



DME

A fuel for the future



Jean-Alain Taupy

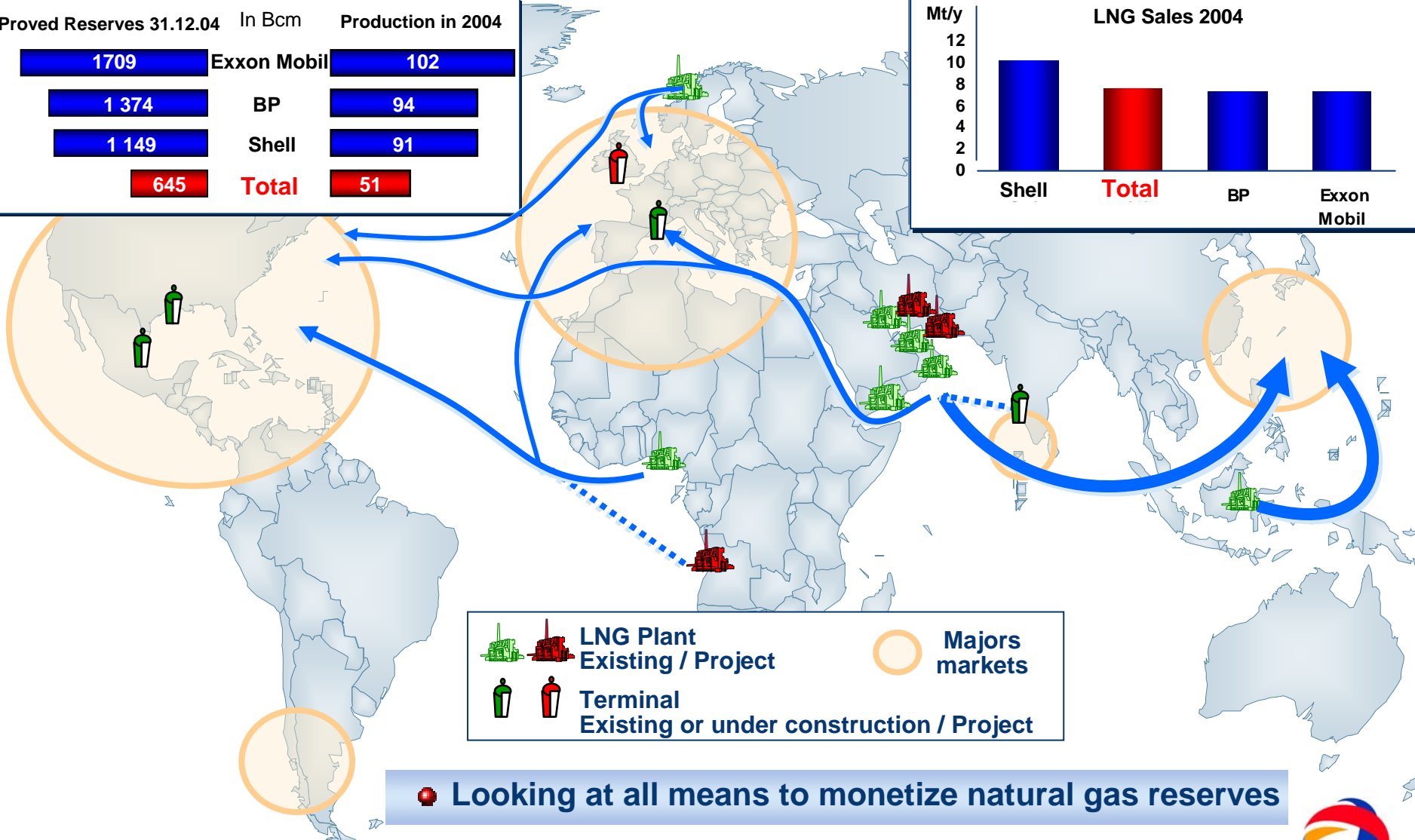
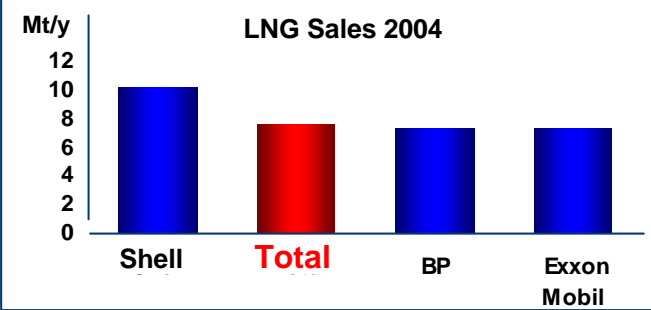
DME Global Downstream Development Senior Manager

TOTAL

March 17th, 2006 Washington D.C.

Total : a major world gas player

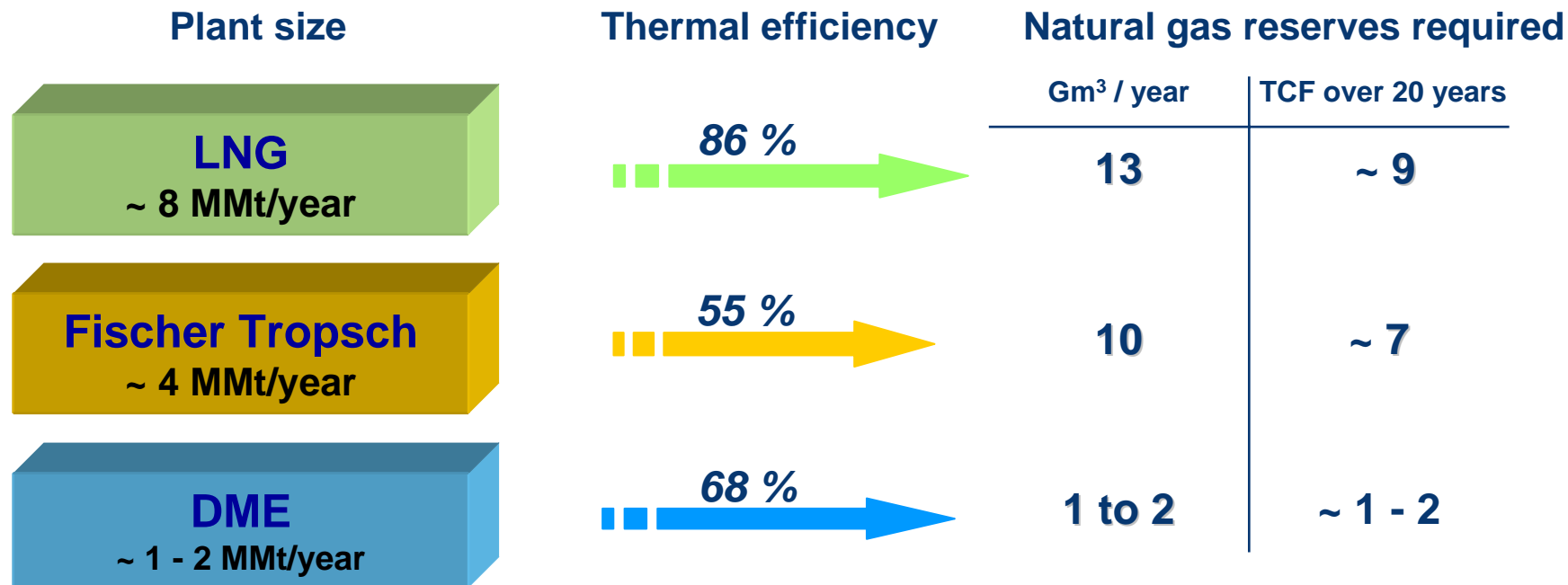
Proved Reserves 31.12.04	In Bcm	Production in 2004
1709	Exxon Mobil	102
1 374	BP	94
1 149	Shell	91
645	Total	51



Looking at all means to monetize natural gas reserves



DME : A new solution for energy transportation

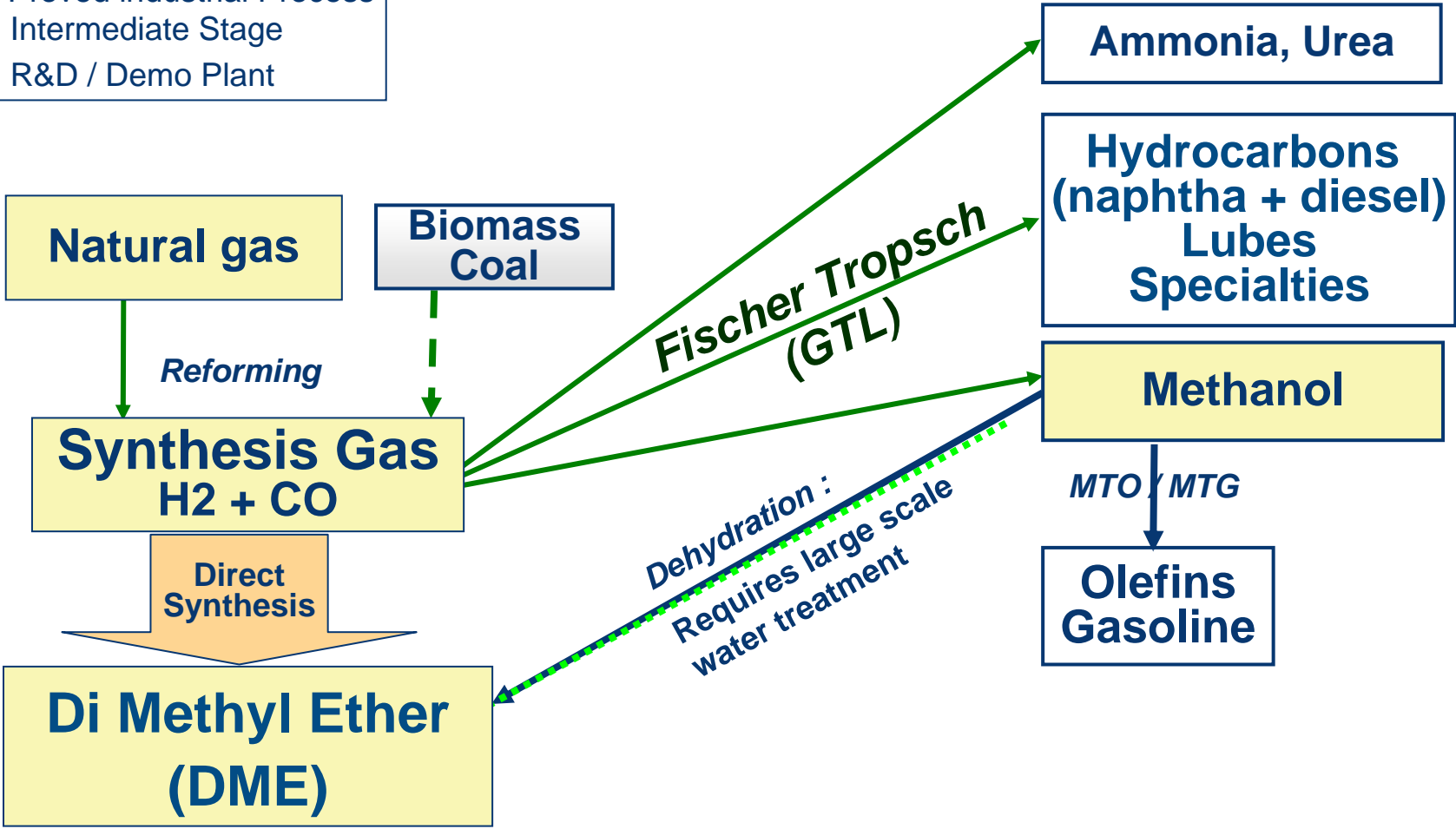


- Best GTL in terms of thermal efficiency
- Conceivable for smaller gas fields
- Economical for storage and transportation

- Economical for remote market
- Broad environmental advantages
- Targets various different markets

Alternative routes to produce DME

 Proved industrial Process
 Intermediate Stage
 R&D / Demo Plant



● Once fully validated, Direct Synthesis will be the most efficient process



TOTAL player in the Direct Synthesis development

- 5 year R&D project,
- Budget: 170 MUS\$ (incl. METI subvention: 113 MUS\$),
- 100 t/d Demonstration plant started-up in December 2003 in Kushiro, Northern Japan,
- Cumulative production of 15000 tons,
- Technical validation to complete in mid 2006.



● TOTAL, sole international gas player among a consortium of 9 Japanese partners*

* JFE, Nippon Sanso, Toyota, LNG Japan (Sumitomo-Nisho-Iwai), Hitachi, Marubeni, Idemitsu, Inpex, Japex,

Jean-Alain TAUPY - Conference on the Development and Promotion of Environmentally Friendly Heavy Duty Vehicles such as DME Trucks – March 17th, 2006 – Washington D.C.



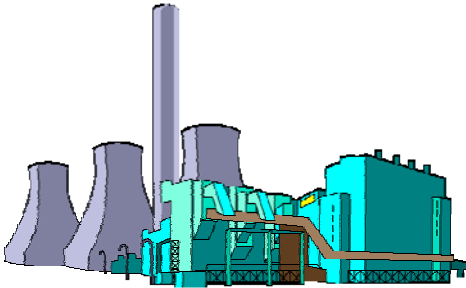
DME : a promising role to play in TOTAL's strategy

LPG Domestic Market



80 Mtpa*

Power Generation



270 Mtpa*

Transportation



240 Mtpa*

● 3 Asian markets large enough to easily receive first DME production

* In tonne of DME equivalent



A promising future, pending two main challenges

● Technological Challenges

- Assessing the feasibility of DME industrial production (capacity 1 to 2 Mtpa)
- Making the DME route economical all along the chain

● Market Challenges

- Working in collaboration with gas producers to raise new market opportunities
- Ensuring that Japan, and more generally Asia, will be the primary areas for DME development

● Stakeholders must work hand in hand to meet these challenges



LPG route as blend

● Challenges :

- Regulatory permits for operating DME businesses
- Validation of DME/LPG blending
- Acceptance by LPG players

● Benefits :

- Immediate and broad markets
- blending easy to implement
- Promising valorisation for natural gas
- Enlarging LPG distributors businesses

● Markets :

- Japan
- India
- China
- Korea and other Asian countries...
- USA?

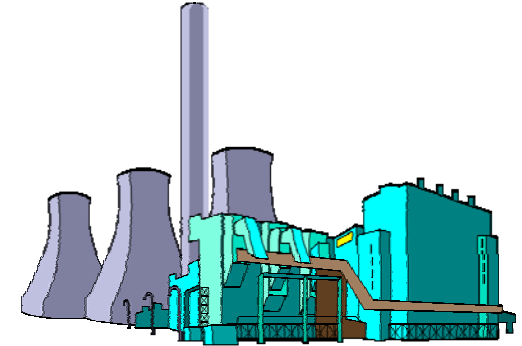


● DME/LPG blending could launch the DME venture

Power Generation

● Challenges :

- Regulatory permits for operating DME businesses
- Long term testing on large industrial gas turbines
- Power Generator : ready to launch a business based on a single innovative source ?
- back-up fuel ?



● Benefits :

- High efficiency CCGTs
- Starting the business in a relatively short term
- Innovative supply for remote and isolated Power Plants
- One project large enough to absorb the full production of a new industrial unit
- Fit-for-purpose contracts
- Supplied zone energy mix enlarged

● Markets :

- Islands, remote cities...

● An asset for medium size power plant (100-500 MW)

Diesel Transportation

● Challenges :

- Regulatory permits for operating DME businesses
- Specific distribution network
- Injection and sealing materials
- Lubricating additive

● Benefits :

- No soot, no SOx, no PM, no particle filter needed on exhaust gas, low NOx...
- Noise reduction
- Huge market
- Alternative to Diesel production issues for refineries
- High Cetane number
- Easy to store

● Markets :

- Captive Fleet
- Environmentally driven
- Japan, China, Europe, USA?...



● A way to prepare for oil decline and to eliminate atmospheric pollution

To make it a reality, all the players should

- **Educate,**

and therefore, set sound basis for the coming businesses

- Markets
- Administrations and Regulators

- **Create,**

imaginative business marketing structures

- Contracts
- Distribution

- **Adapt,**

select the appropriate market for the appropriate country:

- LPG
- Electricity
- Diesel

