CCS developments
Where to after Copenhagen?

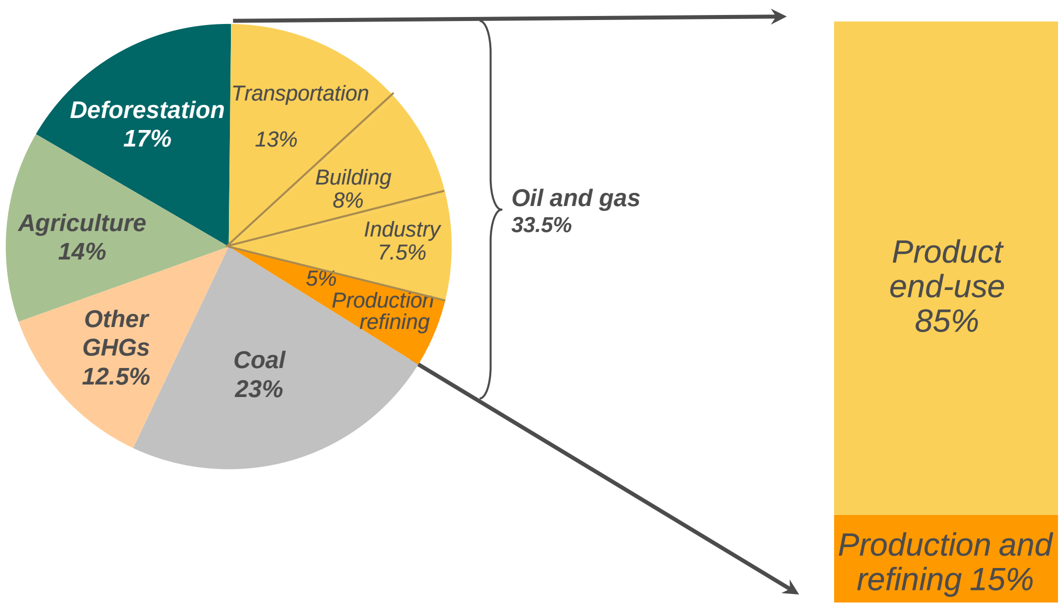
IEF 2nd Symposium on CCS

31st May – 1st June 2010
Luc de Marliave TOTAL

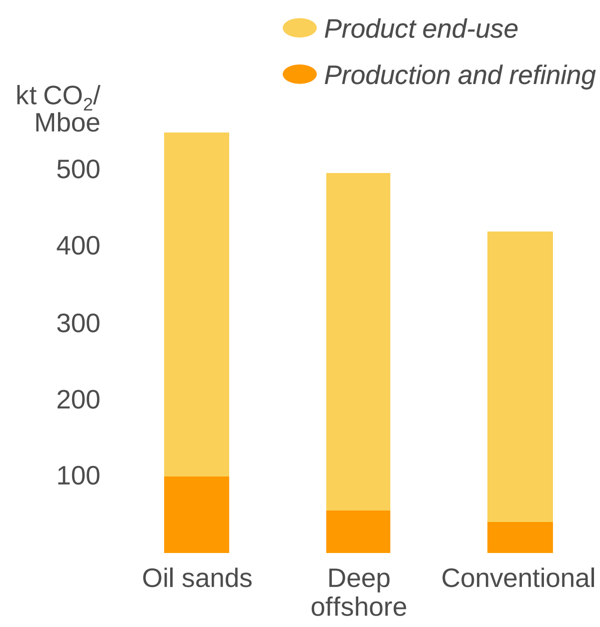
World GHG anthropogenic emissions

50 Gt eq CO_2
including 60 % energy related CO_2

Global GHG emissions by origin*



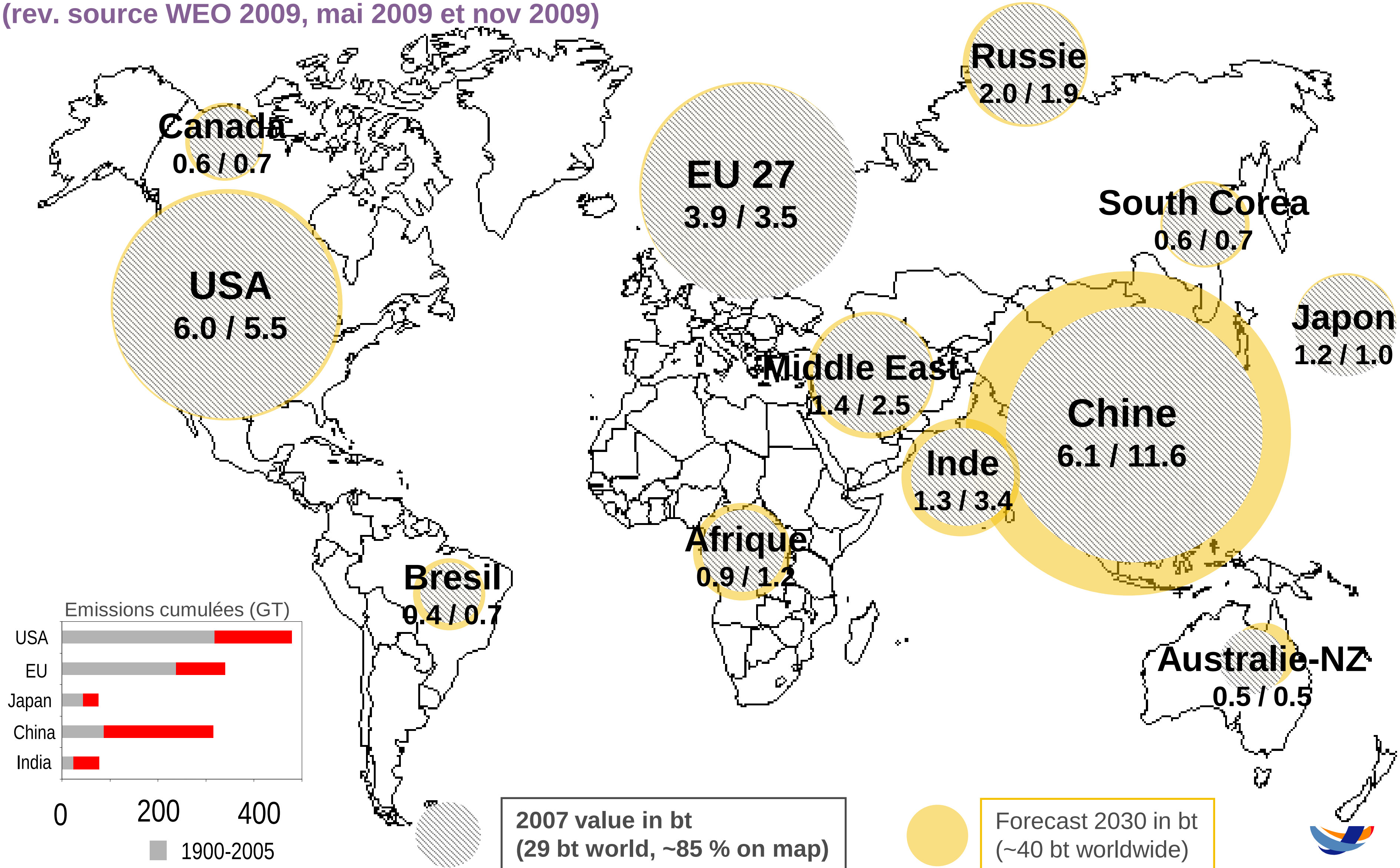
GHG emissions by oil source**



* International Panel on Climate Change (IPCC) 2007 and IEA 2007
** Total

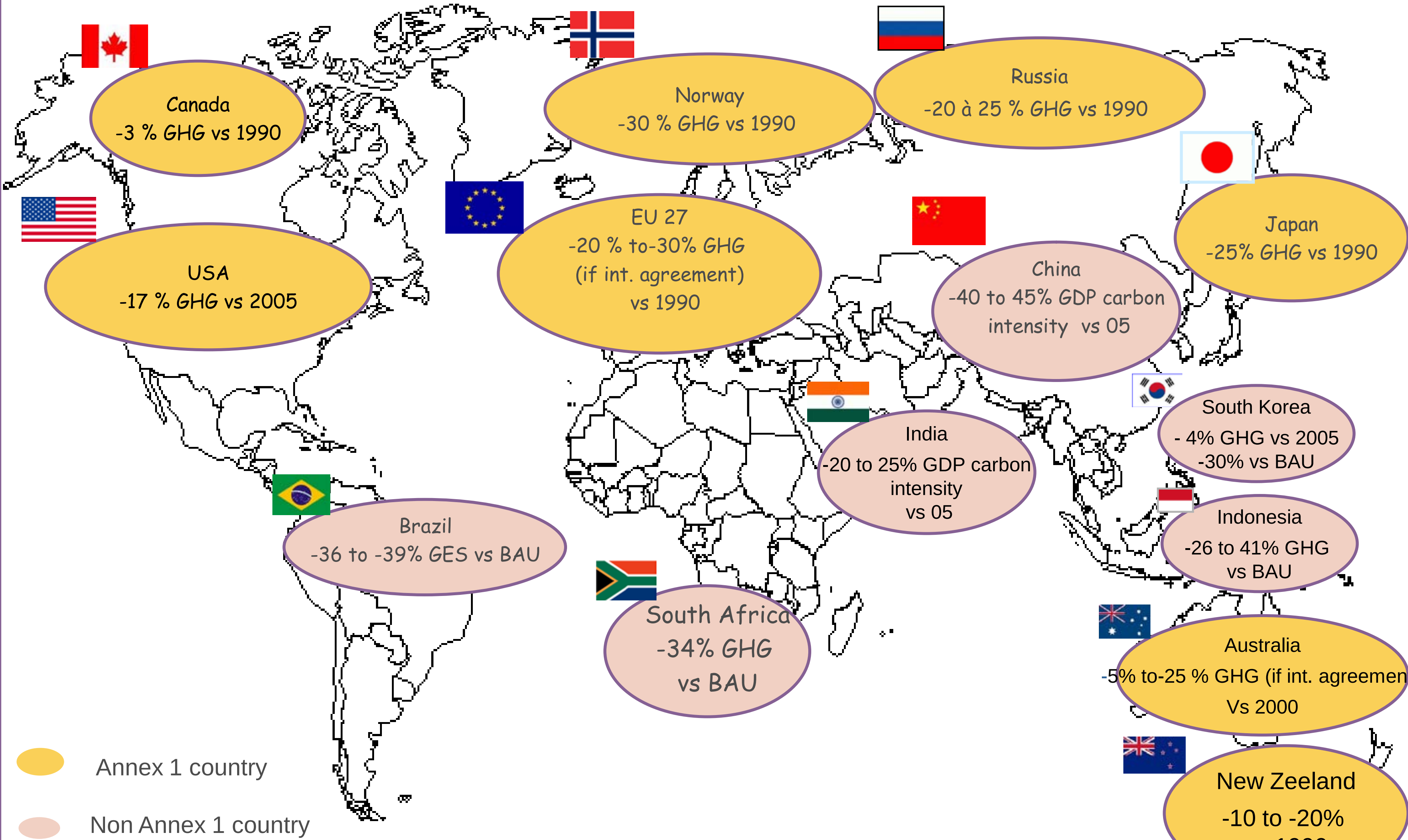
Industrial companies need a clear set of rules for business &long term investment…

Worldwide energy related CO2 emissions (actual 2007 – forecast BAU 2030)
Business As Usual scenario(AIE reference scenario, already including various policies)
(rev. source WEO 2009, mai 2009 et nov 2009)



Will Copenhagen outcome create conditions for safe investment?

Main pledges made in Copenhagen



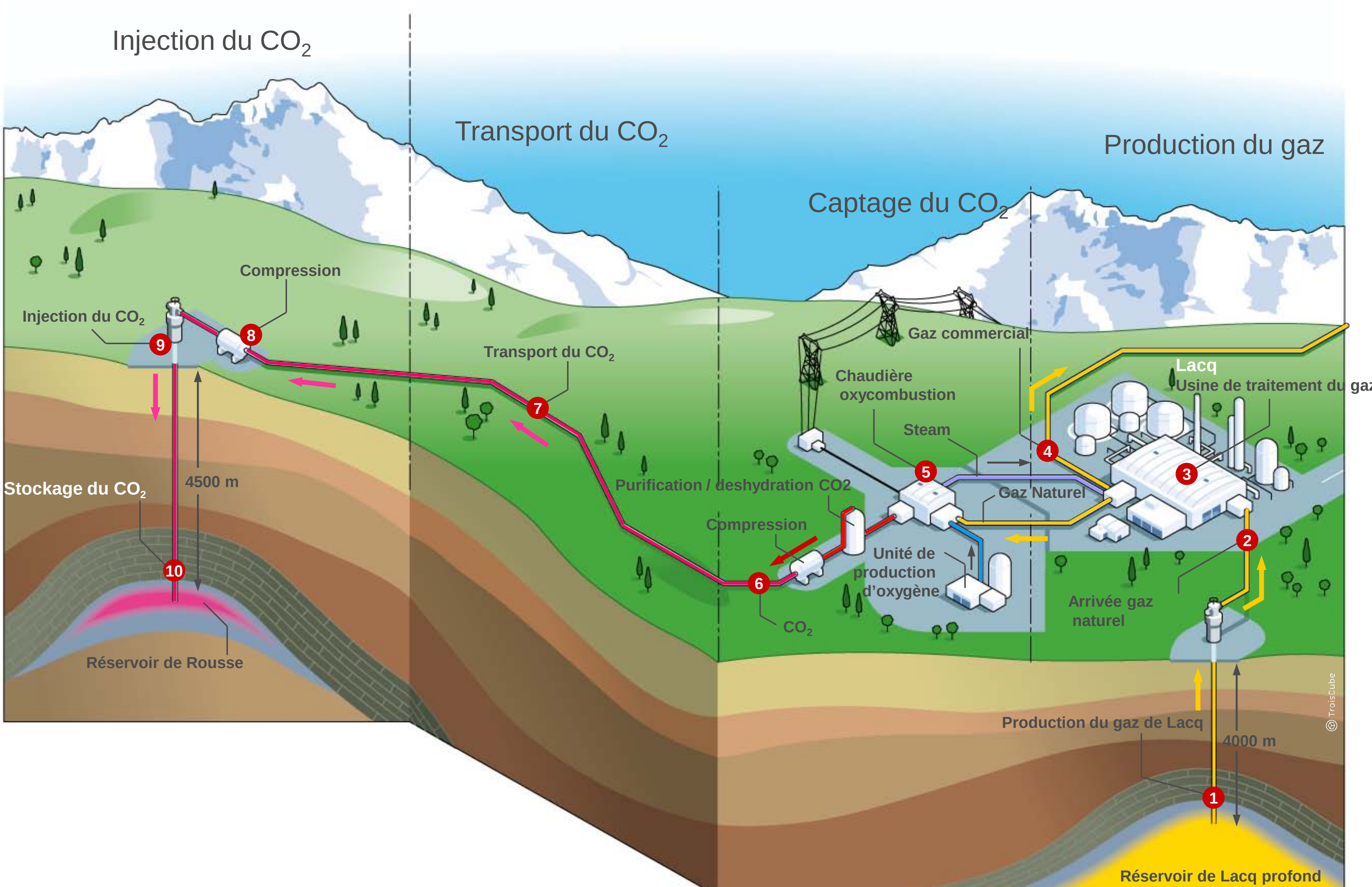
Main orientations for CCS in Copenhagen

- A general recognition that despite its limitations, the CDM mechanism has created an effective price signal for carbon in many countries . However some countries benefit more than others…
- Real progress regarding the technical issues raised by the inclusion of CCS in the CDM (SBSTA report)
- Stronger support gathered among parties including Oil &gas exporting countries, however a broader support among parties still necessary for gaining recognition in Cancun.
- In Copenhagen there has been a progress at political level on the deforestation issue: role of REDD (Reduction of Emissions from Deforestation and forest Degradation), including forests existing before 1990 (REDD+). Another track for CCS?
- The question of what part of the international Copenhagen Green fund could be allocated to CCS demos remains open. A strong conversation on MRV mechanisms took place. International funds invested in projects will require transparent MRV . This would be also the case for CCS.

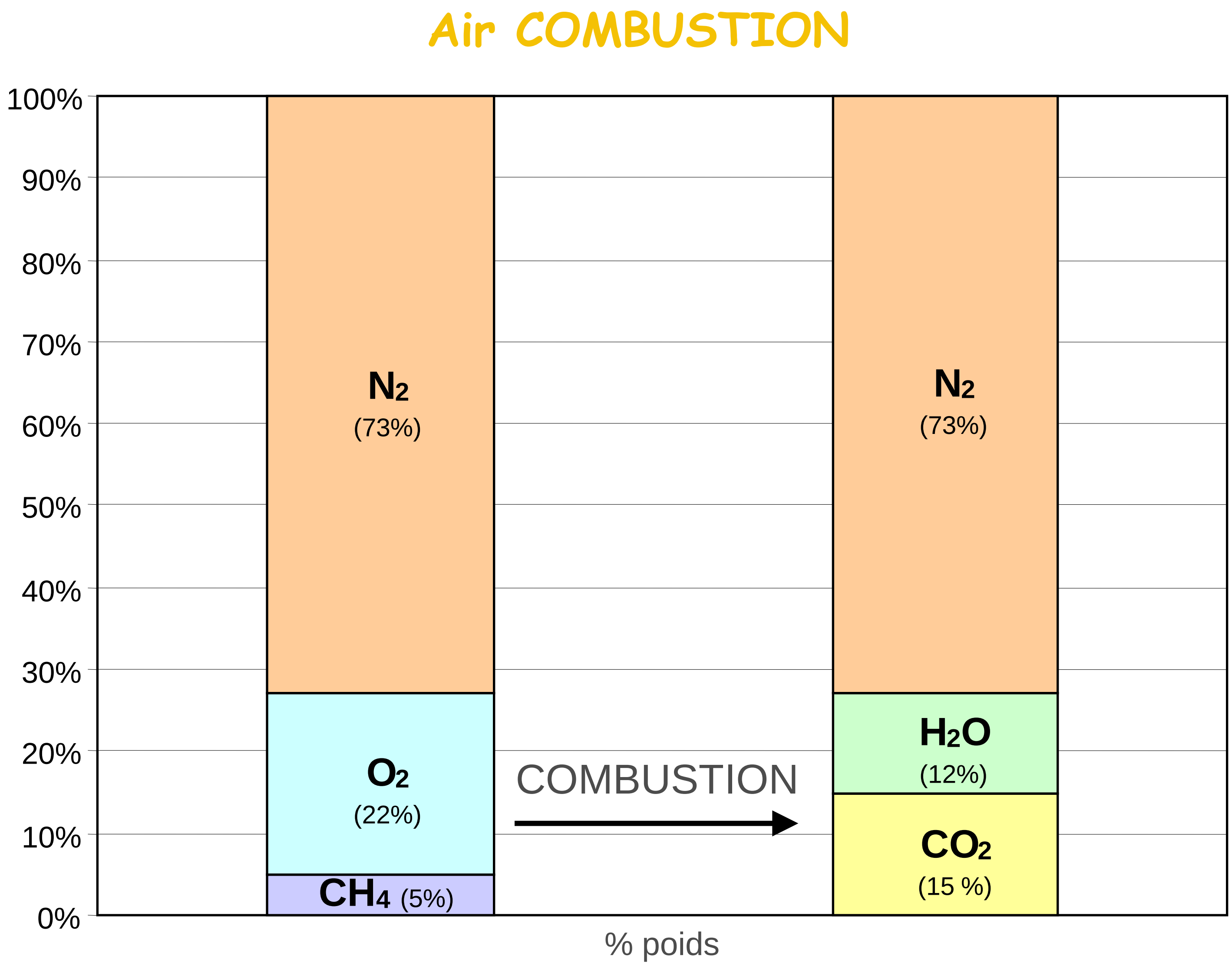
The way forward on CCS-

- CCS remains a relatively attractive solution compared to alternatives for the GHG reduction scenarios to 2050 (impact vs cost and benefits)
- Cost ranges from 20 to 140€/tCO_2 to be compared to other acceptable and subsidized solutions like biofuels, solar or offshore wind for example. Cost optimization to be expected.
- CCS potential sources are 50% power 50% industrial sources (to be taken into account in funding schemes)
- Regulation and public awareness remains to be developed in many countries
- Need to learn more by doing intermediate scale pilots and demos. Learn to develop public private partnerships .

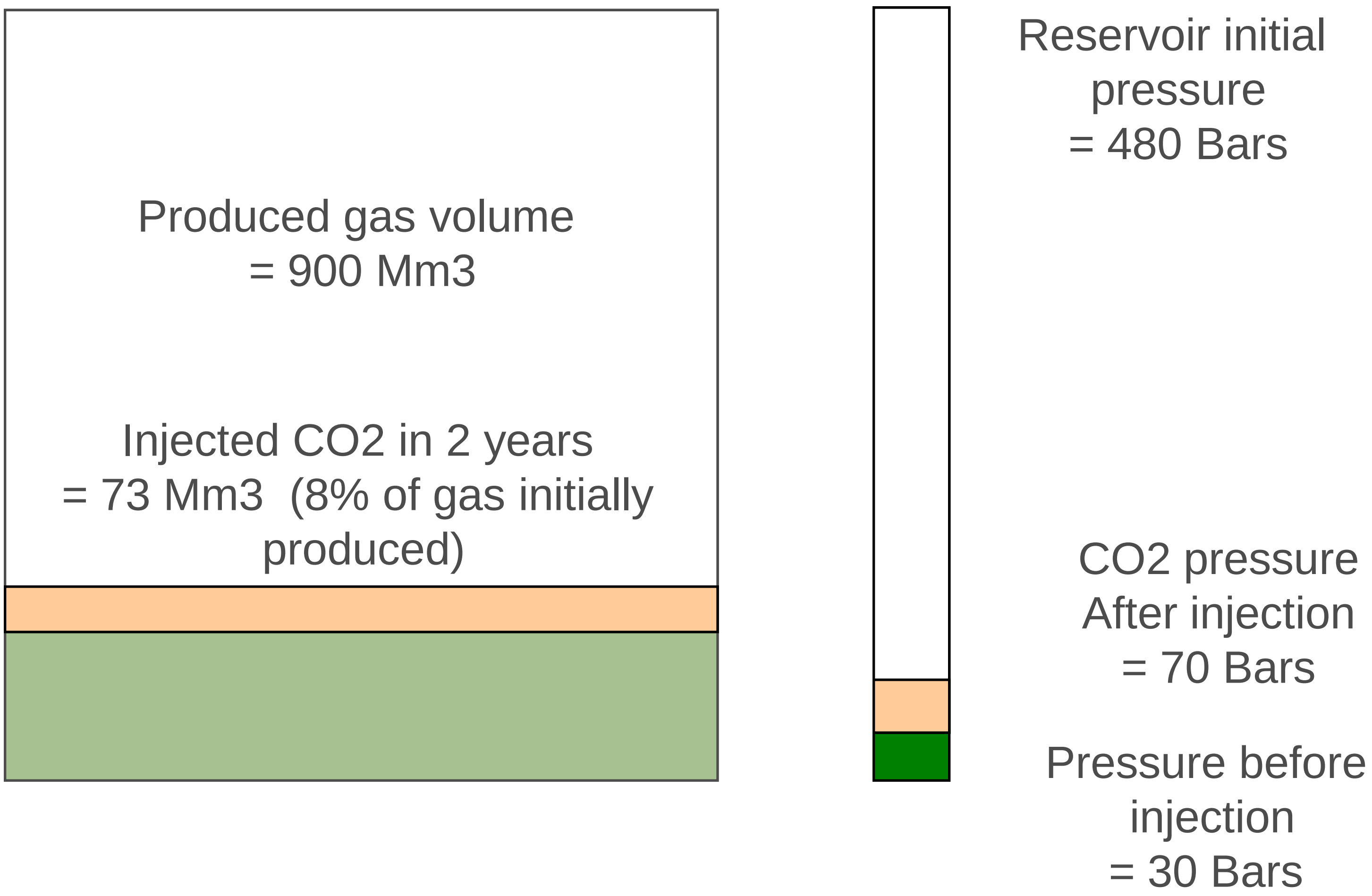
Lacq integrated CCS project



Oxycombustion well adapted for heat&power production…



Depleted gas field situation



Some lessons learned…

- Learned how to convert an existing boiler to novel technology and to purify CO2 for transportation and storage. For the next capture projects : oxycombustion can be upscaled (to be confirmed after pilot)
- For the storage part : success in the public support is key. Learned to design a monitoring system onshore and to gain public acceptance on CO2 storage.
- Set the right level of organization for the stakeholder management of the storage site
- Perform a complete mapping of the stakeholders upfront
- Early discussion with elected representatives to organize the public consultation process
- Have the local specific issues raised early during the public consultation process
- Storage development will require time and has to be started early

TOTAL

A gap in the speed of development of aquifer storage capacities for the next decade…

- A need to get a better grip now on the deep saline aquifers specific issues including pressure management
- assess and develop progressively deep saline aquifer CO_2 storage capacities
- Need to begin with countries able to start early projects , onshore and offshore. Sources of concentrated CO_2 and sources of financial support.
- A project just started in France to learn how to assess and develop deep saline aquifer CO_2 storage capacities with support from ADEME
- The FRANCE NORD (TOTAL, GDFSUEZ, EDF, AIR LIQUIDE, VALLOUREC, BRGM, IFPEN, INERIS, GFZ, EIFER) 54 M€ supported 40% by ADEME to demonstrate storage in the central North part of France.

CCS is part of our portfolio of solutions to GHG reduction
TOTAL's GHG targets

- Reduce flaring by 50% between 2005 and 2014
- Improve Energy Efficiency Indices by 1%/year for Refining/marketing and 2% per year for E&P and Petrochemicals
- Reduce operated GHG emissions worldwide by 15% in 2015 vs 2008
- Use an internal value of 25 euros08/t CO2 in European projects and sensitivities elsewhere
- Develop solutions for consumers(Excellium, Total Ecosolution)
- Develop CO2 capture and geological storage