



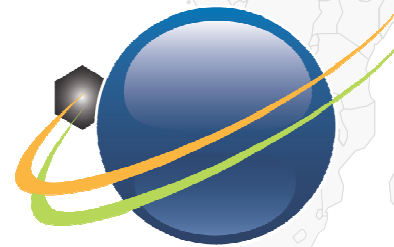
24th World Gas Conference

ARGENTINA | 2009

5-9 October

The Global Energy Challenge:
Reviewing the Strategies
for Natural Gas

Coal-To-Liquids



World CTL Association

Serge Péreineau



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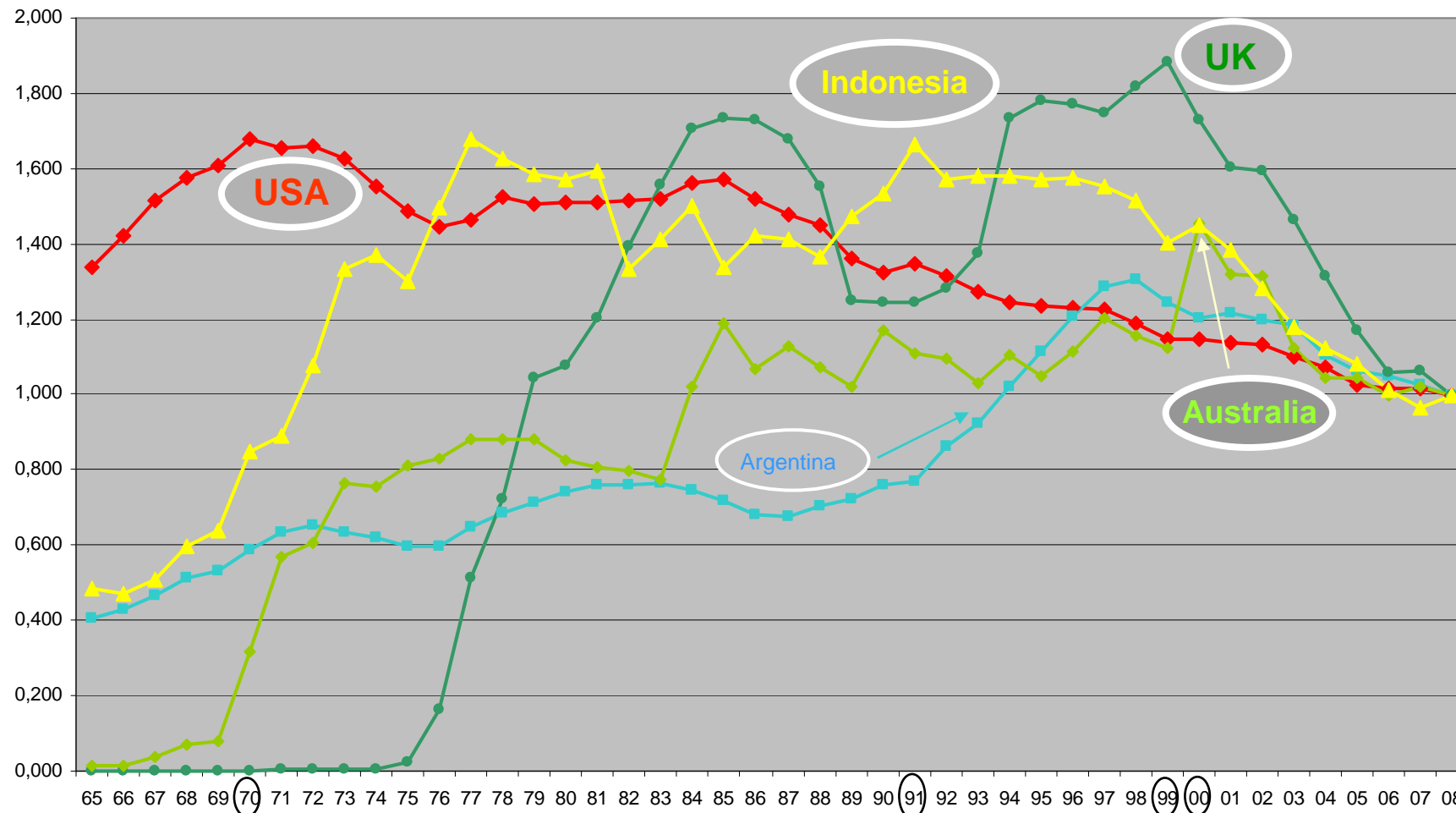
The Global Energy Challenge:
Reviewing the Strategies
for Natural Gas

- **The CTL Framework**
 - Energy Security
 - Technologies
 - Environment
 - Economics
- **Current CTL Developments**



Peak Oils, before « the » peak oil?

Australia, Indonesia, UK, USA have passed their peak oil.



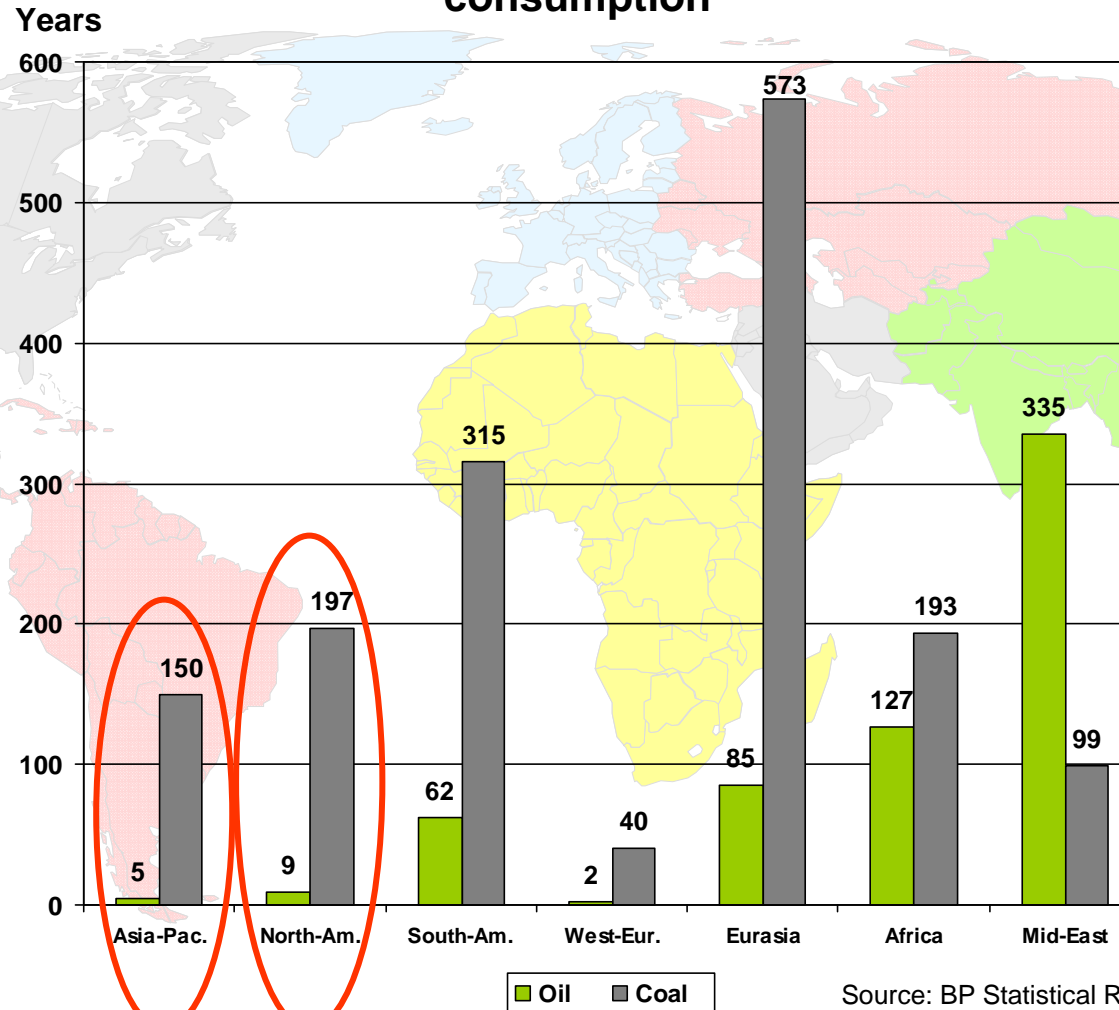
Other countries: Denmark, Egypt, Gabon, Russia, Syria, Vietnam

Source: BP Statistical Review 2009



A major energy security stake

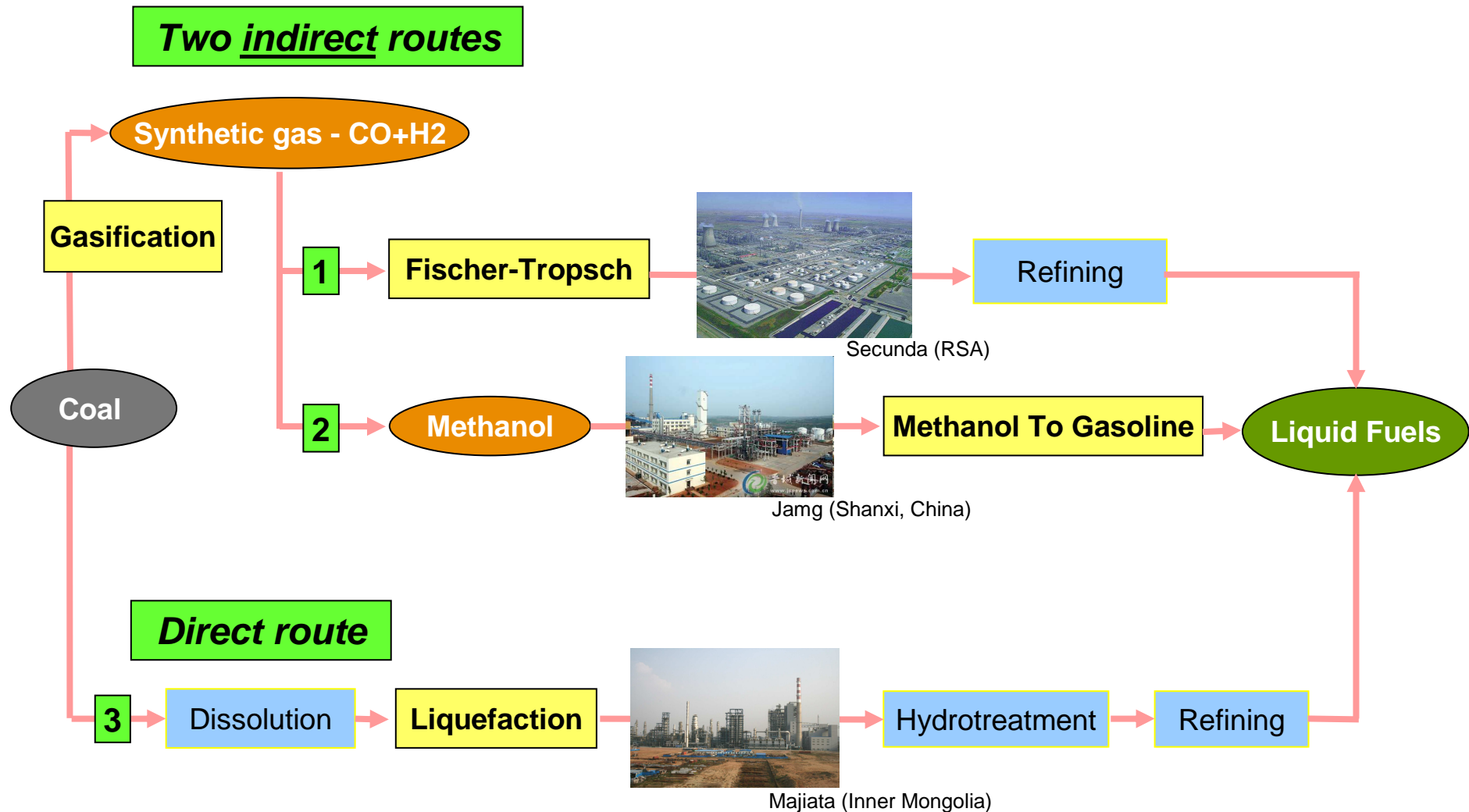
Ratio $\frac{\text{proved reserves}}{\text{consumption}}$ (in years)



Source: BP Statistical Review 2009
Coal reserves modified for Asia-Pacific (4 countries gap)



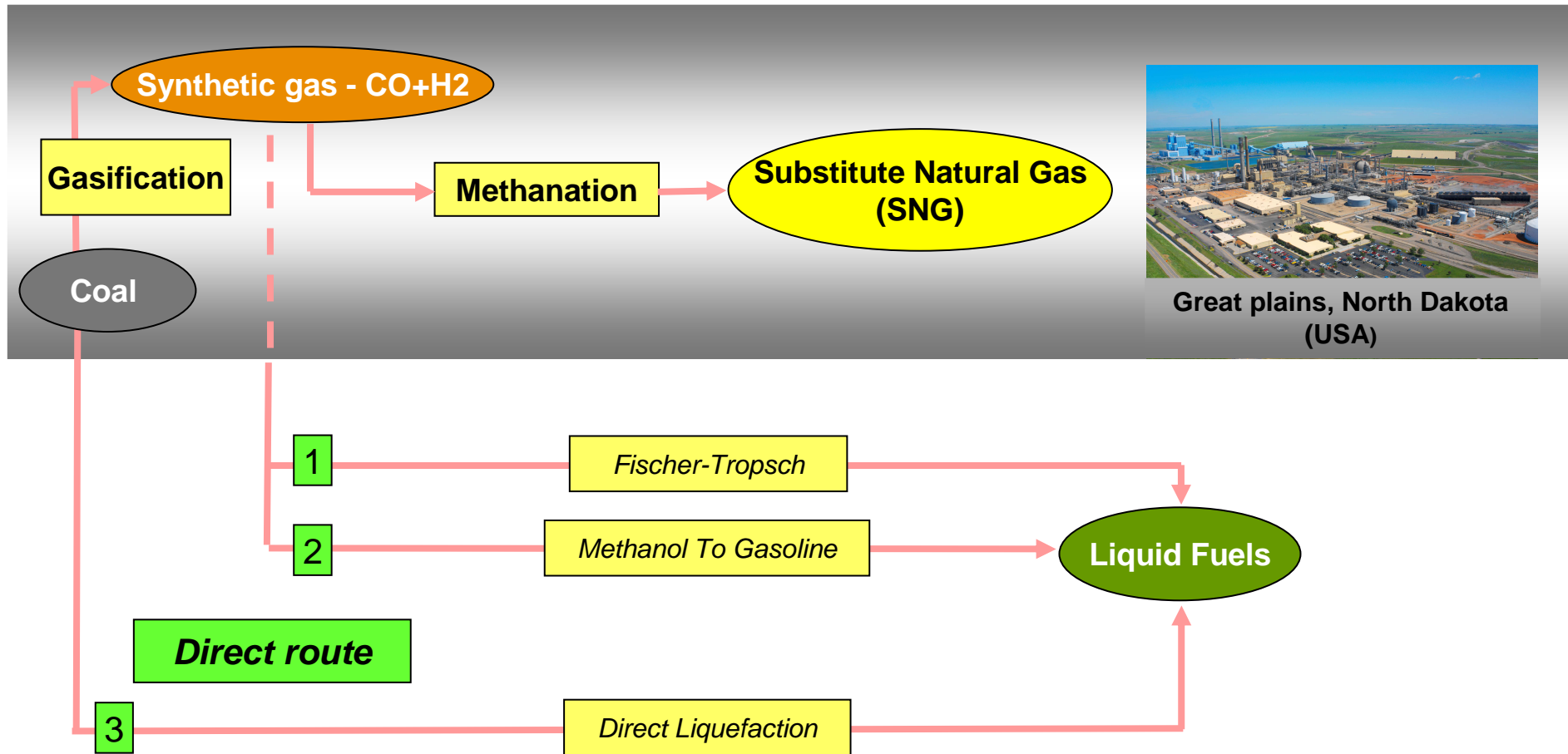
Technologies: three “conventional” CTL routes





Technologies: CTL and SNG

Indirect routes





Environment: Coal is most controversial



March 2, 2009, Washington DC (Reuters)



March 26, 2009, World CTL Conference



« *Coal is My Worst Nightmare* »

Steven Chu, Nobel physicist, U.S. Energy Secretary



Environment: Actual Stakes

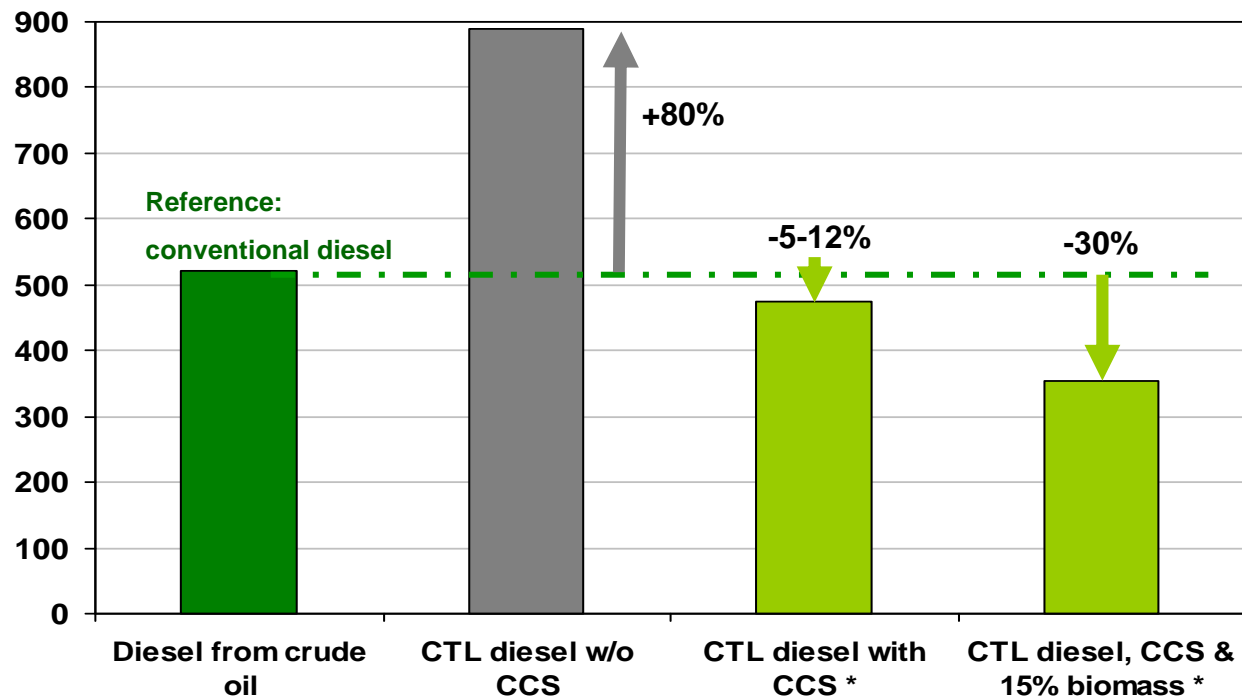
- **Water need**
1 to 2 m³ per barrel: impact on CTL feasibility.
- **CO₂ emissions**
 - Coal: the lowest Hydrogen/Carbon ratio
 - CO₂ is emitted within CTL processes
 - CTL processes intrinsincally capture CO₂.

CO₂ emission, a key issue and an opportunity



Greenhouse footprint vs fuels from crude oil

Well to Wheels emissions (grams of CO₂ equivalent per mile):





CCS is now included in most CTL projects

Sources: Idaho National Laboratory (2007) and U.S. DOE (2009) (marked *)



CTL competitiveness

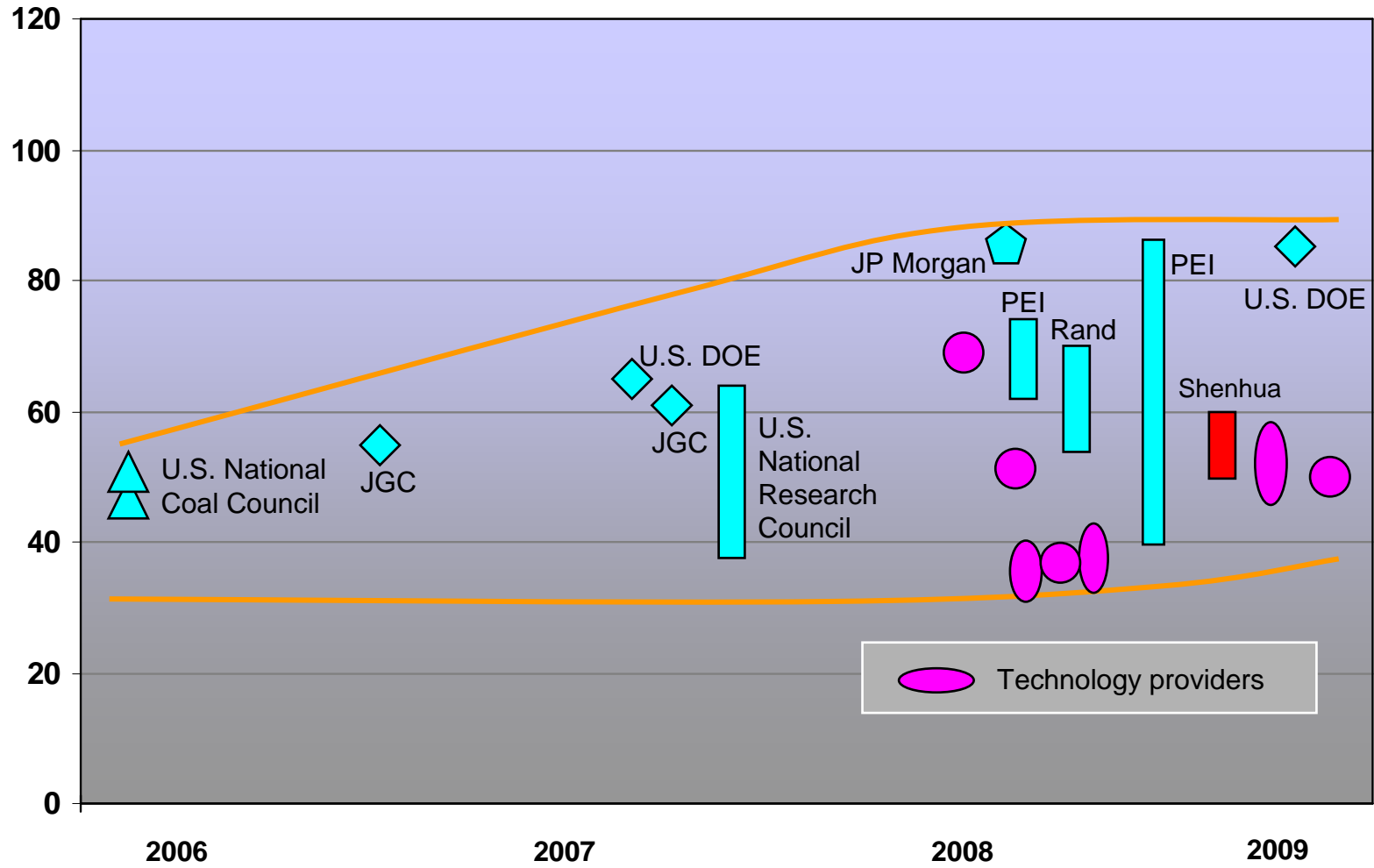
- Capital expenditure: **\$80-120k per bbl/d**;
- A large range of equivalent crude prices announced: **\$40-90/bbl**;
- A reference:   Sasol Synfuels' performance:

| | 2009 | 2008 |
|------------------|---------------|---------------|
| Operating profit | \$2.8b | \$2.7b |
| Turnover | \$4.2b | \$5.4b |
| Production | 150 kBbl/d | 160 kBbl/d |
| Brent average | \$68.1/bbl | \$95.5/bbl |



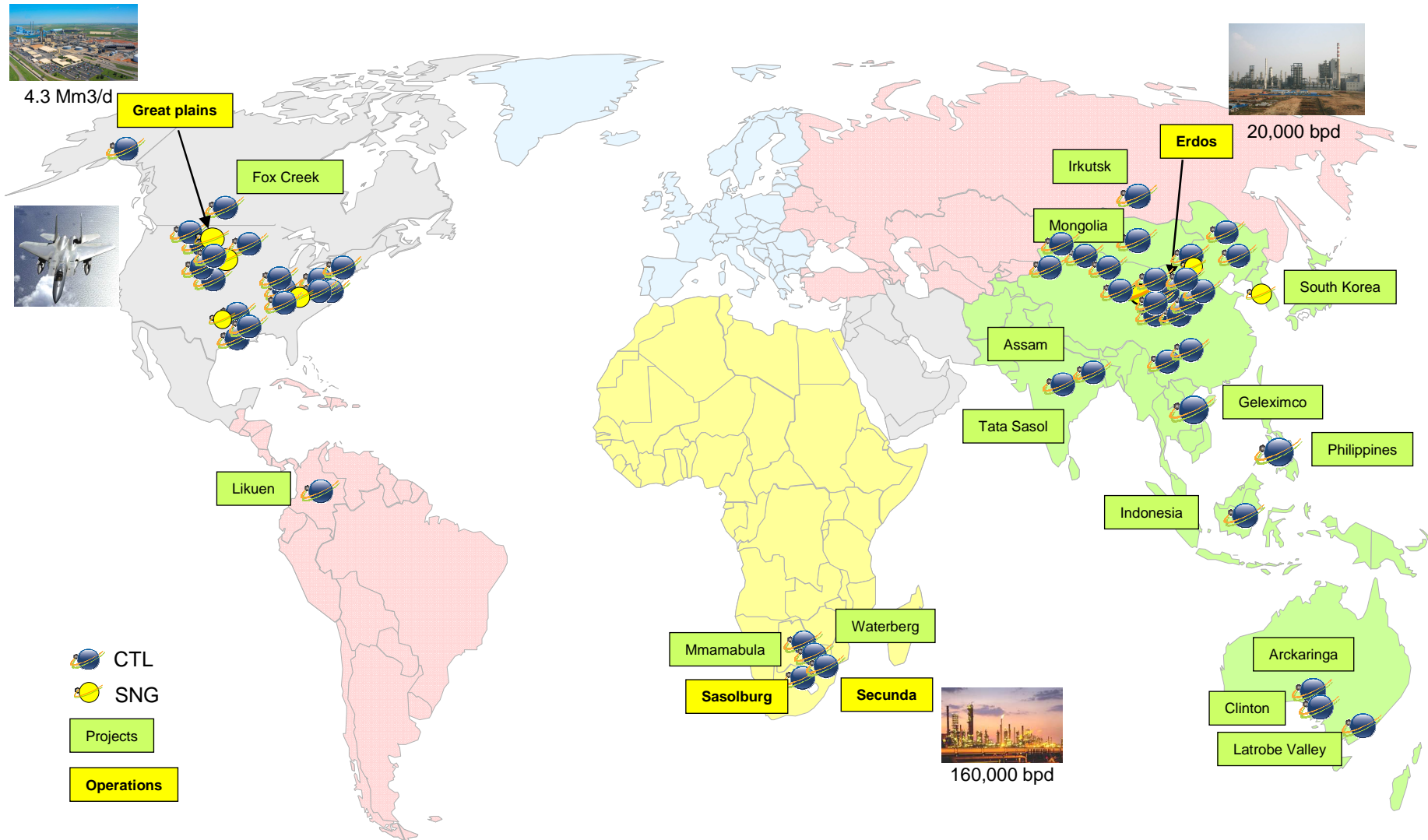
Reported Crude Oil Price equivalents

\$/bbl - Crude Oil Equivalent





Many projects, few plants in operation

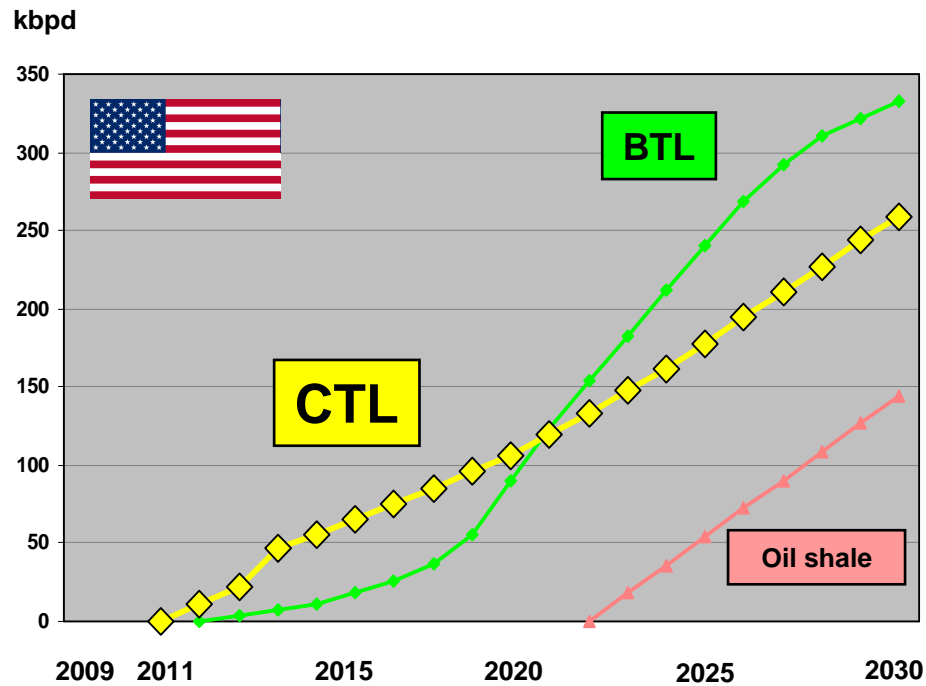




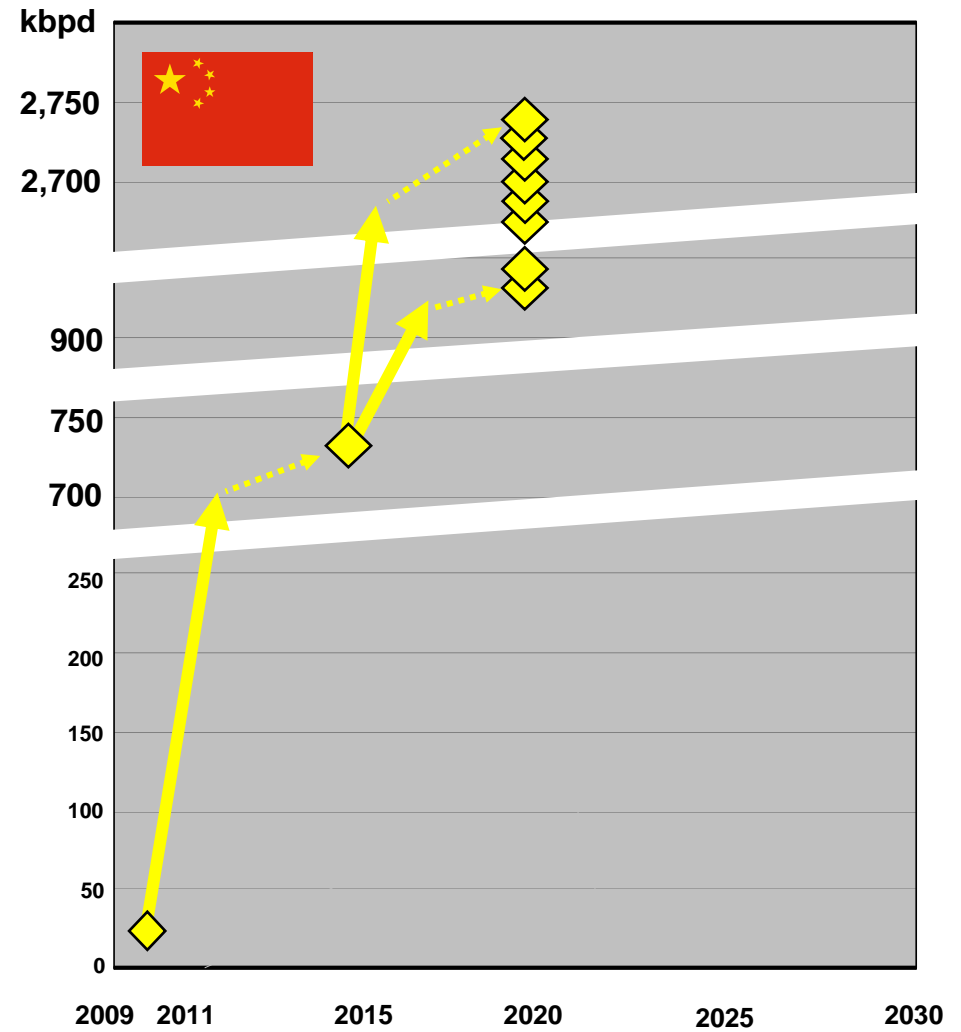
CTL production projections

Forecasts published in

- the U.S.A.
- the P.R. China



Source: U.S. Energy Intelligence Agency (2009)



Source: China Coal Information Institute (2009)



Conclusion

- CTL's predominant role: **energy security**.
- **Environment is a key issue**. Technology, CCS and Biomass are the best allies of CTL.
- Technologies are available, but **little commercially developed**.
- CTL is **capital intensive**, with risks associated to the volatility of crude oil and coal prices.
- **CTL highly competitive** at 2008 energy prices.
- **China and the U.S.** have taken the lead.
- National and international co-operations will develop.



World CTL 2010 Conference

Liquids Fuels, Natural Gas and Chemicals *from* Coal and Biomass

13-16 April 2010, Beijing, China



*Thank you...
and welcome to Beijing on 13 April!*

