

Brunei's Energy Future: a Global Perspective

Yves Grosjean
General Manager
Total E&P Borneo



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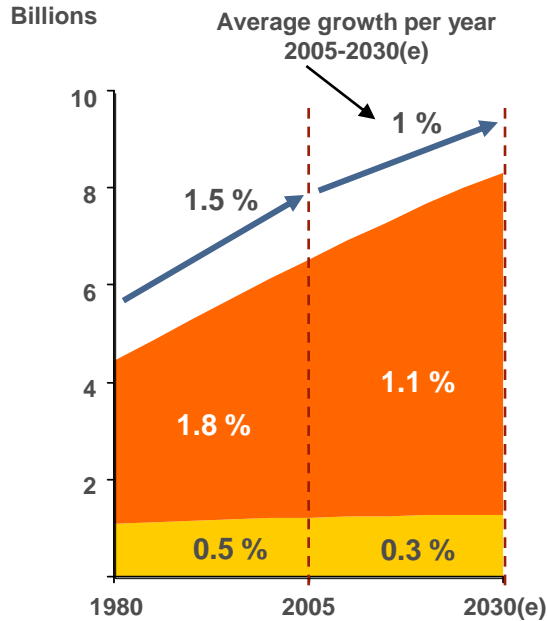
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Global Energy demand

2030 forecast

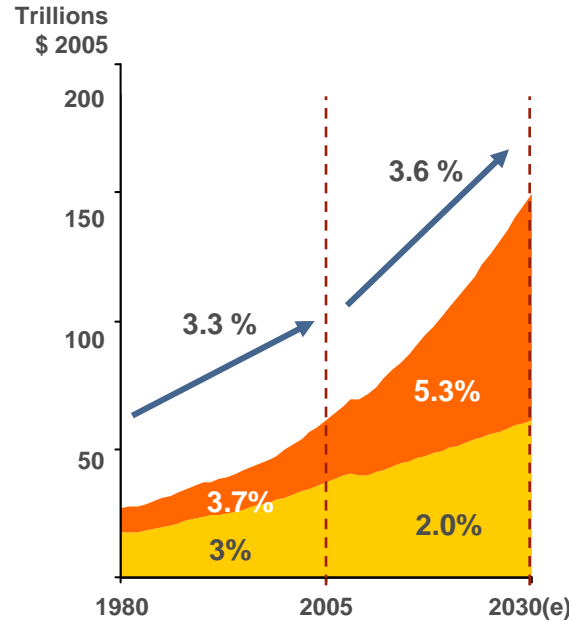
Global energy demand growth

Population

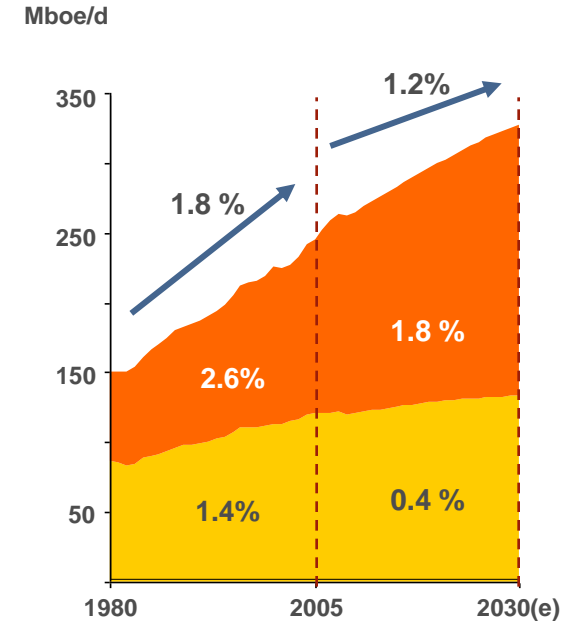


GDP

(purchasing power parity)



Energy demand



● OECD ● Non-OECD

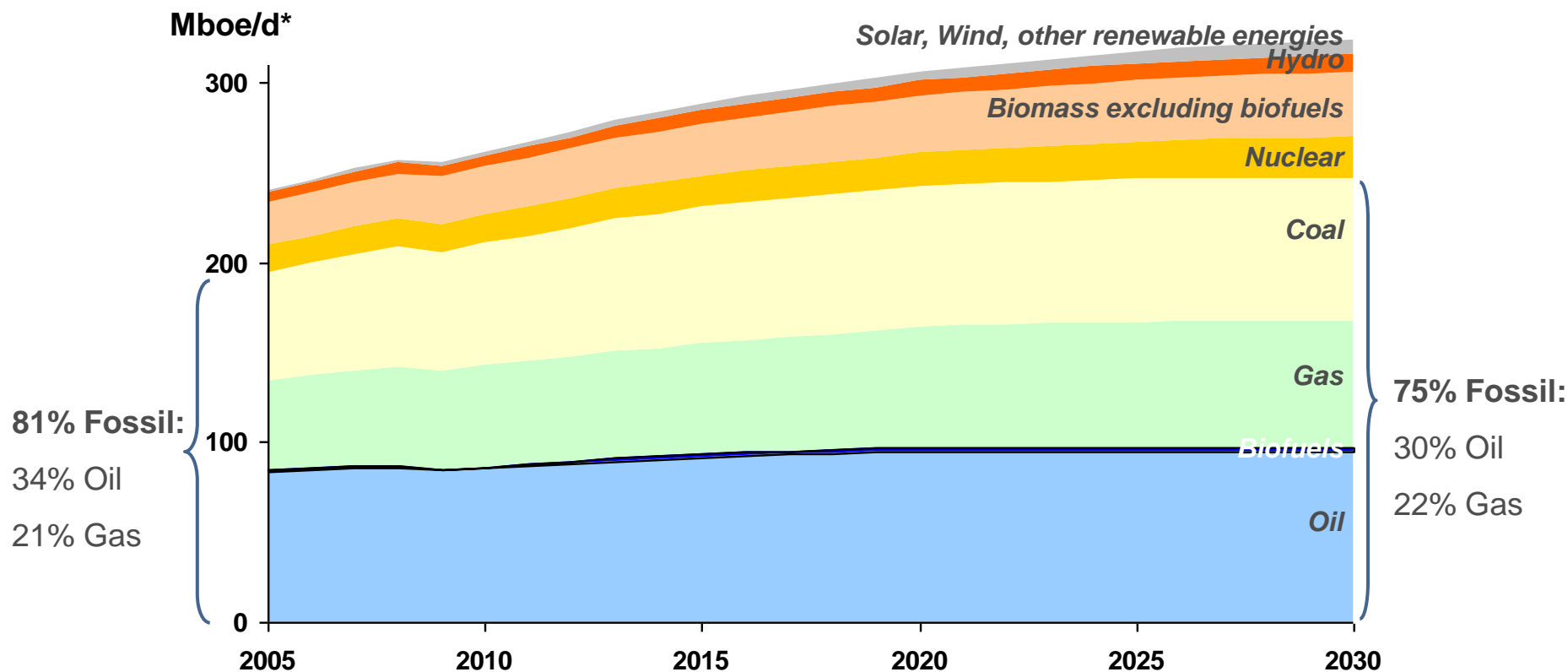
Energy demand growth driven by demography and economic development in Non-OECD countries

Sources : Total estimates



Fossil energies to represent 75% of energy supply in 2030

World energy supply 2005 – 2030



Efficient CO₂ emissions management and diversification of energy supply are key issues

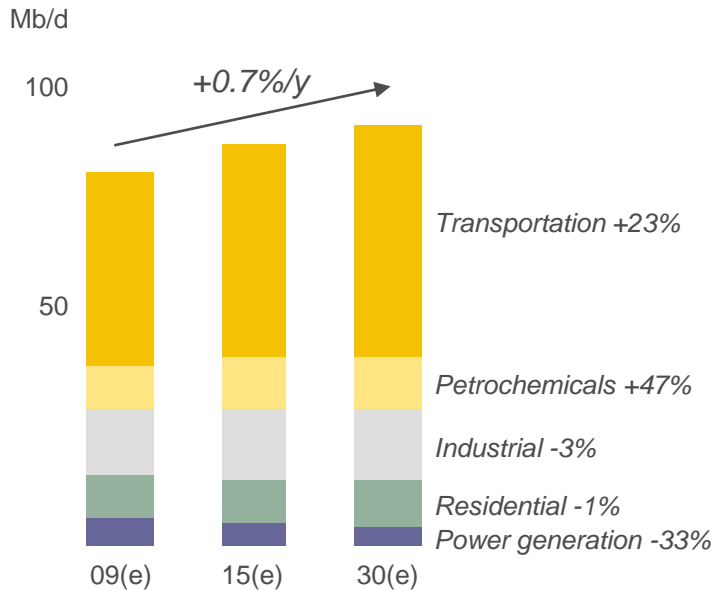
Source: Total estimates.

* Million barrels of oil equivalent per day.

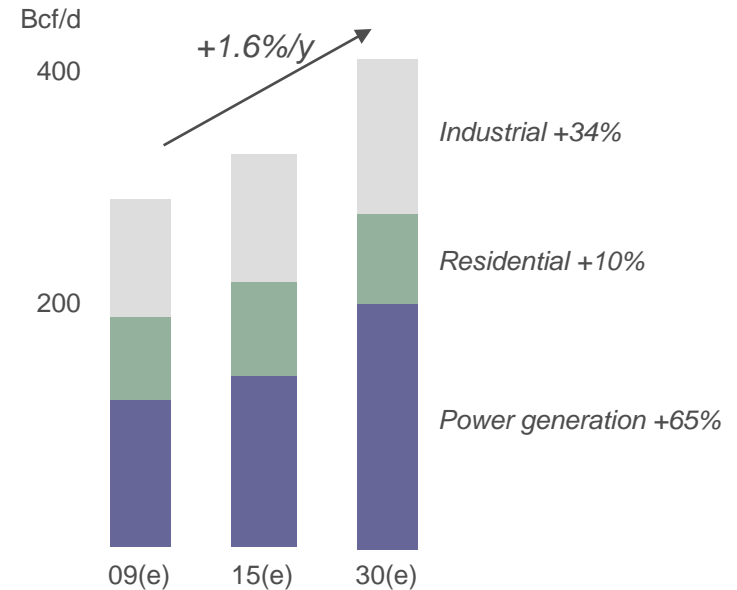


Oil and gas demand driven respectively by transportation and power generation

Oil demand by sector



Gas demand by sector



***Oil will remain the energy of choice for Transportation
Gas preferred to Oil or Nuclear for Power Generation***

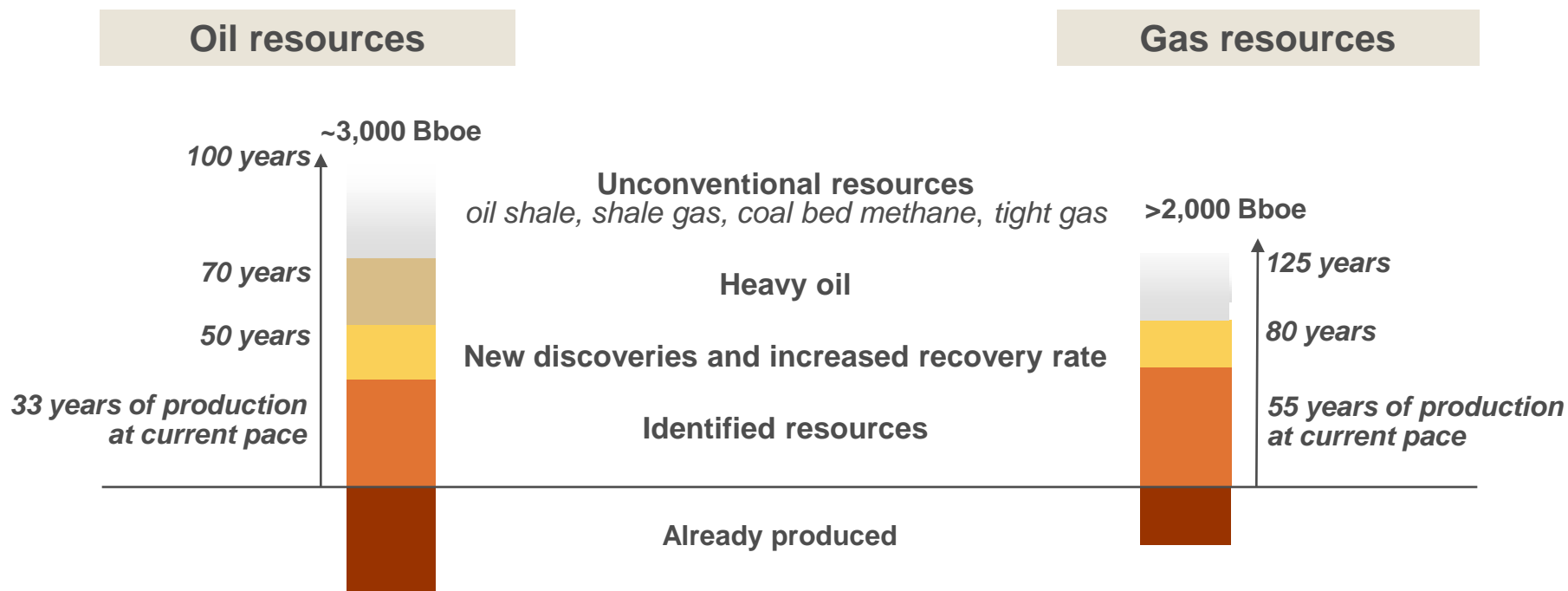
Total estimates



Global Energy supply

52% Oil & Gas in 2030

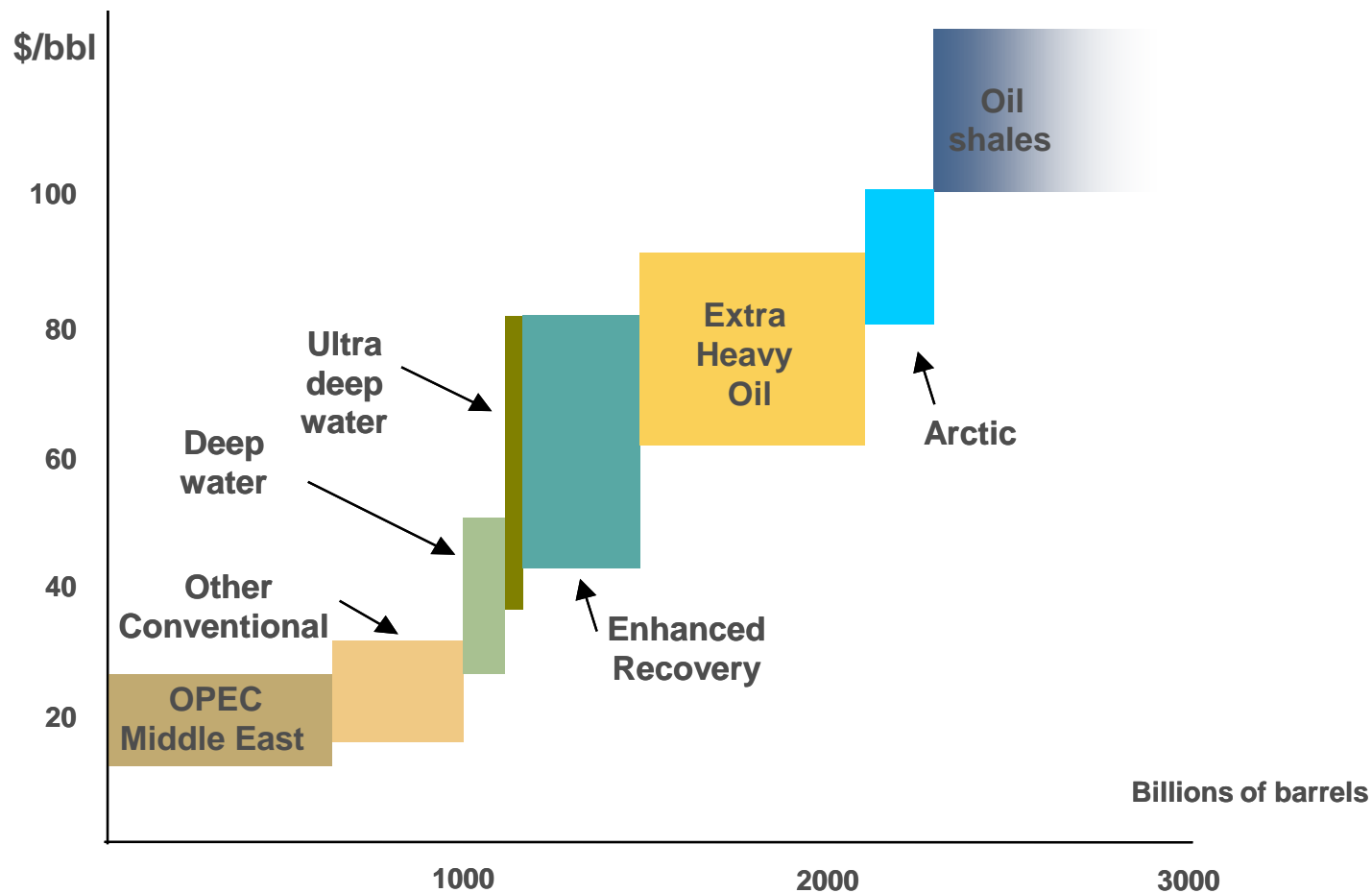
Significant hydrocarbon resources yet to be produced



With advanced technology and large scale investments hydrocarbons will remain the dominant fuel source for the next decades



2010 Breakeven Price (10% IRR) per class of Oil Resource: Higher revenue to the producer unlocks additional Oil

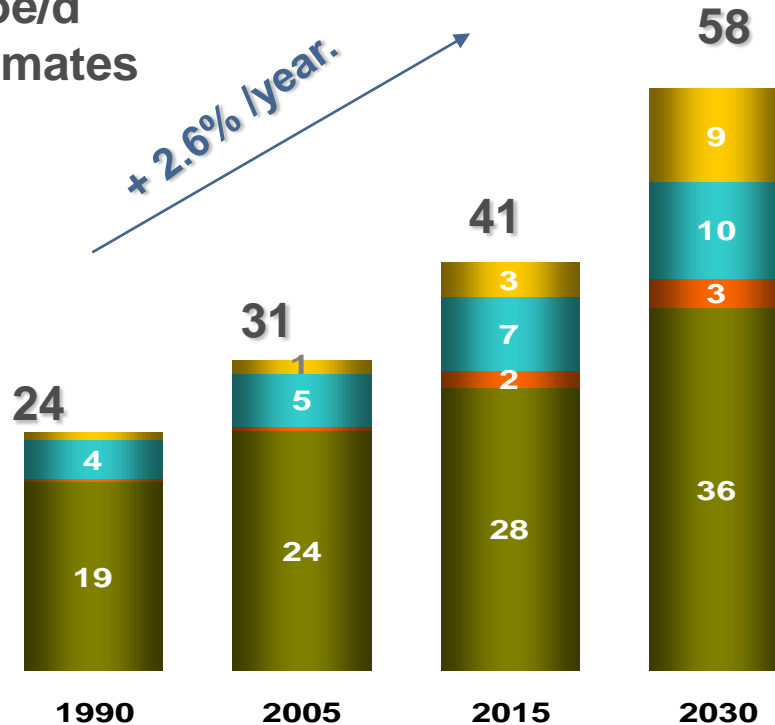


Sources: IEA, CERA, Total

Renewable energies will grow but not enough

Mboe/d
Estimates

+ 2.6% /year.



Annual growth
2005 - 2030

■ Solar, wind, etc

+ 8.3 %

■ Hydroelectric power

+ 2.5 %

■ Biofuels (incl BtL)

+ 7.6 %

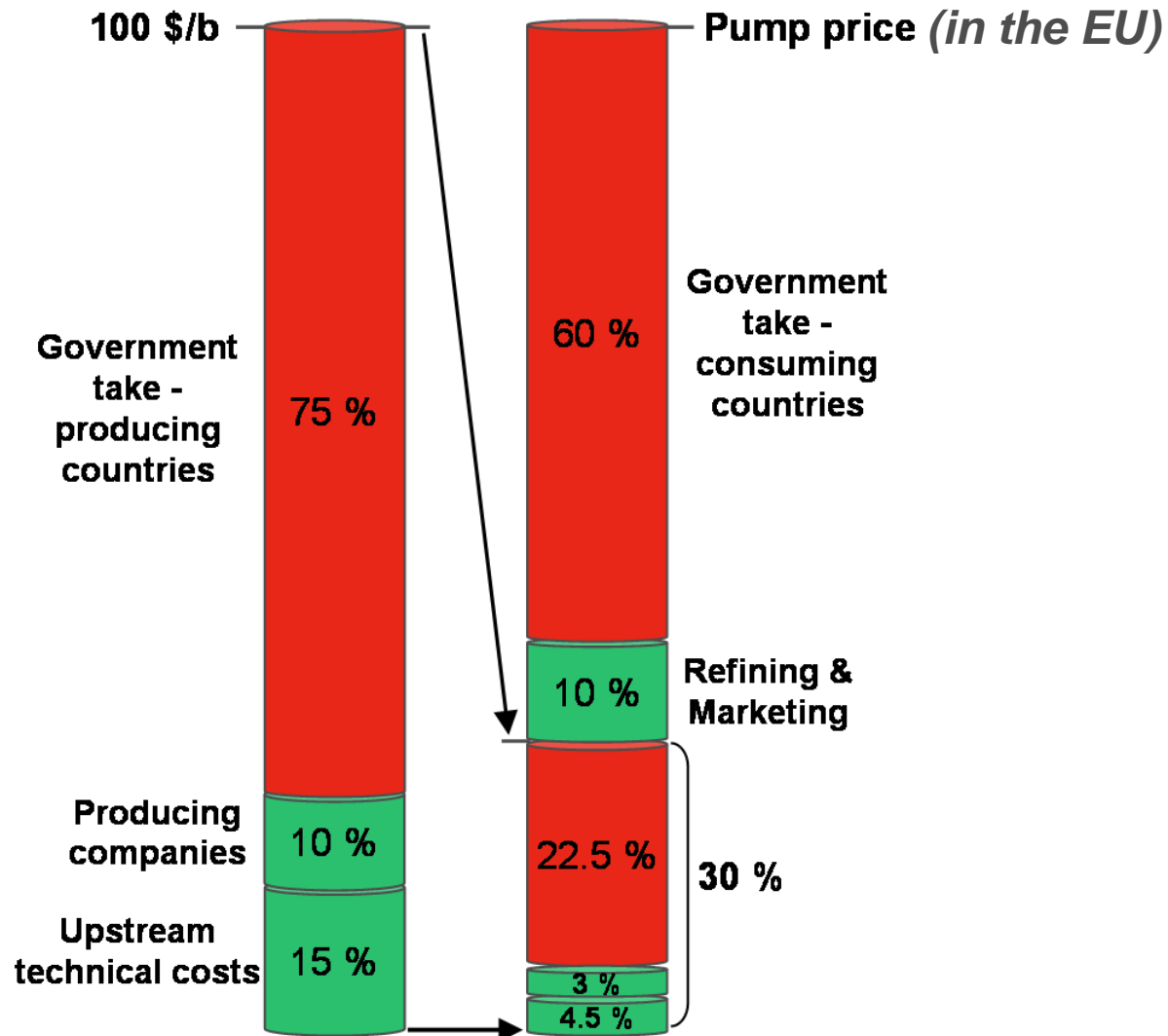
■ Biomass (incl. forest use in developing countries)

+ 1.7 %



Oil products: 82.5% Taxes – 17.5% Costs

what more can we do to help the development of alternative energy ?

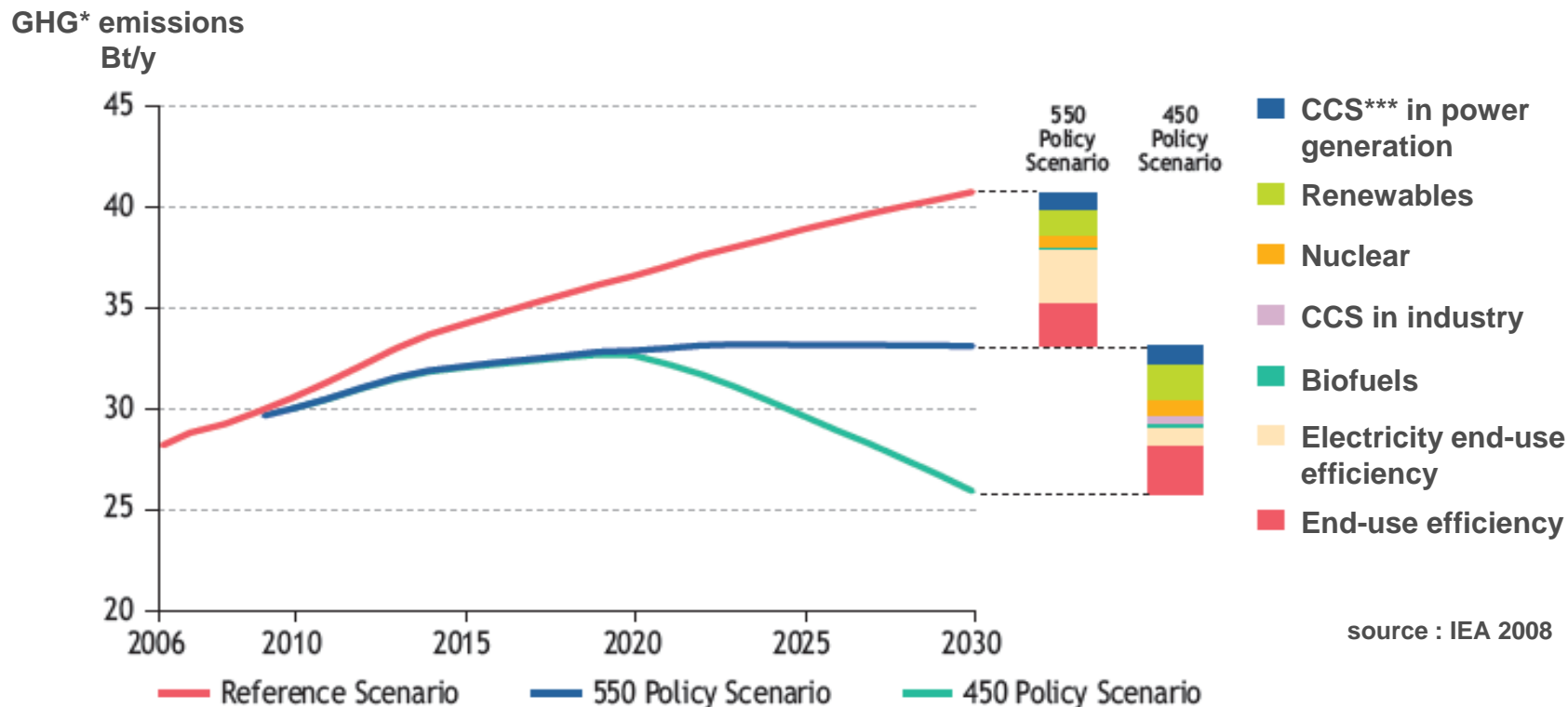


Climate Change: the limiting factor

how to reduce GHG emissions ?

Limiting greenhouse gas emissions is needed for sustainable growth according to scientists

International Energy Agency climate scenarios



*All technologies needed to reach CO₂ concentration targets
High costs to implement required GHG reductions
All countries must be involved, including non-OECD countries
In any case, end-use efficiency is by far the greatest contributor*

TOTAL reduces flaring : no flaring on new projects and flaring reduction on existing fields

Flaring reduction technologies :

- Valorization of associated gas through LNG
- Increase reinjection

Associated gas treatment without flaring :

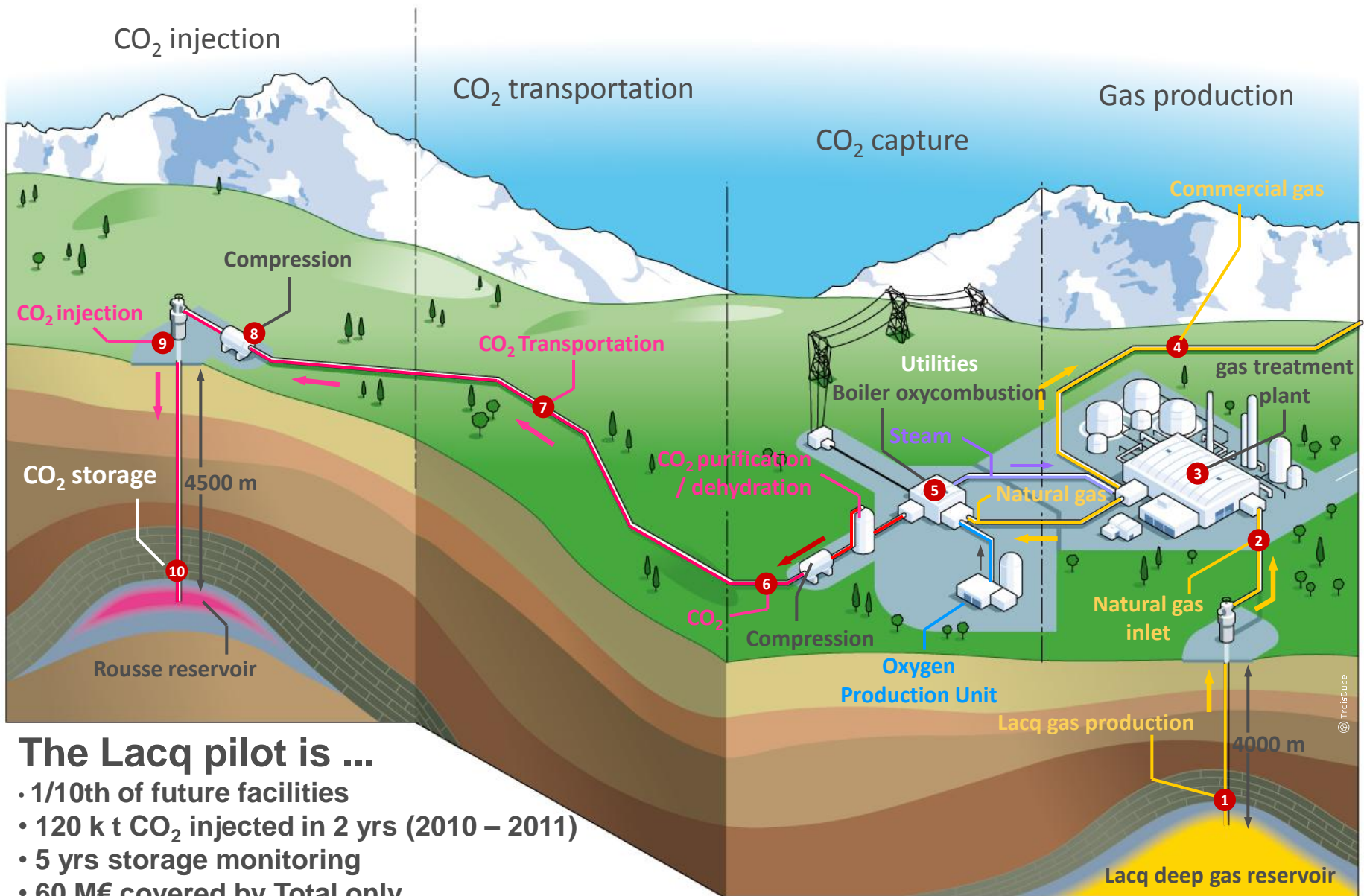
- On new projects
 - Currently producing : Girassol, Dalia and Akpo
 - Ongoing projects : Pazflor, Usan, Egina
- On existing fields
 - Abu Al-Bu Koosh (Abu Dhabi)
 - Nkossa (Congo)
 - Amenam (Nigeria)
 - Maharaja Lela (Brunei)

New Flash-Gas Compressor at OPP



Flaring reduction target : -50% in 2014 vs 2005

CO₂ Capture and geological Storage: a Reference Project by Total opening the way to 7000 large industrial sites worldwide (IPCC)



The Lacq pilot is ...

- 1/10th of future facilities
- 120 k t CO₂ injected in 2 yrs (2010 – 2011)
- 5 yrs storage monitoring
- 60 M€ covered by Total only

TOTAL Energy Efficiency Program

Targets for optimization :
-1% per year for Refining and
-2% per year for E&P and Petrochemicals

▶ Operational optimization including monitoring, reliability and maintenance

Ex : furnaces and boilers

→ from 0.5% to 4% of site Energy Efficiency Index gain

▶ More energy efficient new projects

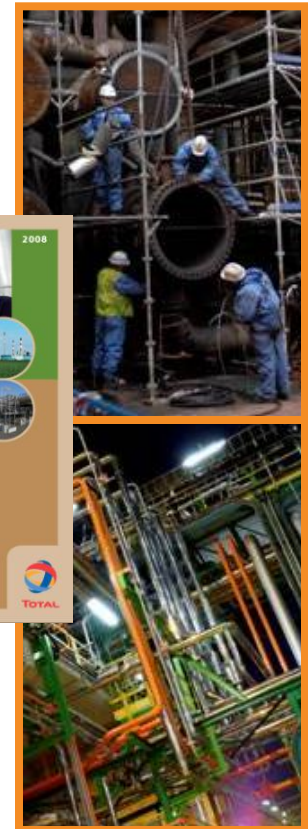
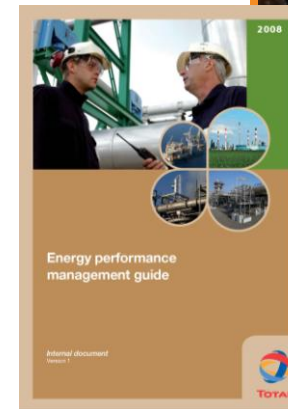
Ex : planned heat recovery and Packinox exchanger

→ from 0.8% to 3% of site Energy Efficiency Index gain

▶ Sharing best practices and technologies

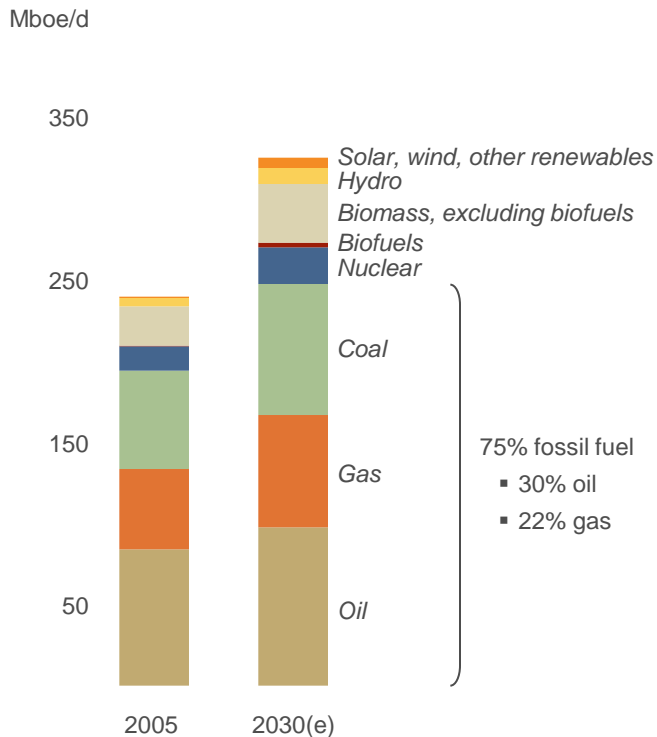
▶ R&D partnerships :

- Capital investment
- 100 M€ for a 5-year program to promote efficient technologies for small and medium enterprises



Developing low-CO₂ energies to meet the climate challenge

Global energy mix by 2030(e)*



Low-CO₂ energies : main axes selected by Total

Solar : integration and advanced R&D

- ▶ **Strengthening industrial and downstream integration**
 - Photovoltec, Tenesol, Abu Dhabi solar project
- ▶ **Technological differentiation (JVs and partnerships for R&D)**
 - IMEC (crystalline PV), LPICM (thin films), Konarka (organic PV), MIT (batteries), AE Polysilicon (polysilicon for PV)



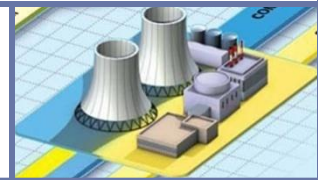
Biomass : R&D for advanced biofuels and green chemicals

- ▶ **R&D on thermochemical processes**
 - BioTfuel pilot (gasifying biomass)
- ▶ **R&D on biotechnological processes**
 - Futurol pilot (lignocellulose)
 - Gevo (sugars → isobutanol)
 - Academic partners (CNRS,...)



Nuclear : acquiring expertise

- ▶ 8.33% interest in Penly project
- ▶ Developing projects in countries where the Group has a presence



Capitalizing on our industrial assets, R&D and partnerships

* Total estimates

Brunei's Energy Future: a Global Perspective

► High stakes: meeting Energy Demand and Protecting the Climate

- Oil & Gas likely to account for >50% of world primary energy consumption by 2030
→ frontier exploration is critical to make new resources available (HPHT, Deep Water)
- Develop technical solutions like CCS to limit related emissions

► Improve efficiency and Diversify the Energy mix

- Necessary development of alternative energy options
→ Nuclear, Biomass, Photovoltaics and Other Renewables to secure the Future
- The best alternative of all = End-Use Efficiency → combined cycle, co-generation, ...

► High Challenges

- Mandatory investments upfront (efficiency or exploration) ↔ high reward for Brunei
- Proficient workforce ↔ will fuel the growth in other sectors
- Mandatory technological innovations ↔ available via partnerships

Not to forget: Deforestation is the second most important source of GHG emissions (after Coal)

Terima kasih

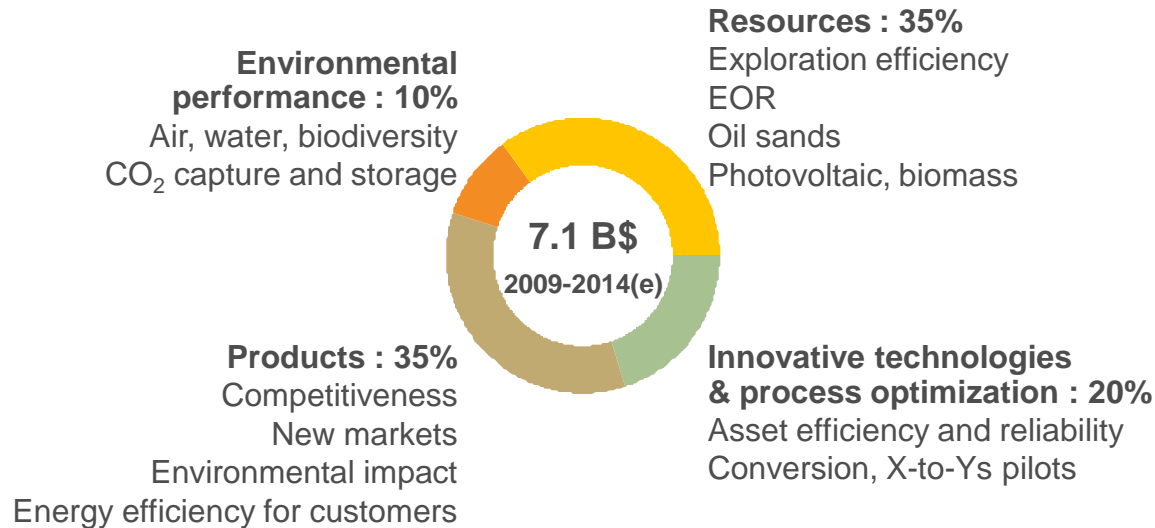


Energy Supply and Climate Change

the TOTAL commitment

Anticipating the future energy demand

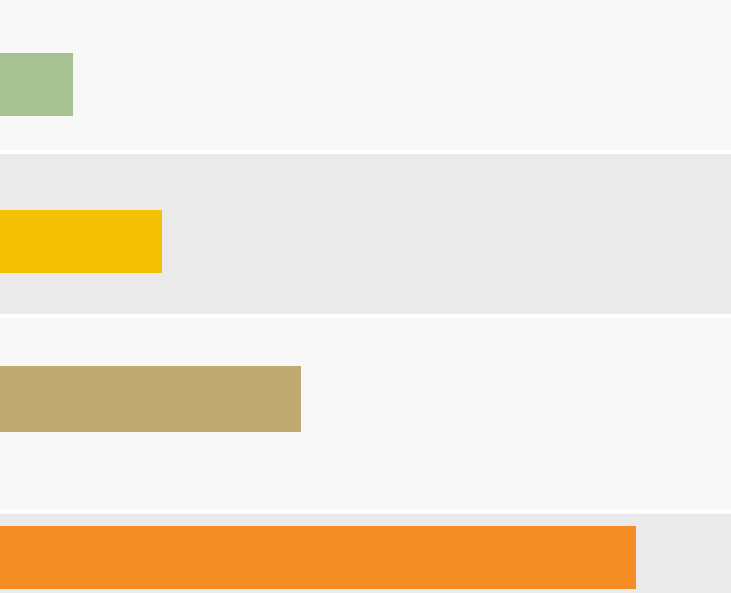
Increasing leverage to R&D



R&D investment in 2009 : 0.9 B\$

Supporting growth potential in oil and gas through new technologies
Improving industrial and product efficiency and reducing environmental impact
Accelerating the development of core competencies in new energies

Renewables Pros and Cons

Rate of growth pa. 2010 - 2030 (%)	Pros	Cons
Hydro 	Low CO ₂ intensity	Limited potential Environmental impact (population displacement...)
Biofuels	Low CO ₂ intensity expected from 2 nd generation biofuels Complementary source for liquid fuels	Competition with food security for 1 st generation biofuels Costs, global analysis (water...)
Wind	Low CO ₂ intensity	Limited technological progress High costs Acceptability Variable peak rate
Solar	Unlimited supply Strong potential for efficiency and cost improvement Access to electricity in remote areas	High costs in early stages Variable peak rate

Solar : very high rate of growth but still a limited part of the power mix in 2030
Biofuels : development favored by availability of 2nd generation fuels

Implementing innovative solutions for end-users

- ▶ Excellium premium engine fuels launched in 2005



- ▶ New “Total Ecosolutions” program launched in 2009



- More energy efficient and environment-friendly products and services
- Labeling process
 - ISO 14021 principles
 - External audits
- 12 products already labeled



Lubricants



Packaging



Heating systems

Total Ecosolutions products avoid up to 500 kt/y CO₂