

ENERGY CHALLENGES AND IFP STRATEGIC PRIORITIES

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Long Term Challenges of the Energy Sector

Three Challenges :

- On going growth of demand
- Climate change
- Finite resources

5 Major Challenges for Sustainable Development



Renew and increase
world hydrocarbon
resources

Develop clean
and high-efficiency
refining and
petrochemical
processes

Master CO₂ capture and
storage

Diversify energy
sources for
production of fuels
and hydrogen

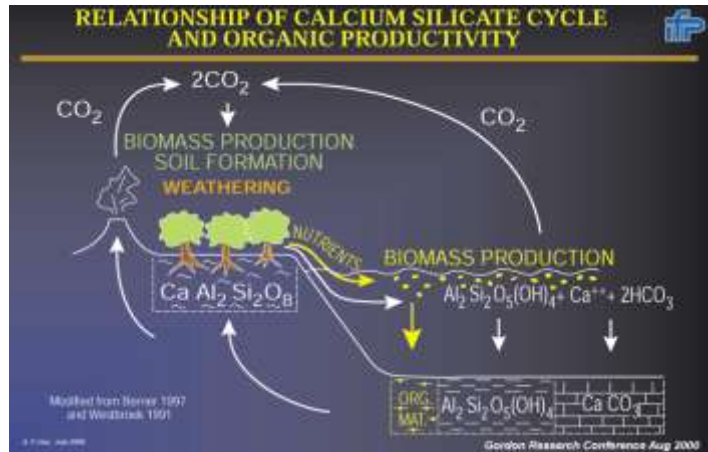
Reduce vehicle
emissions and
consumption



What are the technological obstacles ?



CO₂ Capture and Storage



Develop efficient and safe technologies having an acceptable cost

Capture

- Fume-scrubbing processes using solvents
- Treatments by adsorption
- Cryogenic techniques

Storage

- Control of CO₂/rock interactions
- Storage surveillance
- Biomineralization

Diversify Energy Sources



Develop processes
allowing the production of quality fuels
at an acceptable cost

GAS

- Gas To Liquids: Fischer-Tropsch diesel
- Hydrogen production

BIOMASS

- Thermochemical treatment
→ Biomass to Liquids
- Vegetable oil esters
- Cellulases for ethanol production
- Hydrogen production

COAL

- Liquefaction and upgrading of liquefied products



Reduce Vehicle Emissions and Consumption

Reconsider conventional engines from the sustainable development perspective

Reduce local pollutant emissions



Reduce vehicle consumption

Dedicated engine
•NGV, GTL
•Hydrogen

Electric vehicle
Batteries/Fuel cells

Hybrid vehicle thermal/electric
•System modeling
•Control strategies

Develop alternative solutions to combustion engine

Develop Clean and Highly Efficient Processes

Intensify refining and petrochemical processes

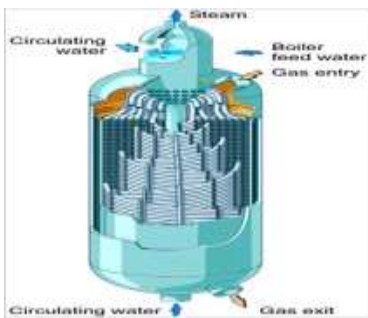


CONCEPTION AND CONTROL

- Multifunctional and structured reactor
- Micro-technologies
- In line analysis systems
- Real time modeling

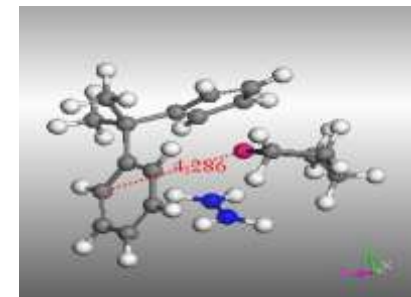
CATALYSTS AND ADSORBENTS

- Molecular modeling
- High-throughput experimentation
- Nanotechnologies to optimize structure, texture and functionalization

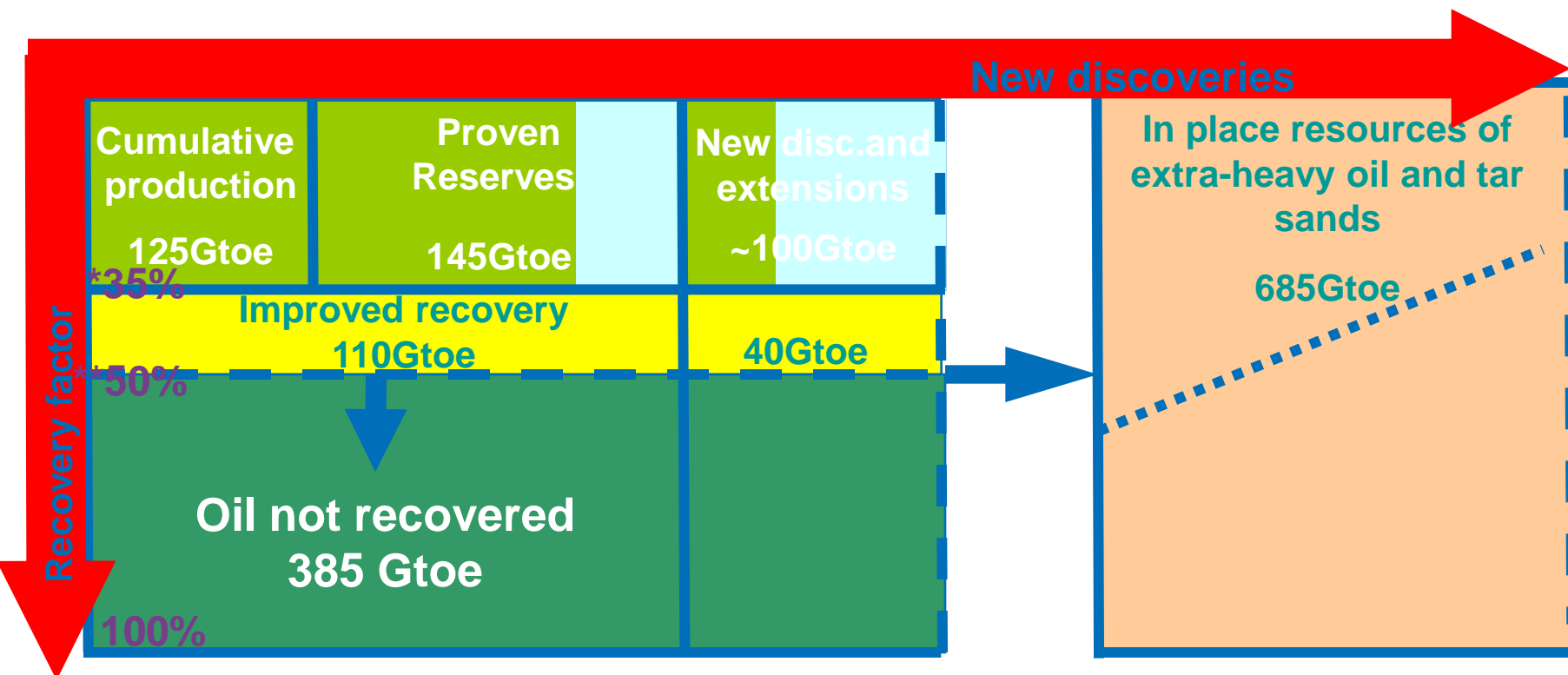


WASTES

- Supercritical solvents
- Ionic liquids



Renew and Increase World Hydrocarbon Resources



- Increase the exploration success rate
- Improve the recovery rate of oil in place

- Develop high technological content hydrocarbons
- Promote the development of natural gas



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