World Energy Prospects According to Total

Thierry Desmarest
Chairman of Total

Earth Resources: Threat or Treat?
Global Launch Event of the International Year of Planet Earth
UNESCO – Paris – February 13, 2008

TOTAL

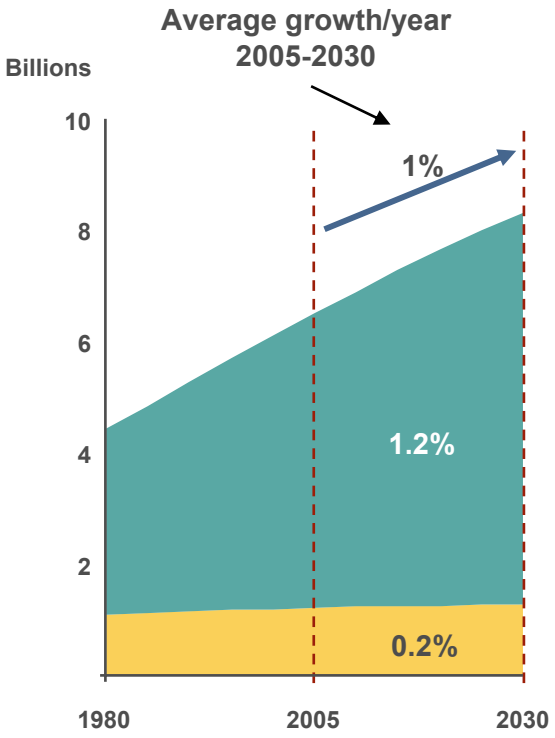
Earth Energy Resources: Threat or Treat ?

- **Demand**
- Earth resources
- What can we do ?

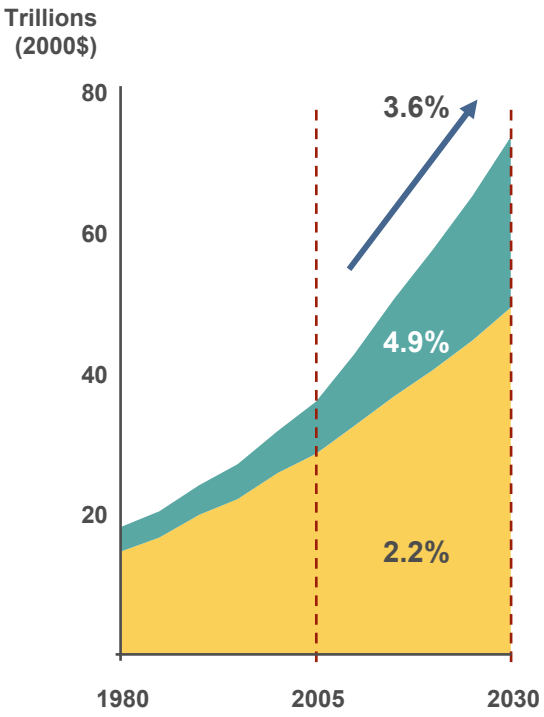
TOTAL

World energy demand is set to increase…

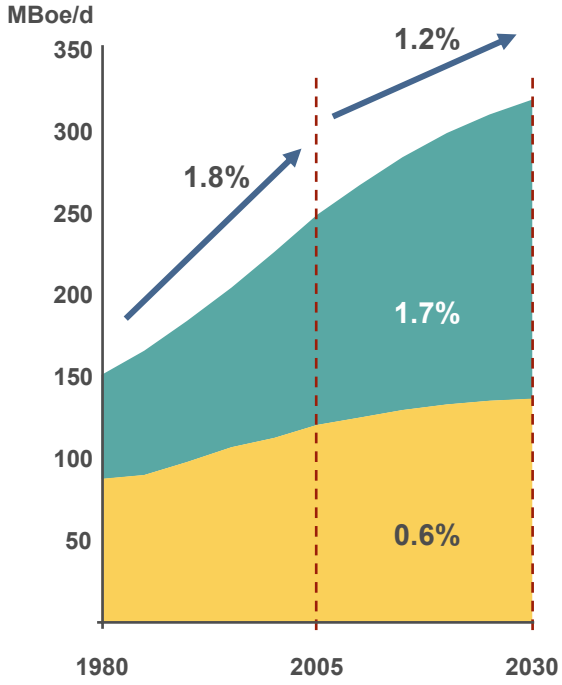
Population



GDP (in real terms)



Energy demand



Source : UN, World Population Prospects. IEA. Total

OECD Non-OECD

...driven by population growth and economic development

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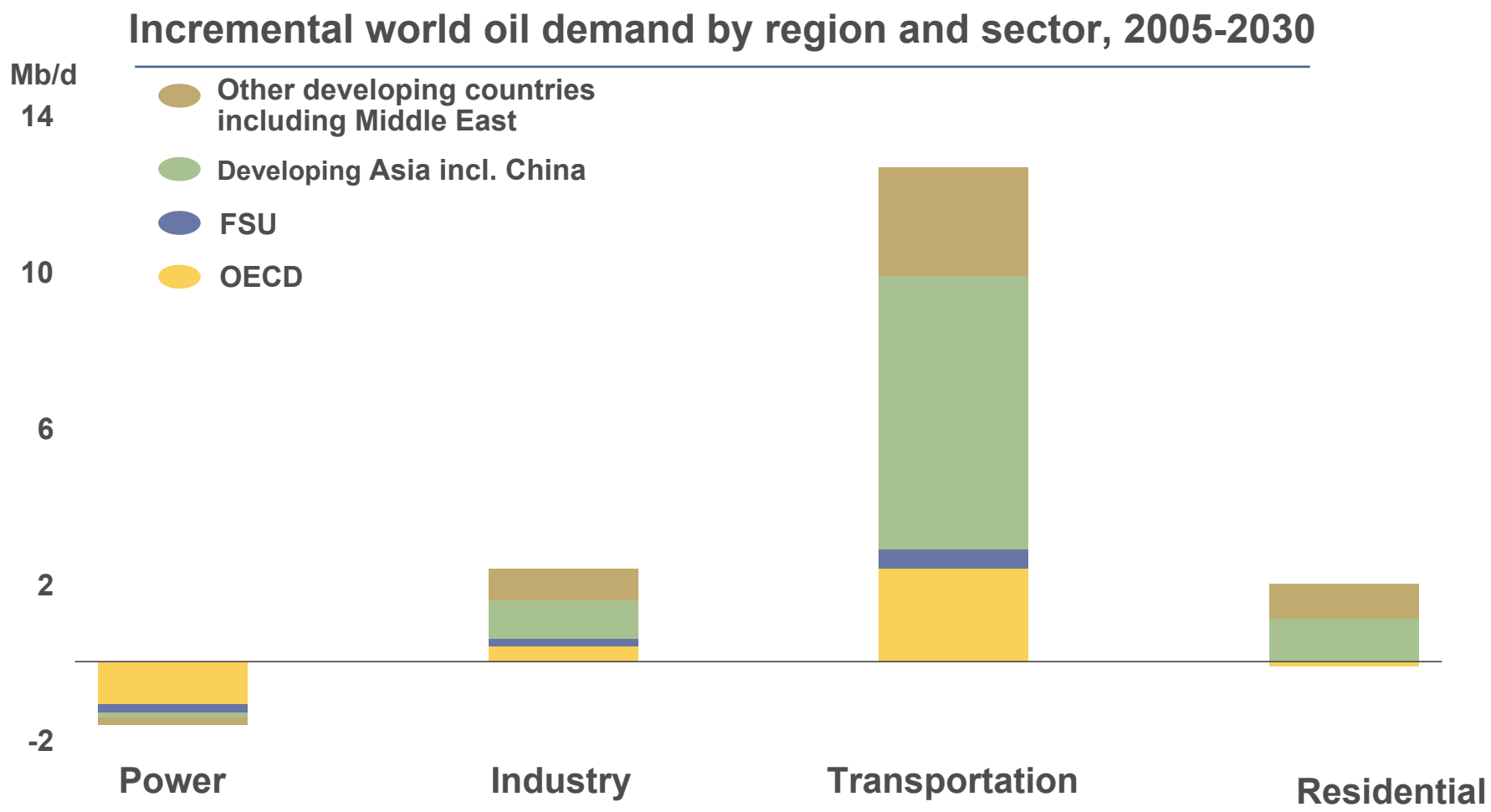
Oil demand mainly driven by transportation

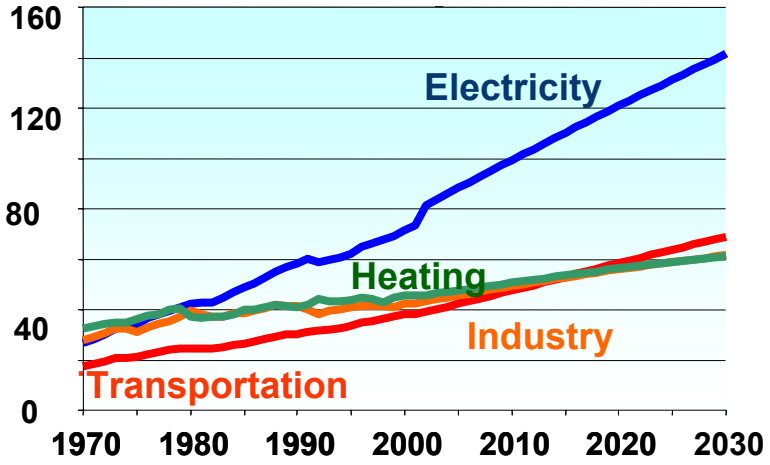


The number of cars in non-OECD countries, mainly Asian, will be multiplied by 3 (from 200 to 600 million) over the next 25 years

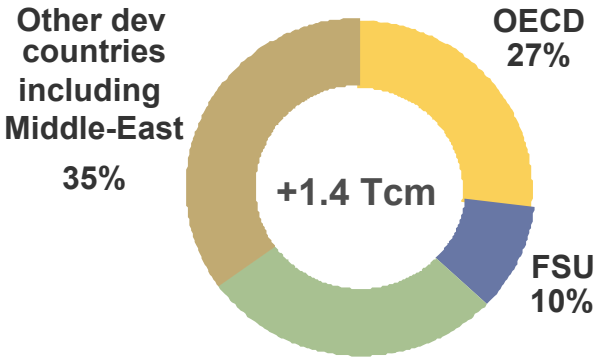
Source : IEA World Energy Outlook, Total

Gas demand mainly driven by power generation, the fastest-growing energy demand segment

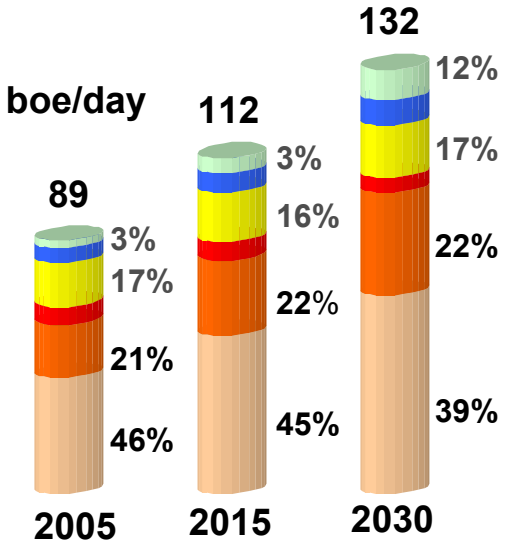
IEA primary energy consumption by segment



Incremental world gas demand by region, 2005-2030



Coal and gas are the main fuels used for power generation. Renewables are expected to increase their share



Annual growth rate, 2005-2030

Renewables	(+5.6%)
Hydroelectricity	(+2.0%)
Nuclear	(+0.7%)
Oil	(- 0.7%)
Natural gas	(+2.5%)
Coal	(+2.1%)

Sources: Total, AIE
Alternative Policy Scenario

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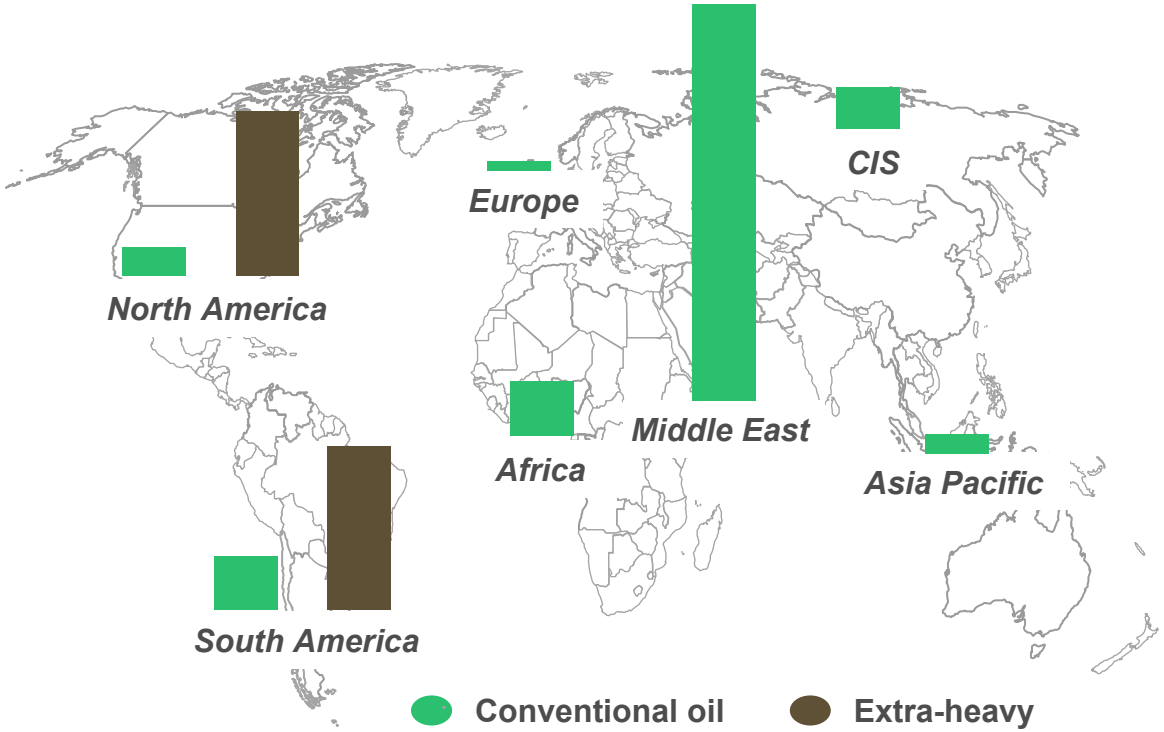
Oil reserves and resources

Oil resources* (Bb)

Proved reserves of conventional oil and extra heavy oil (EHO) resources *



* Sources: IEA, USGS, Total estimates

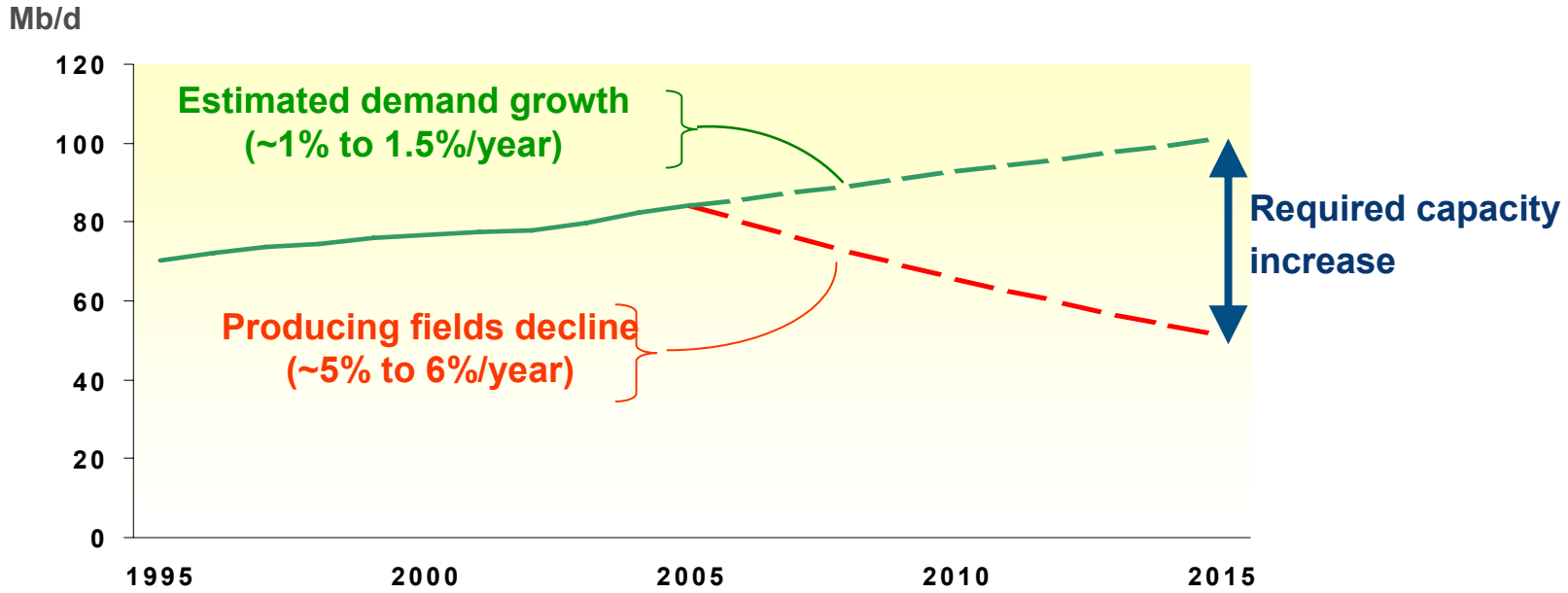
Proved oil reserves cover around 40 years of today's demand

… but are strongly concentrated in the Middle East

The production growth challenge

Mb/d = Million barrels per day

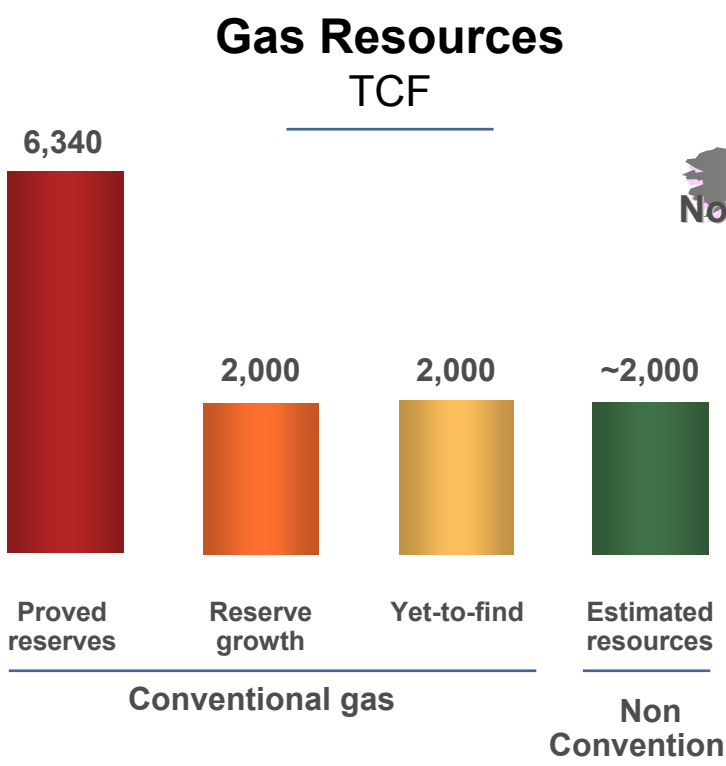
World oil production

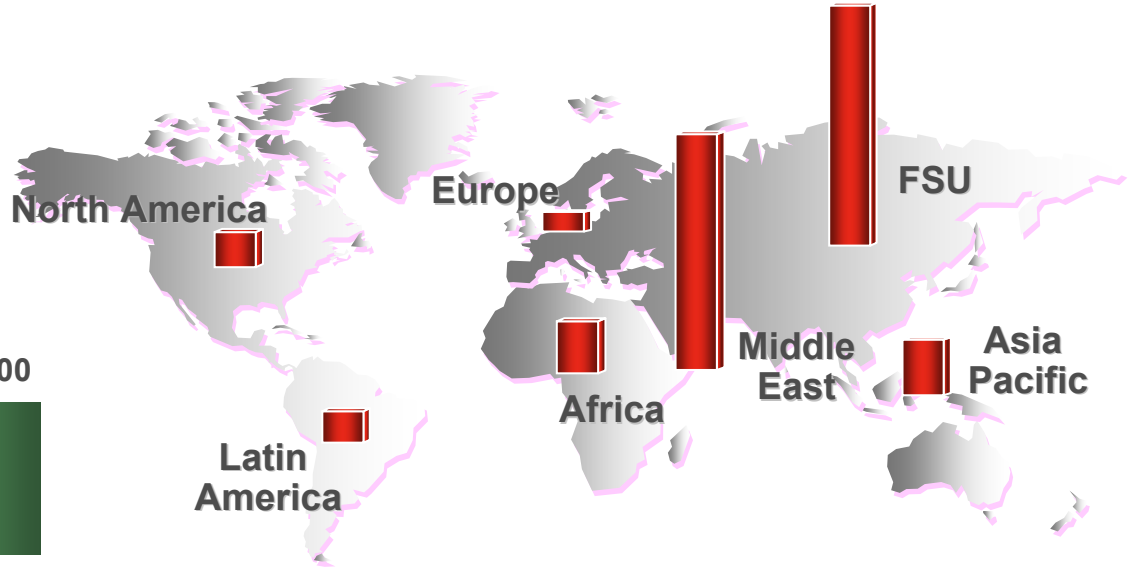


Increasing demand and natural decline of producing fields require ~ 50 Mb/d of new production between 2005 and 2015

- At current oil prices, producing countries do not need to increase output
- Geopolitical constraints or local troubles in producing countries
- New developments are complex, expensive and time-consuming

Gas reserves and resources are more widely spread





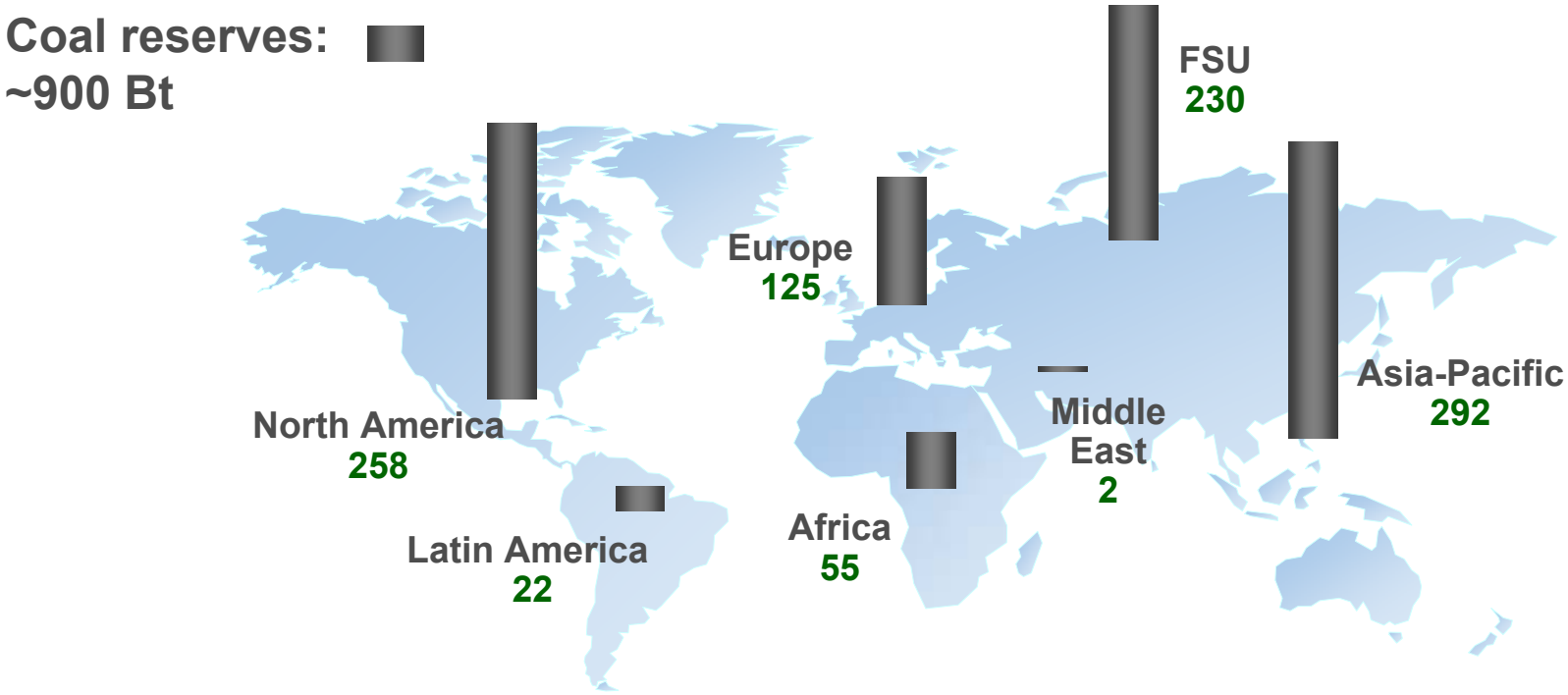
Proved reserves of Gas

Proved conventional gas reserves equivalent to 65 years of today's demand

Sources : O&G Journal, USGS, IEA, HIS, Cedigaz

TOTAL

Abundant coal reserves

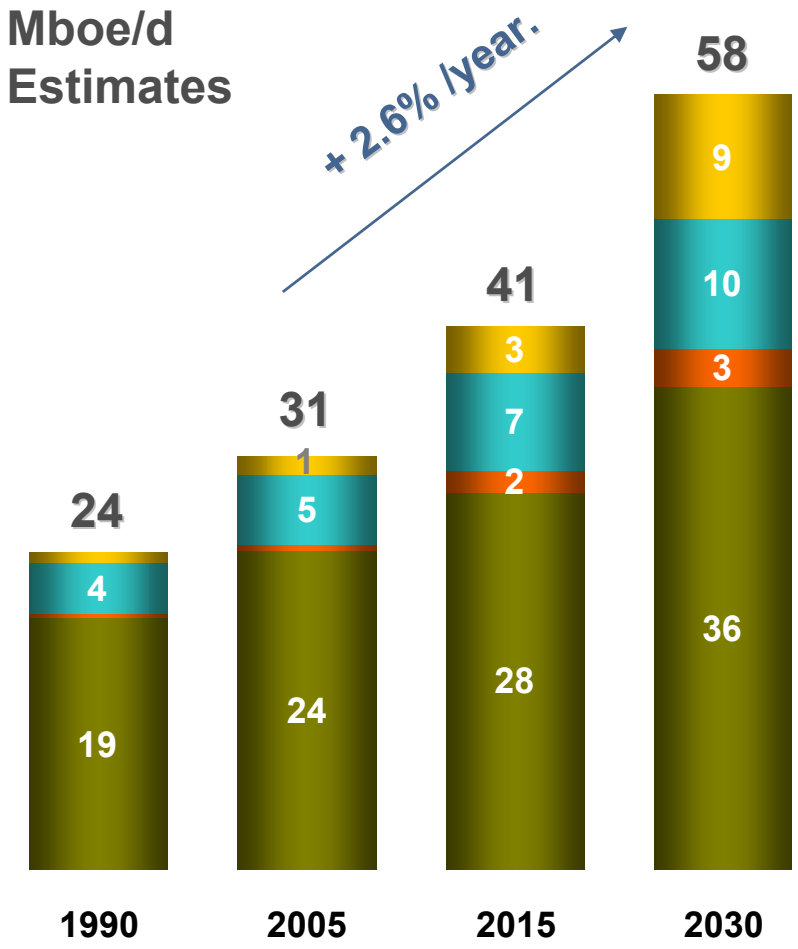


- Widely spread geographical distribution of reserves
- World coal reserves represent about 200 years of today's consumption
- But the increased use of coal will have a strong impact on CO2 emissions

Source : BP SR

TOTAL

Renewable energies will grow but account for a small share of the energy mix



Annual growth 2005 - 2030

- Solar, wind, etc. + 8.3 %
- Hydroelectric power + 2.5 %
- Biofuels (incl BtL) + 7.6 %
- Biomass (incl. forest use in developing countries) + 1.7 %

Source: IEA World Energy Outlook , Alternative Policy Scenario

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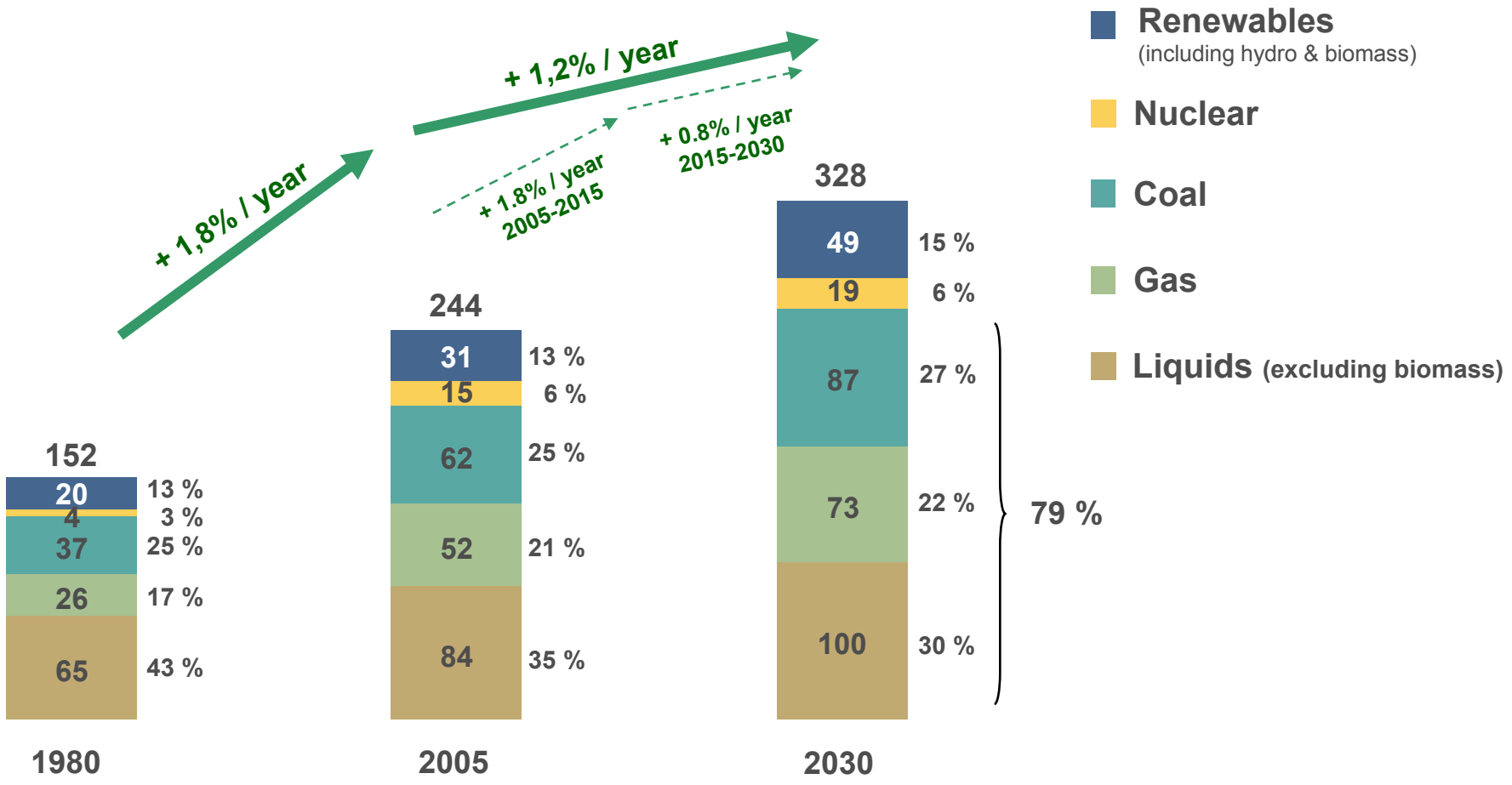
A long transition period in energy supply: 80% of the energy mix still derived from fossil fuels in 2030

World energy demand* (million boe/day)



* Primary energy

Sources: IEA World Energy Outlook and Total

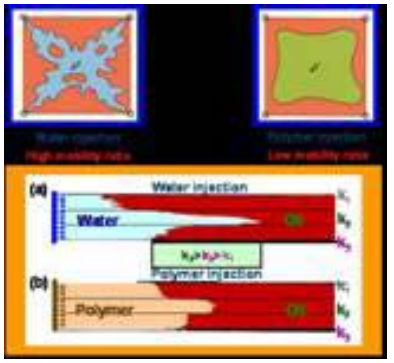
Advanced technology to meet energy demand

International oil companies rely on technology to produce new fields in extreme conditions and to enhance recovery rates from existing fields

Extra-heavy oil

- Recovery
- Upgrading
- Process integration
- Energy and CO_2

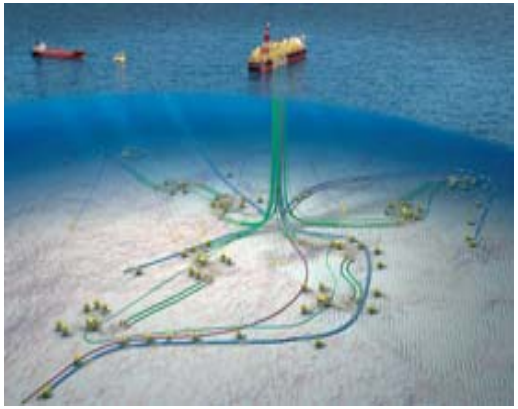
Enhanced oil recovery



- Polymer injection
- Chemical methods: solvents,etc.

Gas solutions

- Sour gas, CO_2 and H_2S treatment
- LNG
- Chemical conversion: GTL, etc.



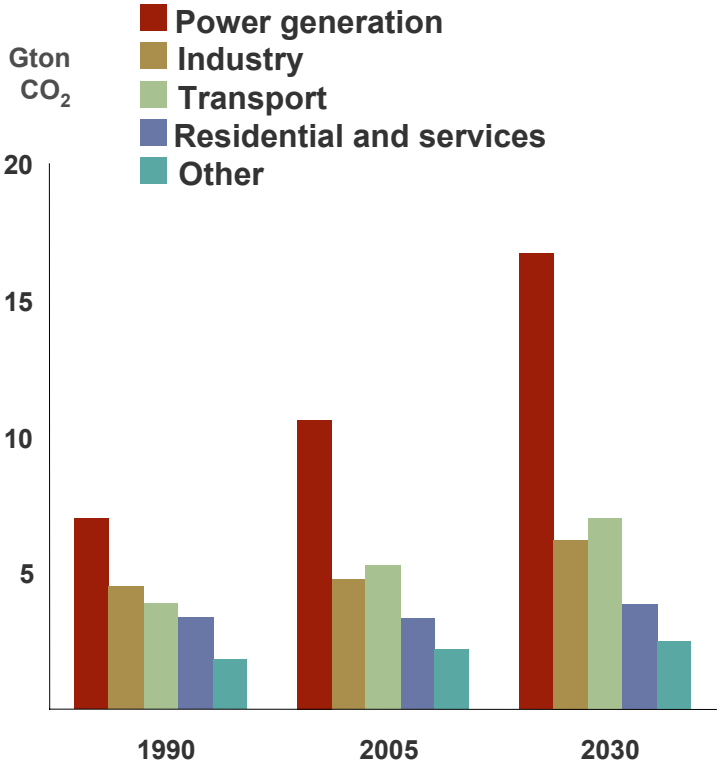
Deepwater

- Multi-phase subsea installations

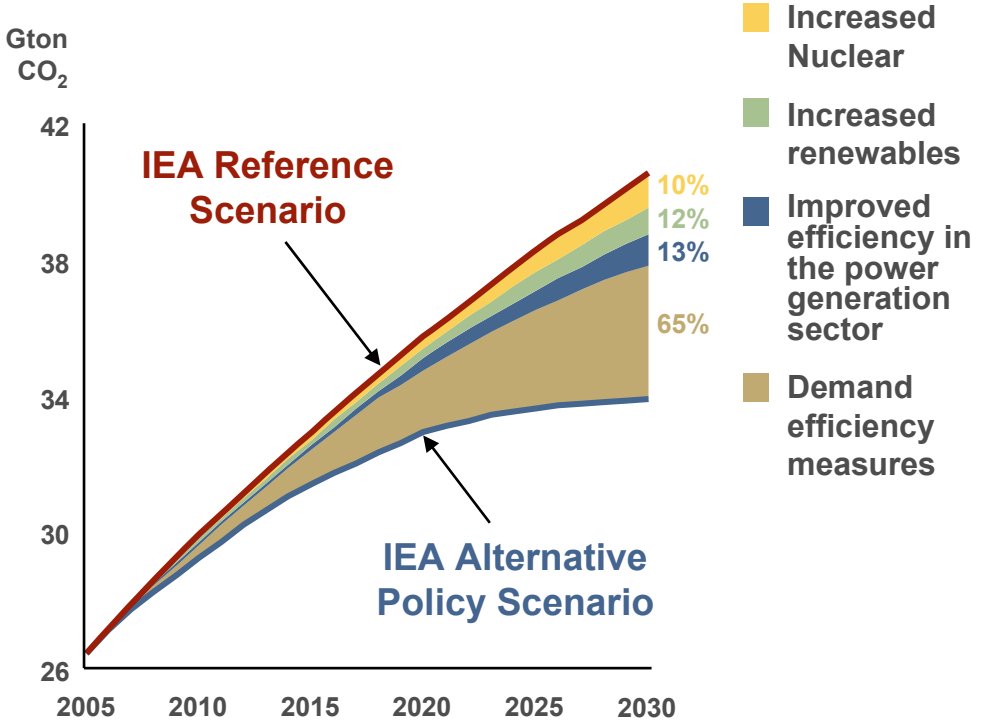
TOTAL

Greenhouse gas emissions: a critical challenge for sustainable growth

CO_2 emissions by sector



CO_2 emissions : potential savings

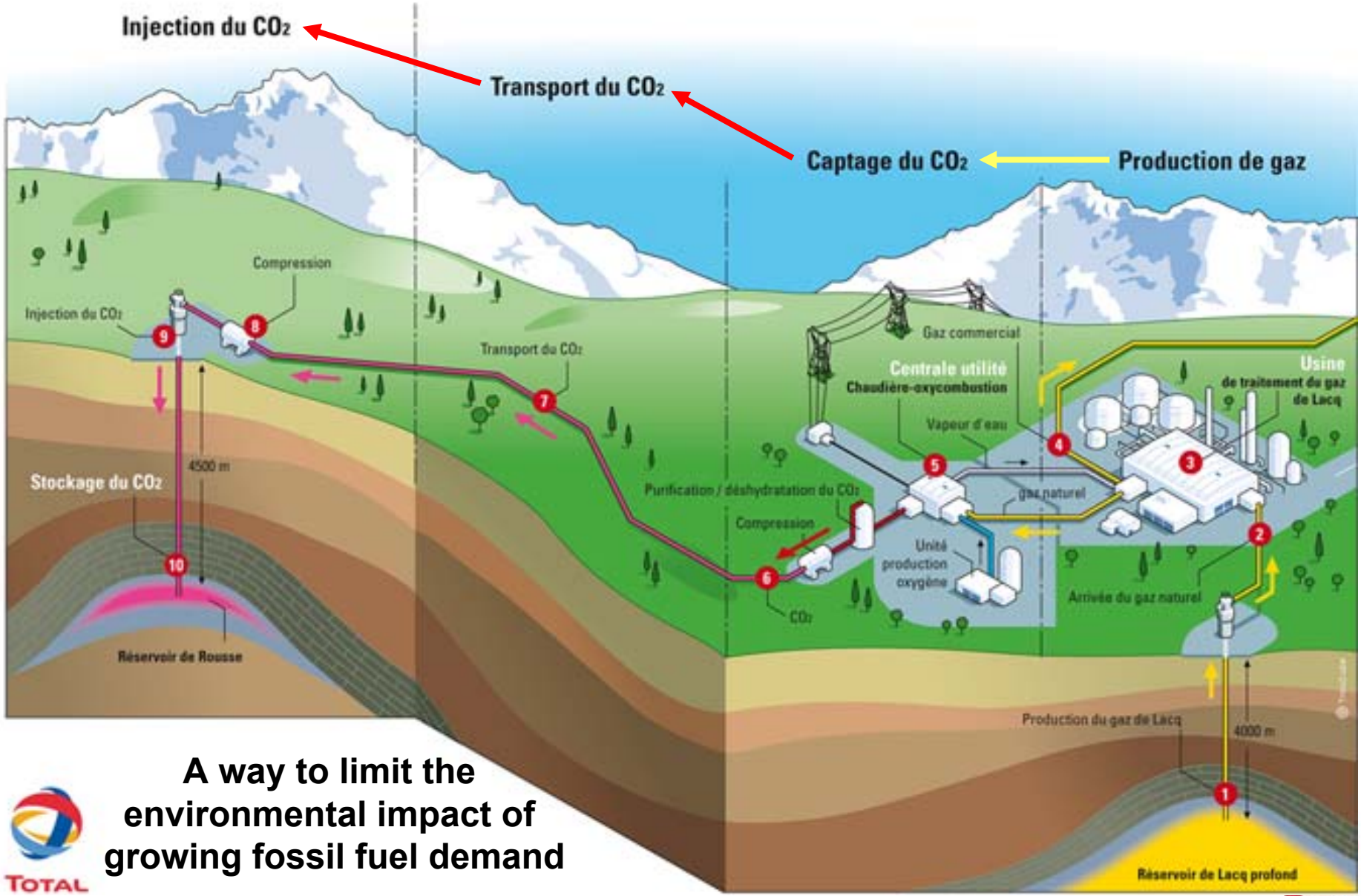


Fossil fuels (incl. coal) account for 59% of GHG emissions

Everyone must contribute to more efficient energy use and to CO2 emission reductions

TOTAL

Lacq : first complete CO_2 capture and storage project in Europe



A way to limit the environmental impact of growing fossil fuel demand

Conclusion

- Importance of promoting energy efficient solutions to save natural resources and limit CO2 emissions
- The critical challenge is reconciling two up to now conflicting targets: meeting energy demand and protecting the climate
  - Oil and gas likely to account for more than 50% of world primary energy consumption in 2030
  - Develop technical solutions such as CCS to limit related emissions
- Diversify the energy mix
  - Necessary development of alternative / renewable energy options such as nuclear power, biomass, photovoltaic and other renewables to secure the future

TOTAL