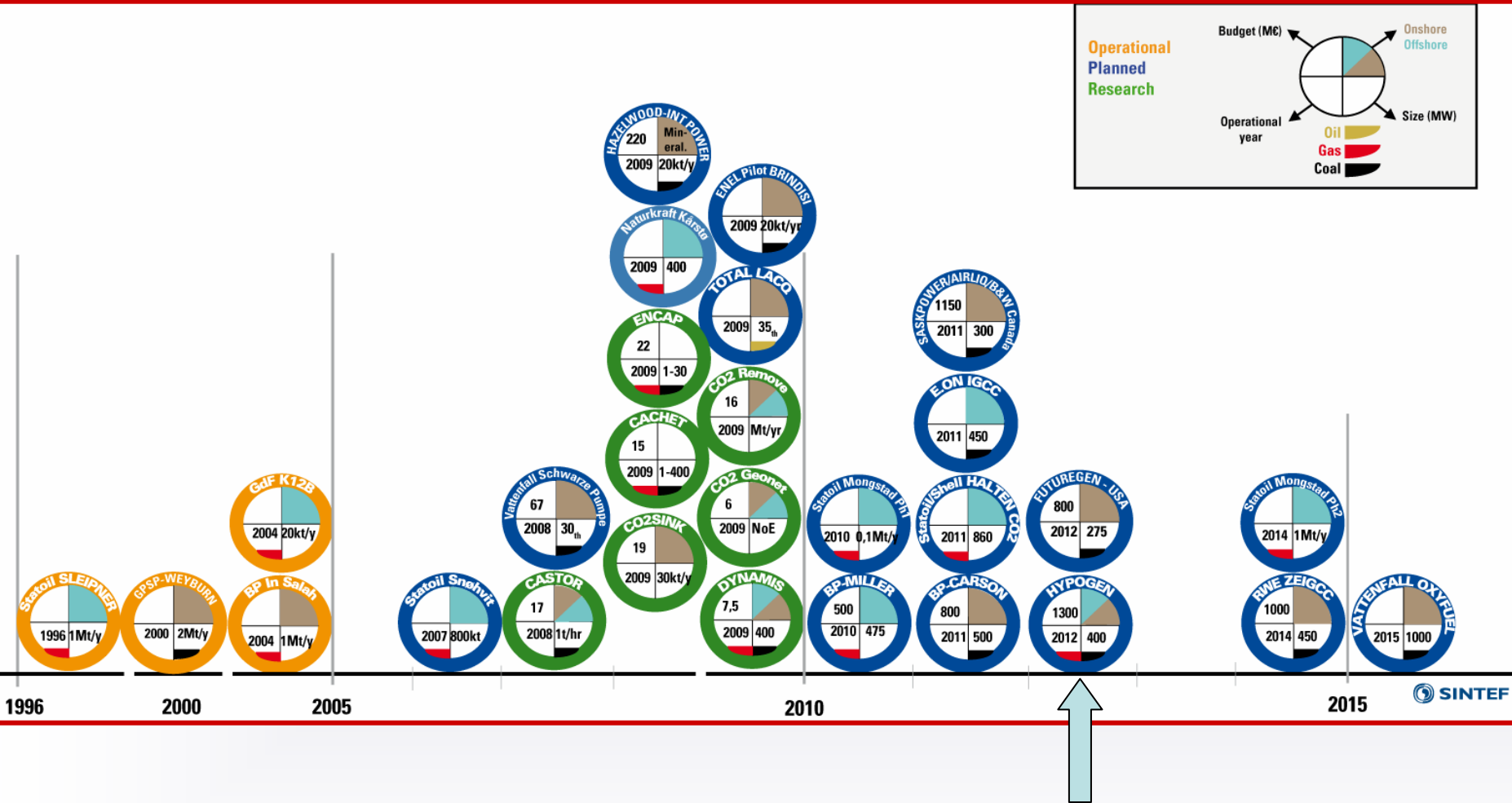
Gas separation or no Capture

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Pre-Combustion

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# Projects timeline



# What is Europe asking for?

## Quote from” COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN COUNCIL AND THE EUROPEAN PARLIAMENT - AN ENERGY POLICY FOR EUROPE”

As set out in its Sustainable Power Generation Communication 24, the Commission will in 2007 start work to:

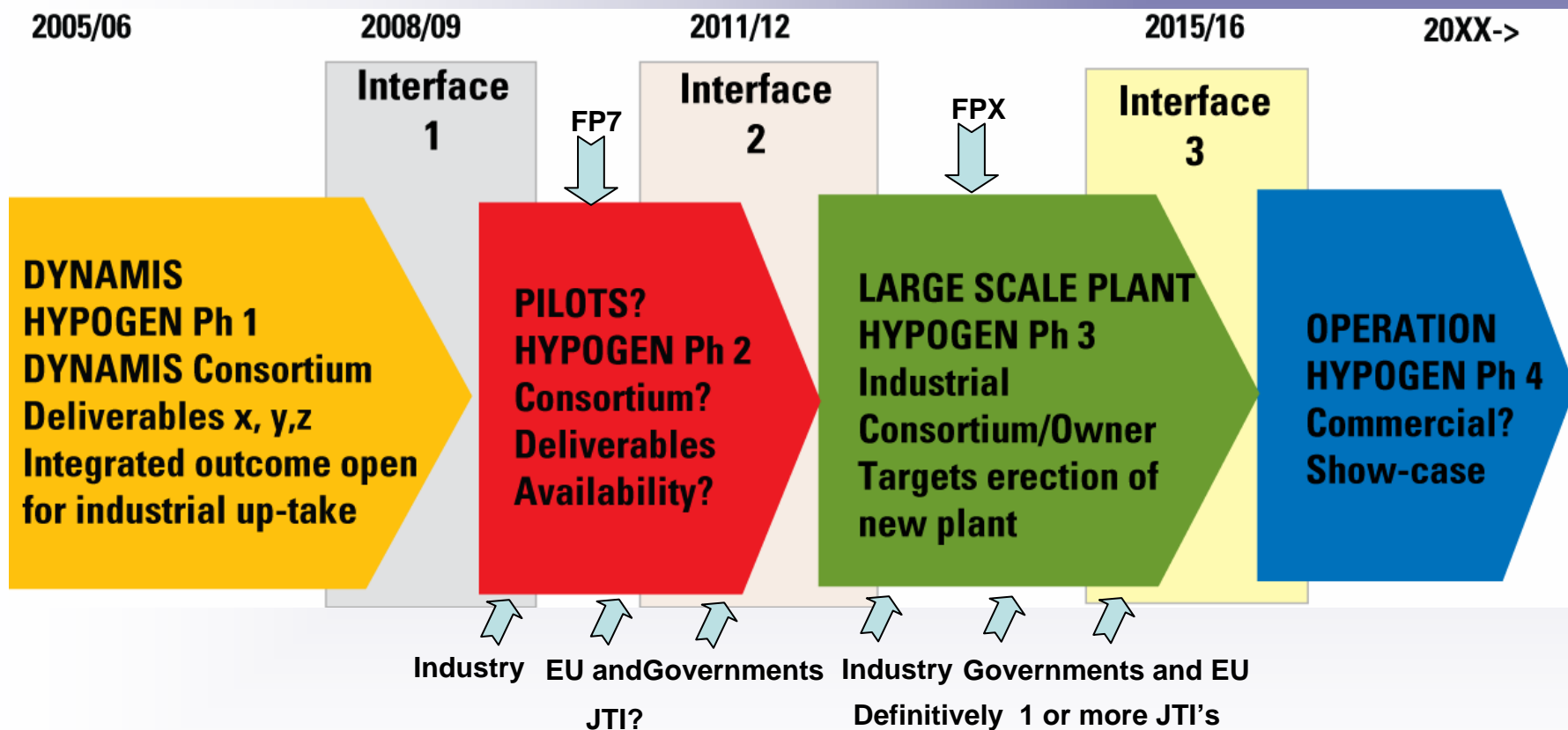
- Design a mechanism to stimulate the construction and operation by 2015 of up to 12 large scale demonstrations of sustainable fossil fuels technologies in commercial power generation in the EU25.
- Provide a clear perspective when coal- and gas-fired plants will need to install CO<sub>2</sub> capture and storage. On the basis of existing information, the Commission believes that by 2020 all new coal-fired plants should to be fitted with CO<sub>2</sub> capture and storage and existing plants should then progressively follow the same approach.
- Proposed a committment of 20% cuts by 2020 in GHG emissions and to push for 50% cuts globally by 2050



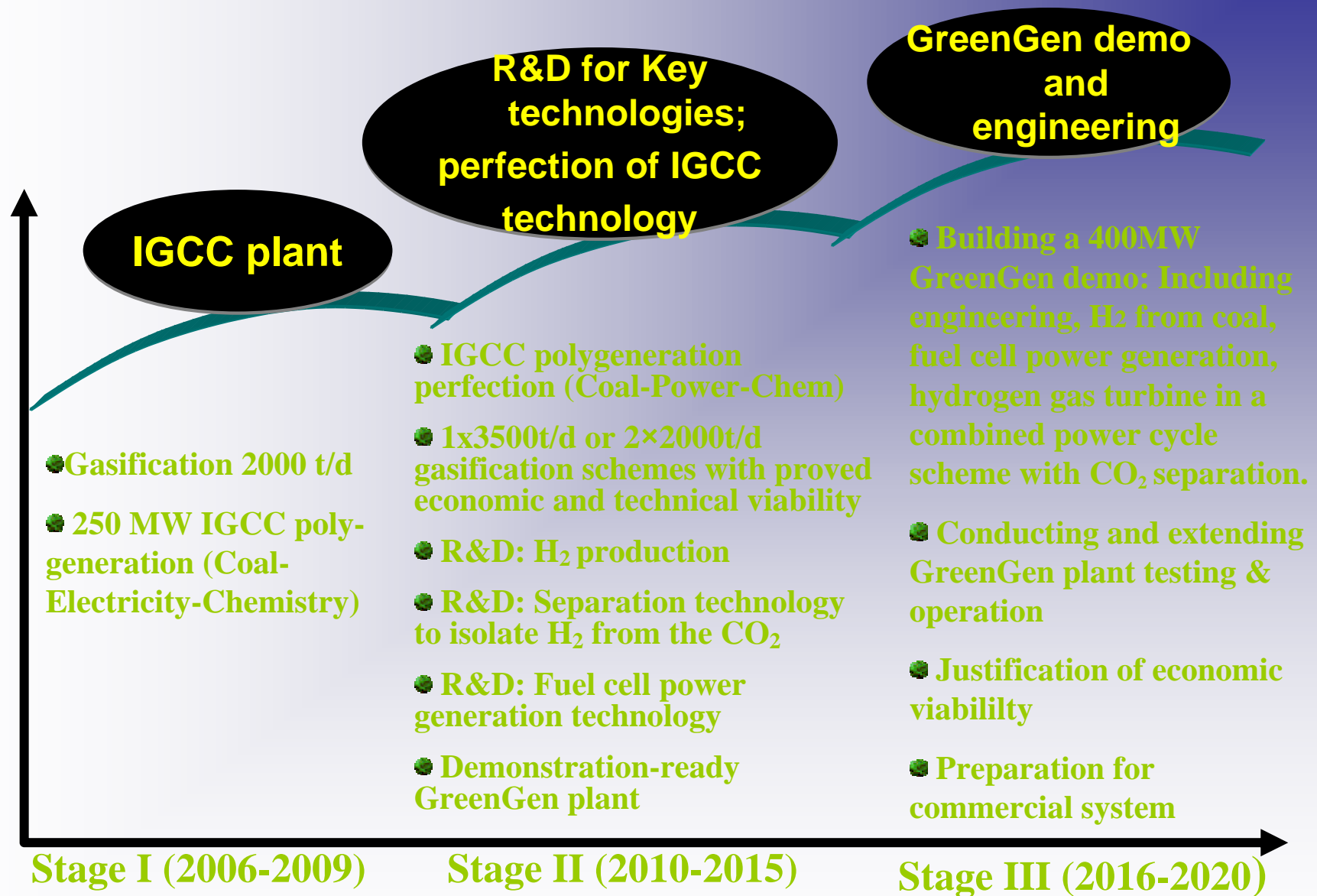
# Food for thought

- ❑ Limited support for following up the HYPOGEN – the vehicle is established!
- ❑ DYNAMIS can facilitate the next phase of HYPOGEN but probably mainly outside the FP's- we need to form an alliance
- ❑ DYNAMIS is well placed to address the challenges addressed in the Energy Communication Strategy from the commission
- ❑ Use the tools at hand!
- ❑ World's most obvious JTI?

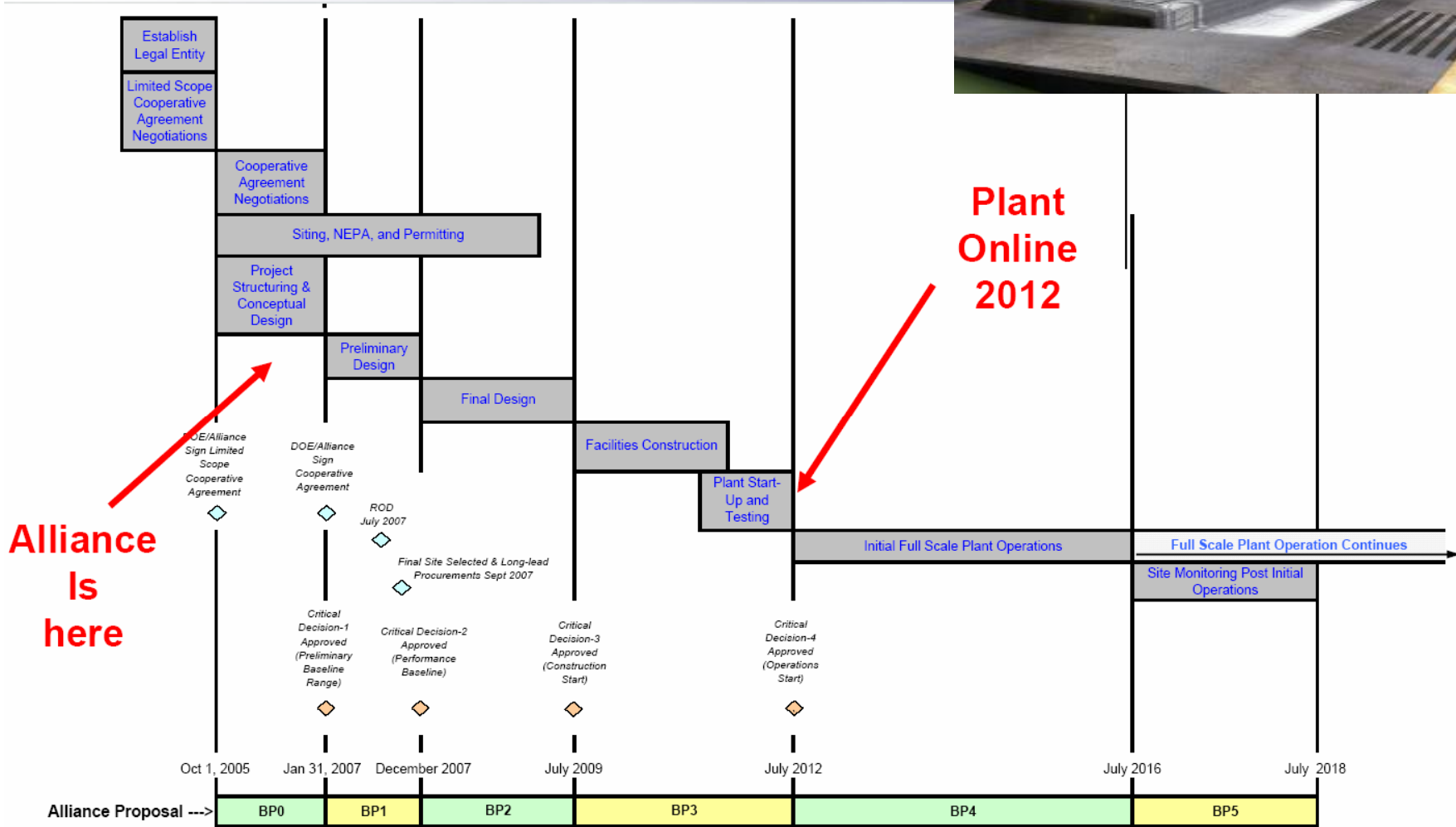
Let's make a "Dugnad" to make HYPOGEN happen with all the gearing mechanisms available and stop talking about concept projects- streamline with the energy communication strategy and ZEP



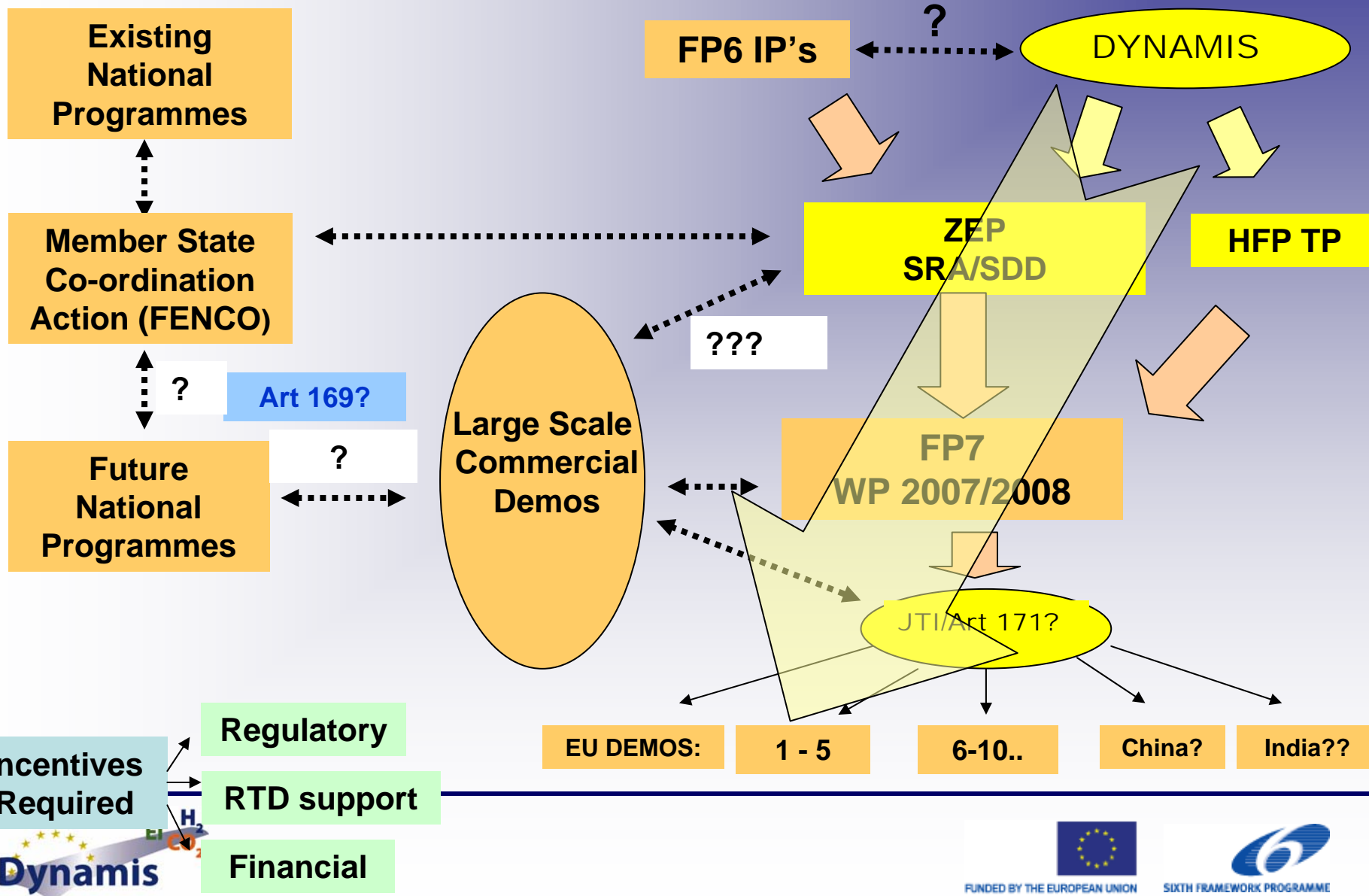
# The Chinese GREENGEN



# Futuregen is happening!



# How does everything fit together?



# Summary

- DYNAMIS is the vehicle for HYPOGEN
- It has the promise of uniting the hydrogen and the low carbon economy
- It should be used actively to promote and accelerate the HYPOGEN initiative
- DYNAMIS is ready to play a role in this effort