

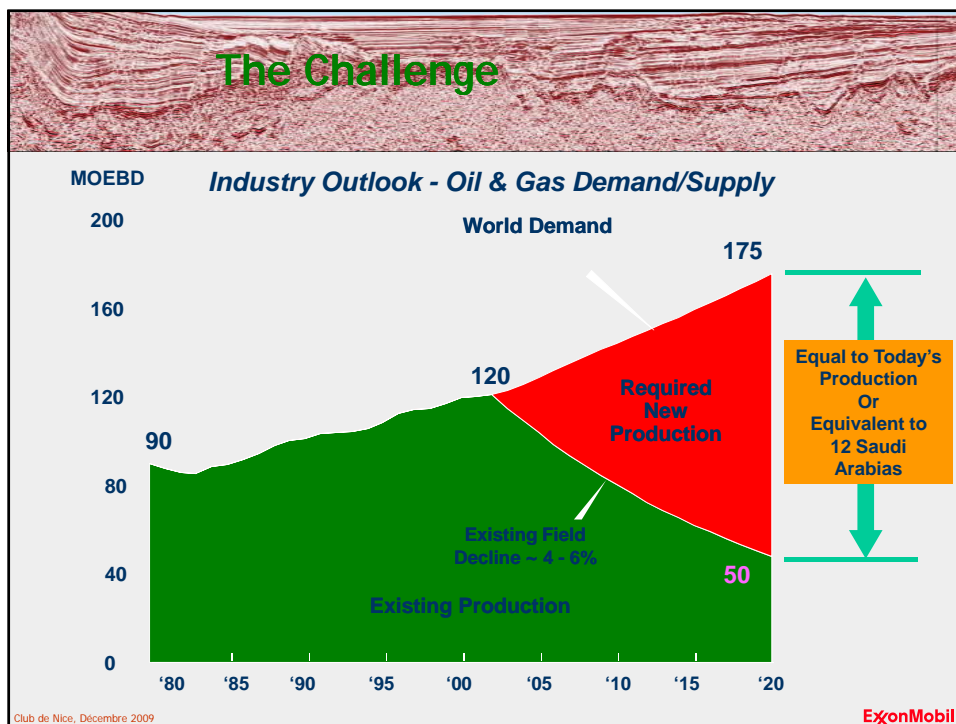


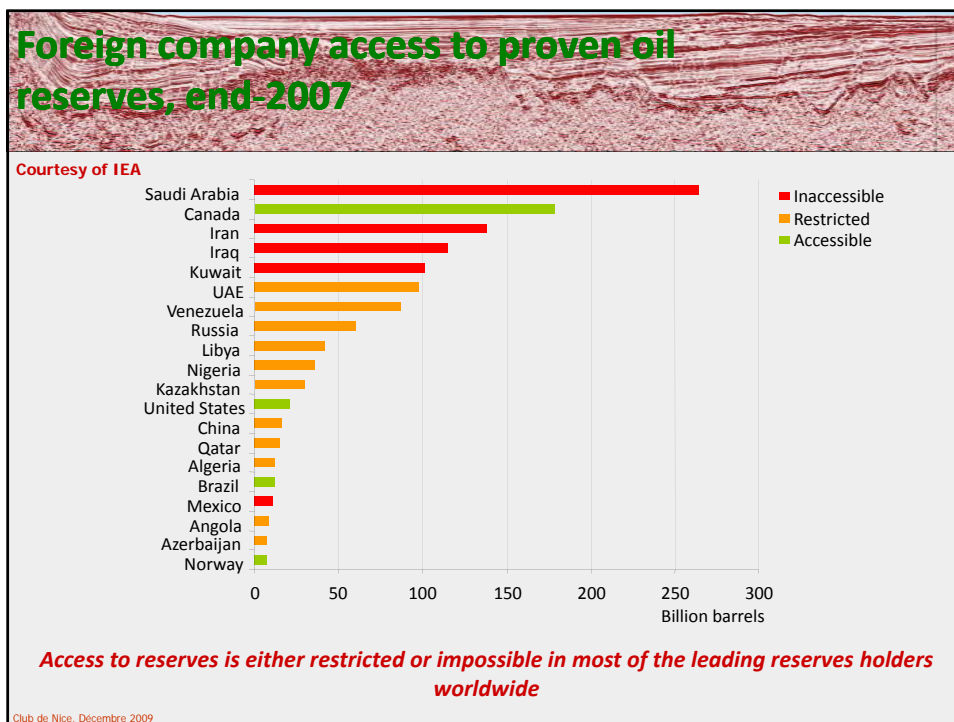
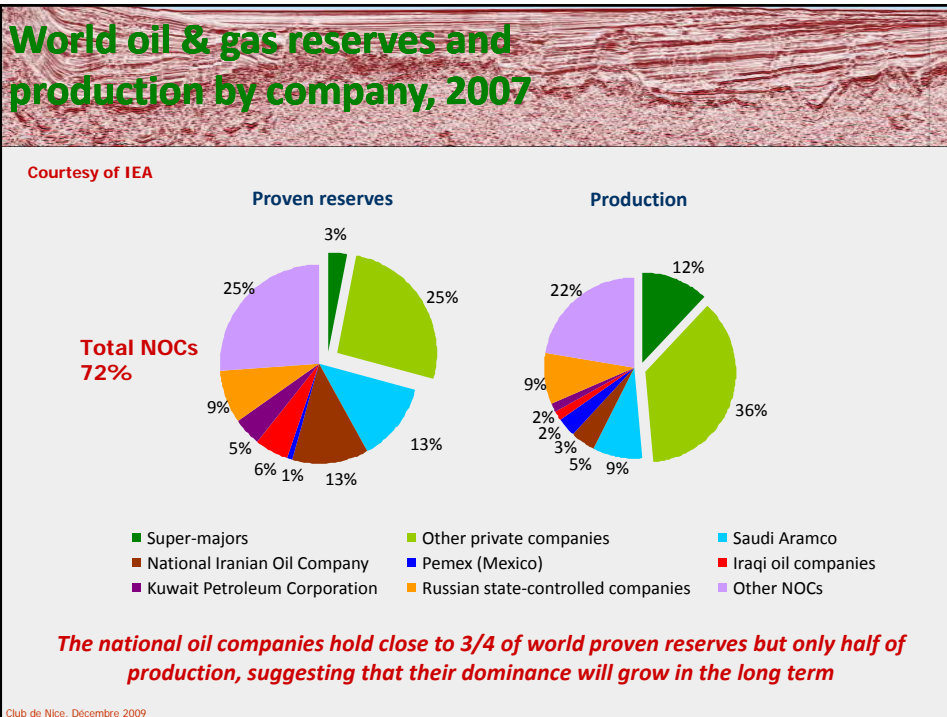
Oil and Gas Industry

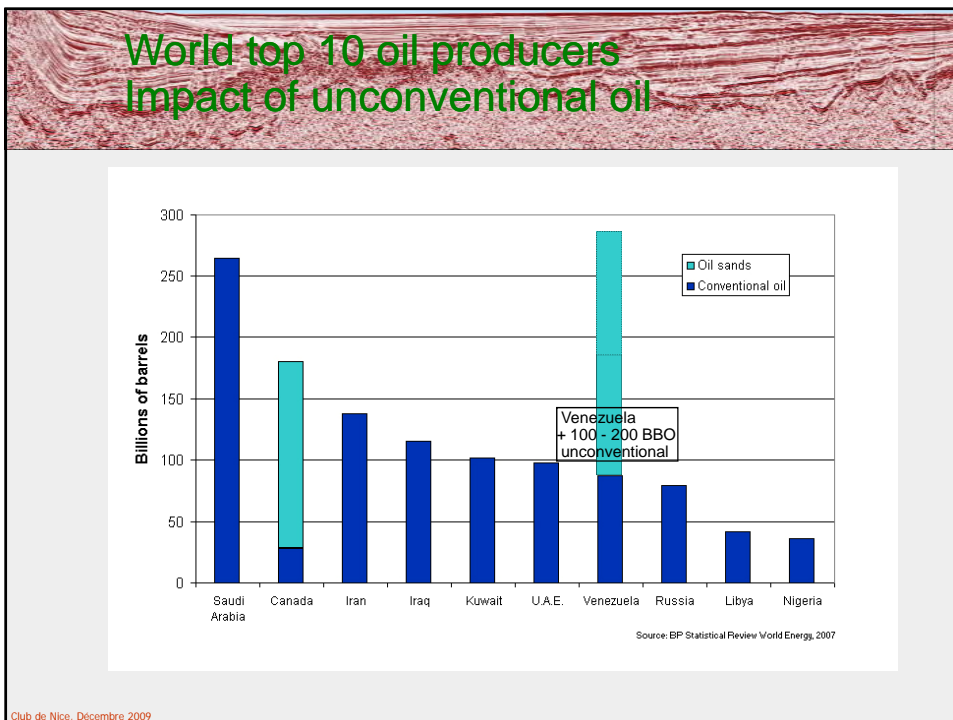
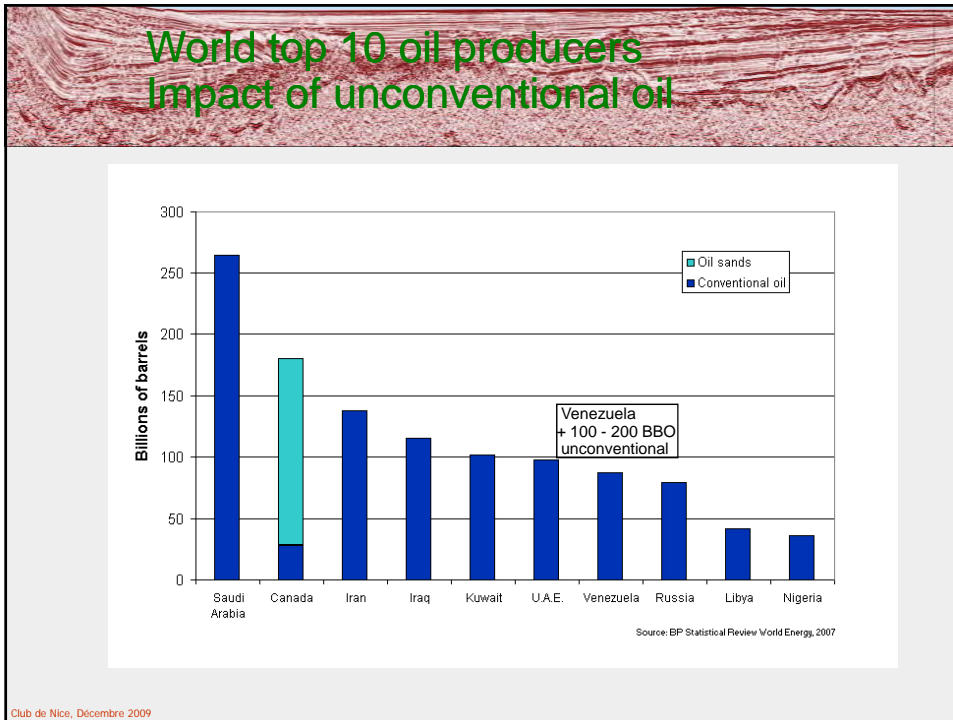
Upstream 2009
Frédéric Guinot

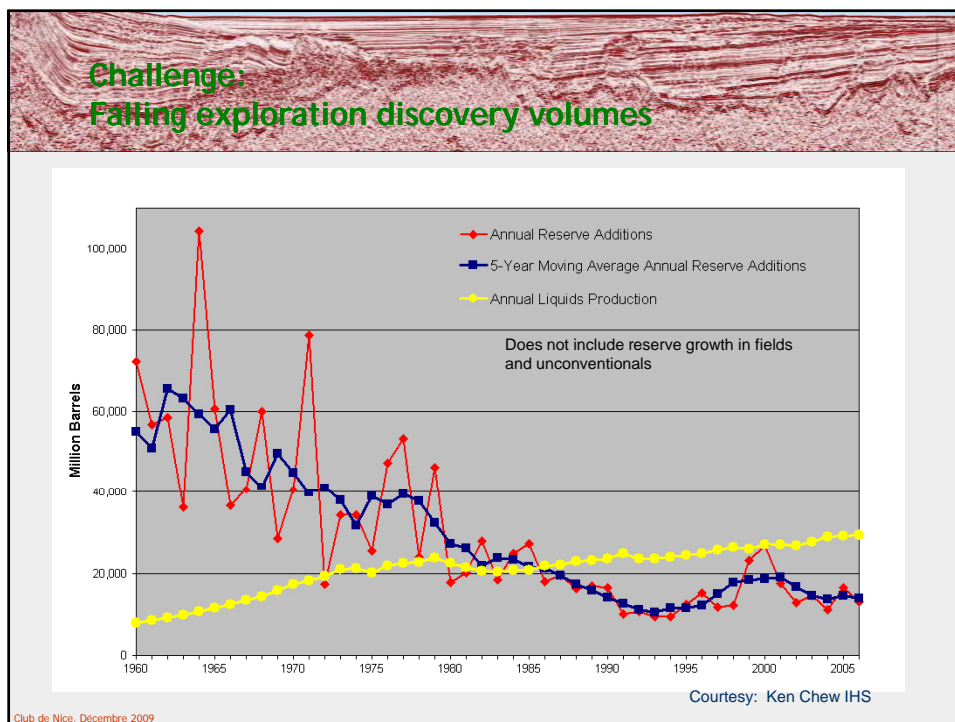
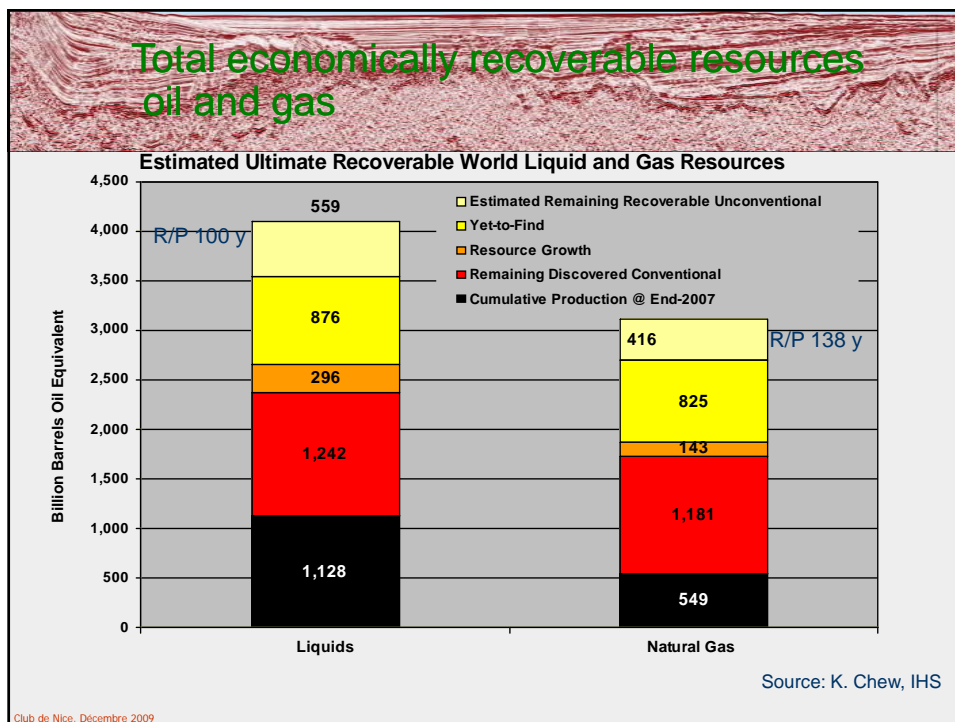


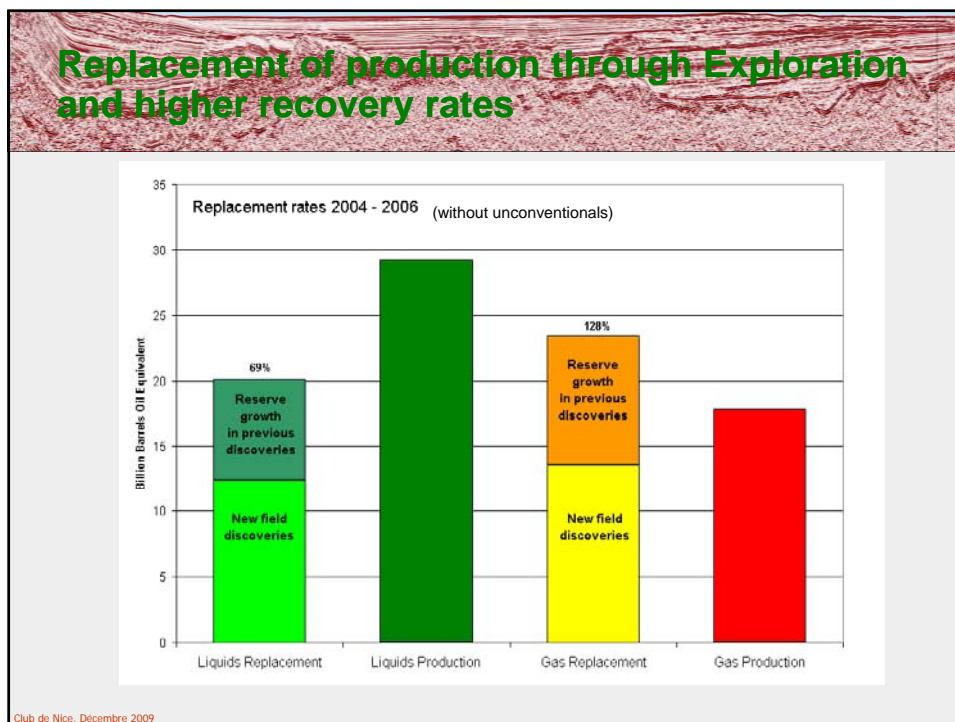
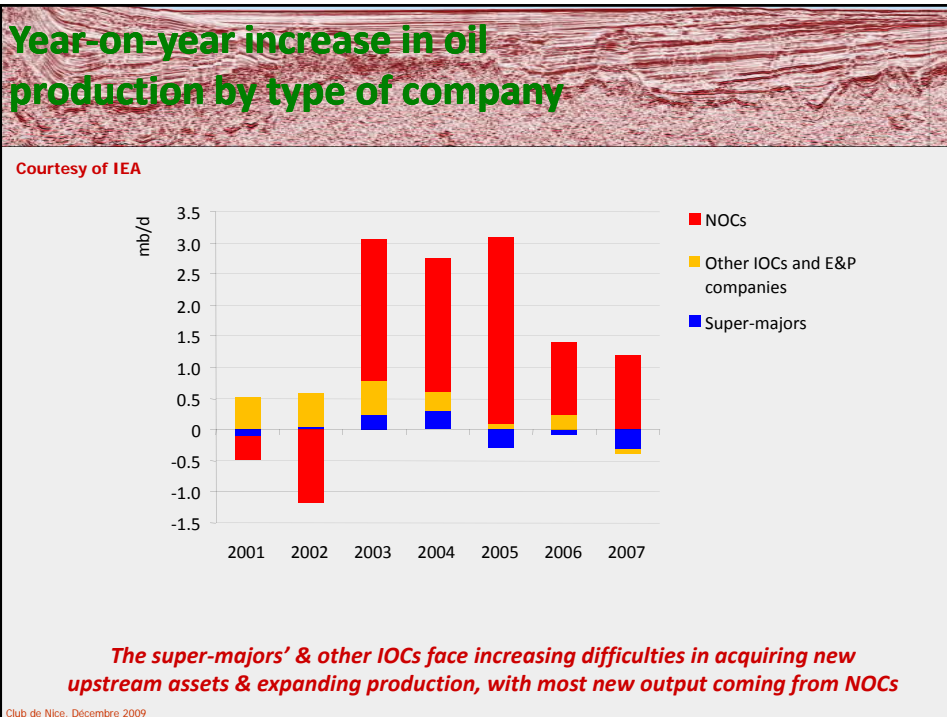
Club de Nice, Decembre 2009

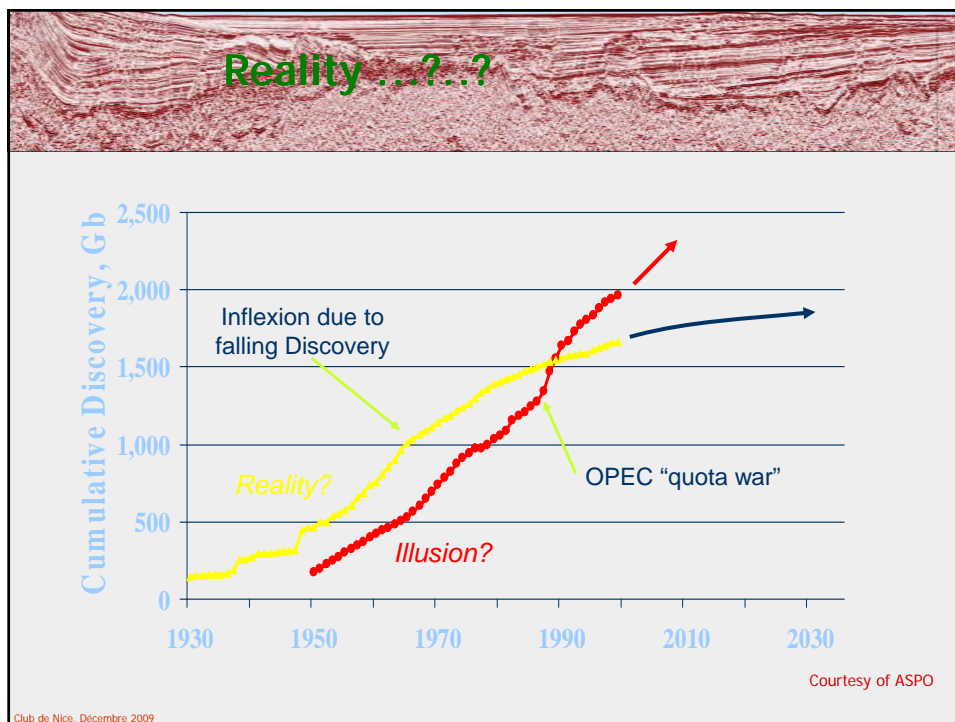








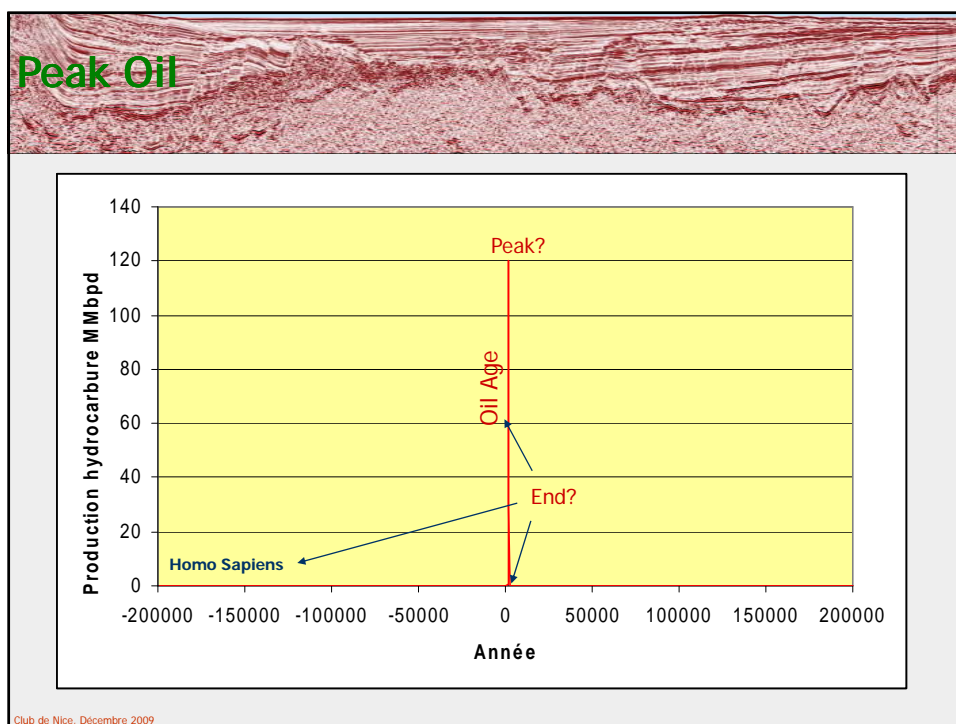
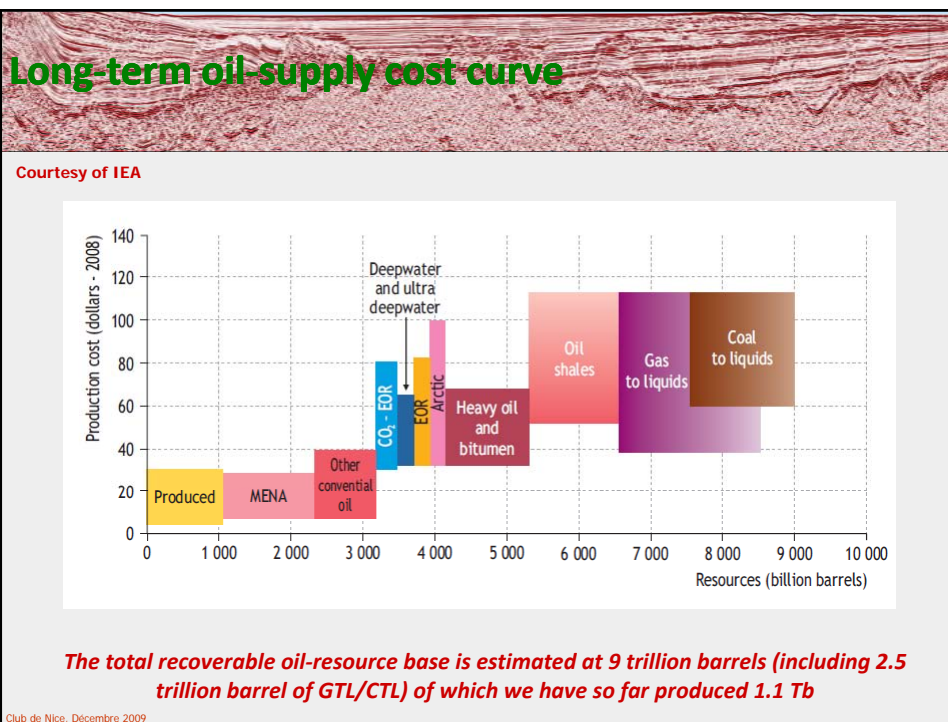




Where is the truth?

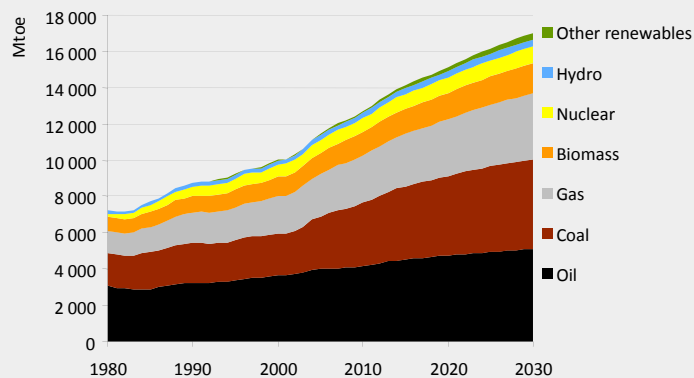
- $\frac{2}{3}$ to $\frac{3}{4}$ of world oil reserves are unaudited
- OPEC oil quota could prompt OPEC countries cheat on numbers
- Producing country budget set on oil price estimates x production forecast of a non-renewable resource could make Oil rich countries cheat on numbers

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World primary energy demand in the Reference Scenario: this is unsustainable!

Courtesy of IEA

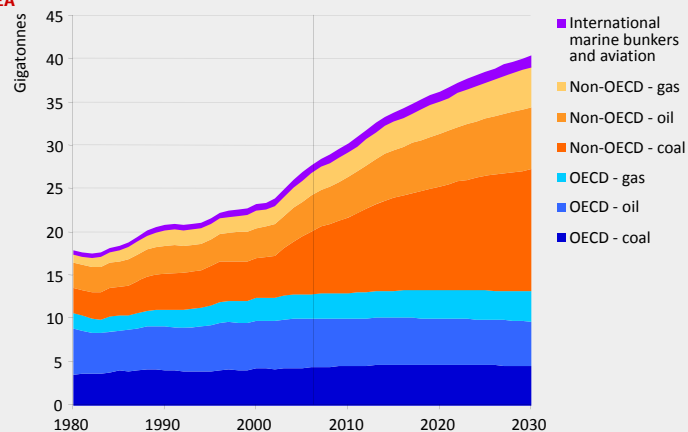


World energy demand expands by 45% between now and 2030 – an average rate of increase of 1.6% per year – with coal accounting for more than a third of the overall rise

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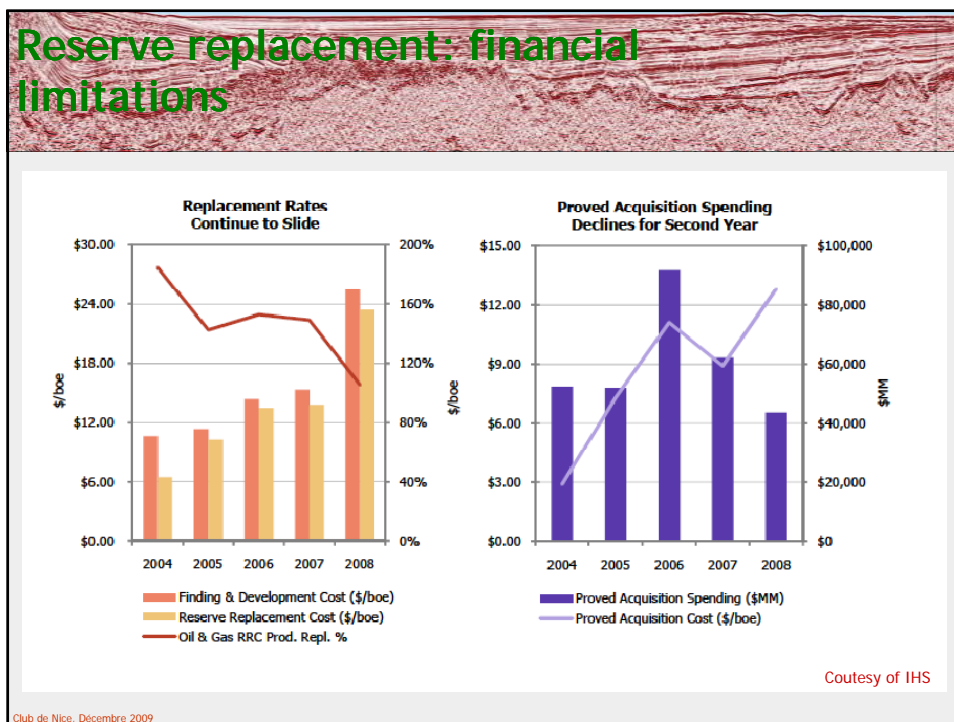
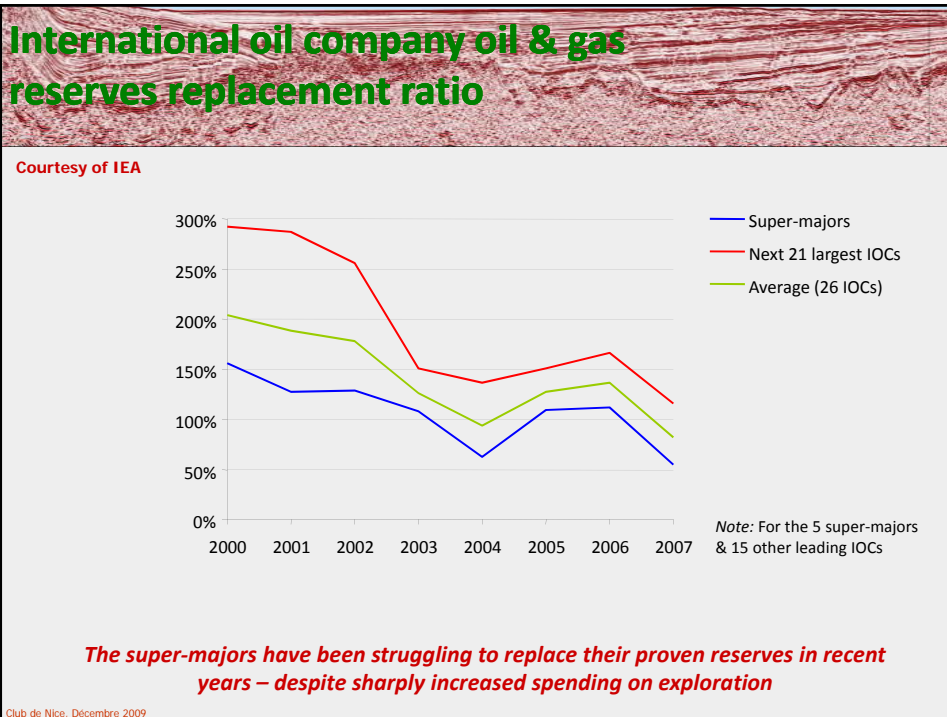
Energy-related CO₂ emissions in the Reference Scenario

Courtesy of IEA

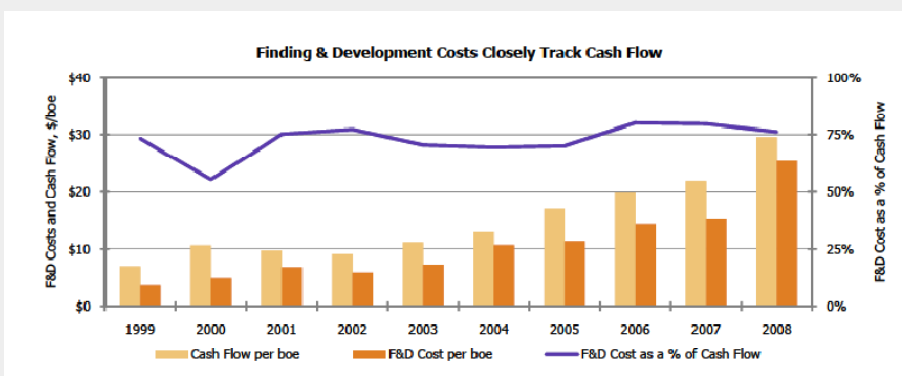


97% of the projected increase in emissions between now & 2030 comes from non-OECD countries – three-quarters from China, India & the Middle East alone

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Financial limitations: Cost are rising

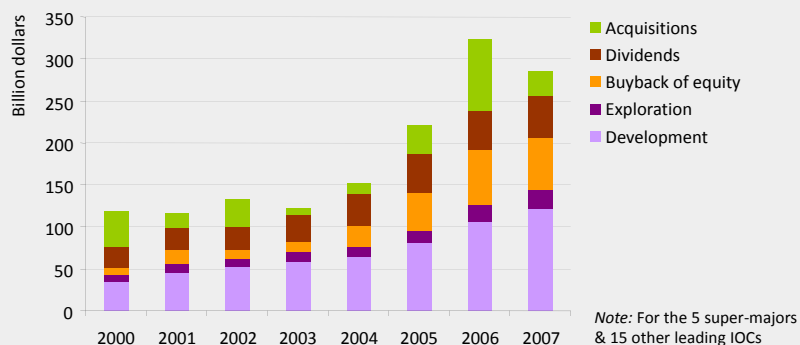


Courtesy of IHS

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International oil company outlays from operating cash-flow

Courtesy of IEA



Half of the increase in cash-flow in 2000-2007 was returned to shareholders in the form of equity buybacks & dividends – exceeding the increase in E&P spending

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Technology

- **Finding Reserves**
 - **Finding new reservoirs**
 - **Improving the recovery factor (currently 35% average for conventional oil)**
 - **Improve economics on unconventional**

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Technology

- **Improved seismic, DHI**
- **Low Frequency Passive Seismic**
- **EOR: Flooding, SAGD, ES-SAGD, Bacterial**
- **Improved drilling – Multilateral**
- **Greener drilling and production**

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Recovery factors

- **3 trillion recoverable means 9 trillion OIP**
- **Improving RF from 0.35 to .5 means 4.5 trillion recoverable i.e. more than produced today...**
 - **Who will go back to abandoned fields?**
 - **All fields are not candidate**
 - **Currently EOR accounts for about 2% of the oil produced...**
 - **Still, we can improve through research and development**

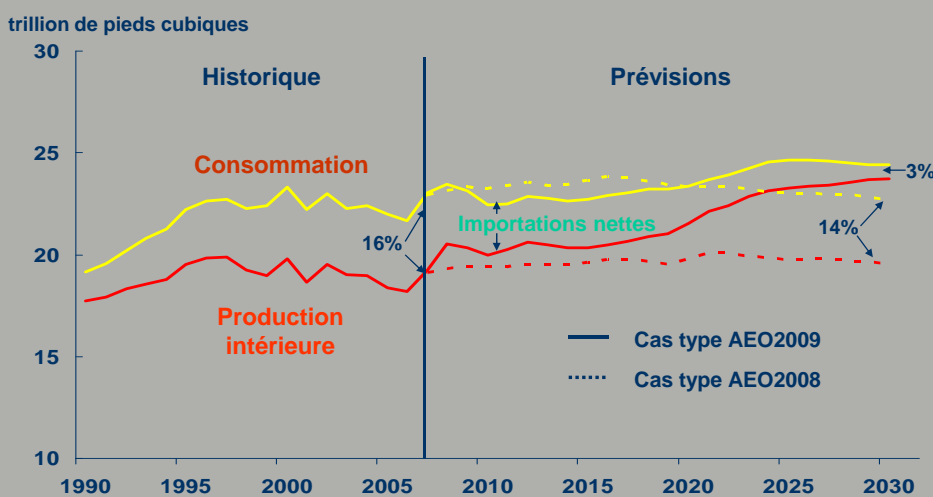
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Unconventional: Tar sand

- **Energy Efficiency is currently around 20%**
- **Environmental impact**
 - **Air**
 - **Water**
 - **Land**

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En augmentant l'exploitation domestique, les États-Unis ont diminué leurs importations de gaz naturel.



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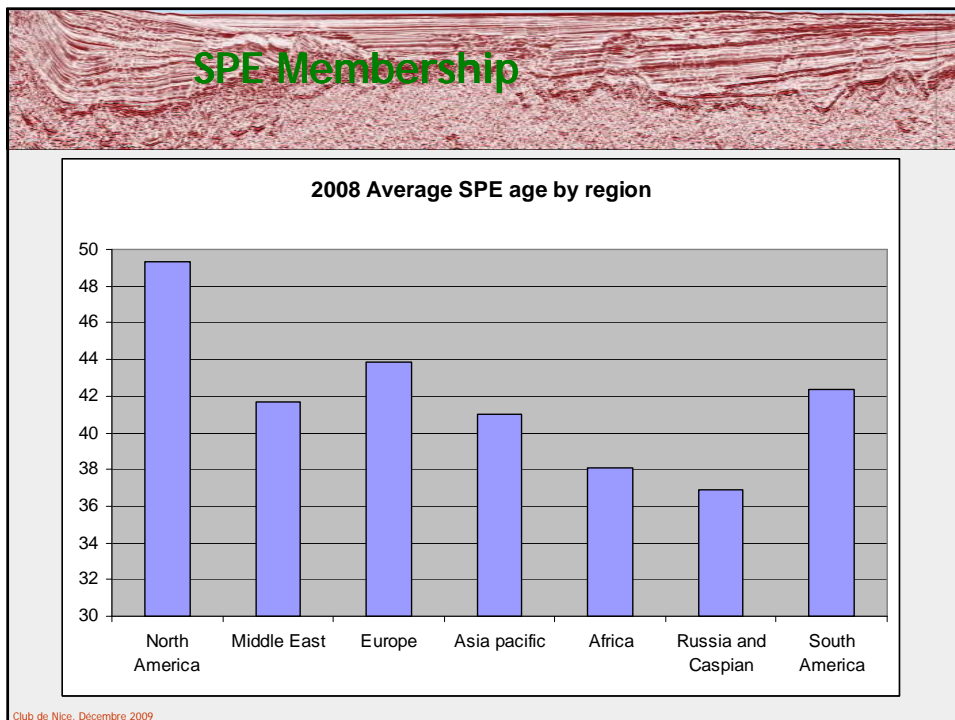
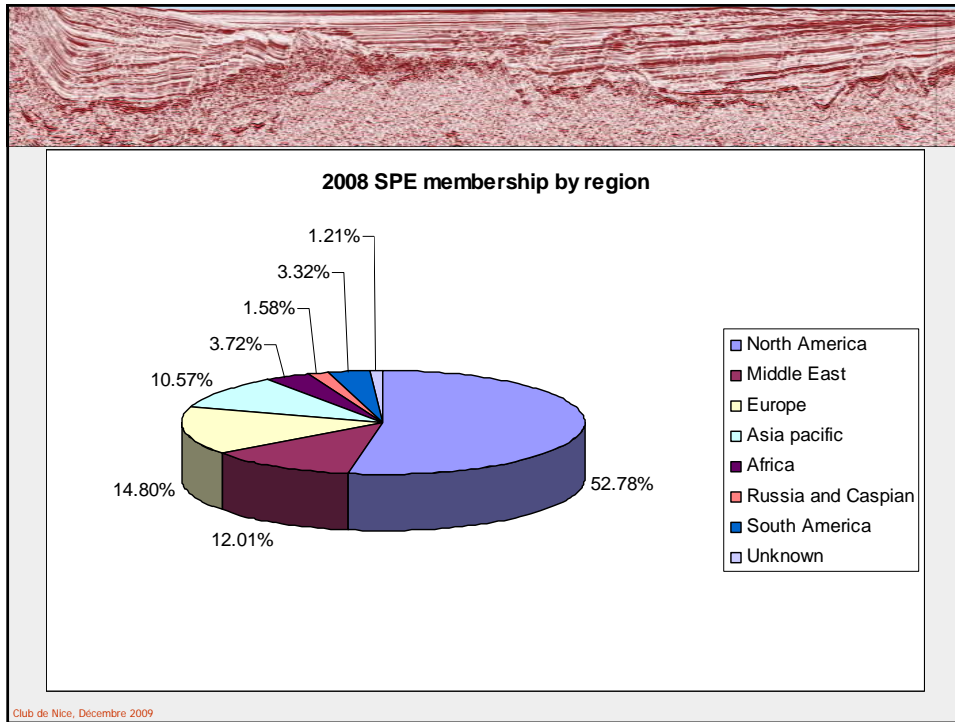
Source : EIA, Présentation du cas type Annual Energy Outlook 2009, 17 décembre 2008

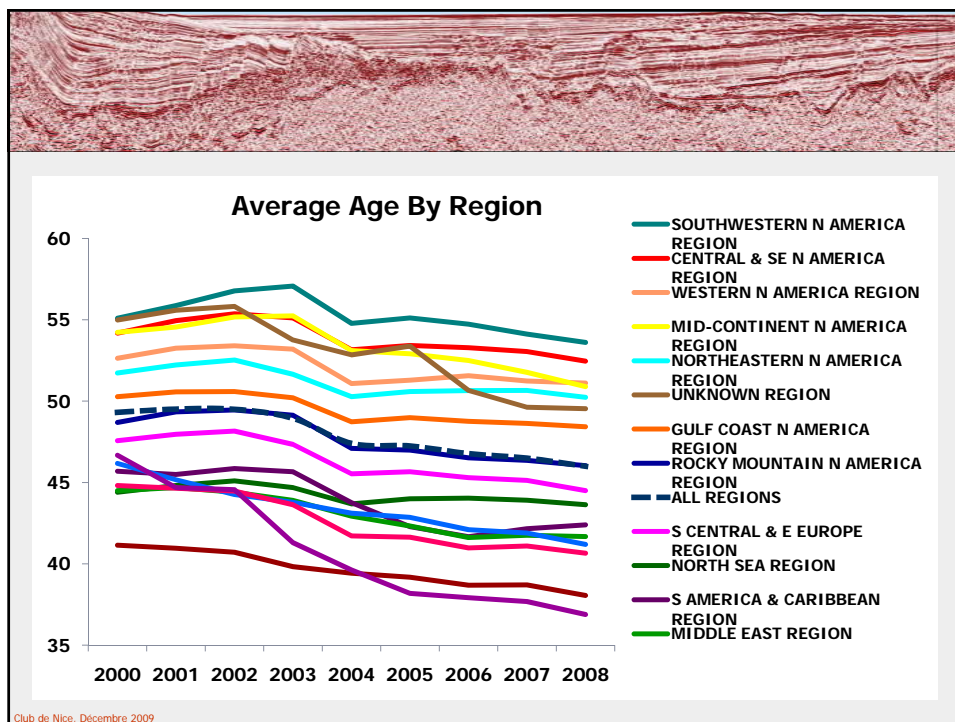
Aging workforce

Management of Human Assets: The Aging Workforce



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**Management of Human Assets:
Changing Environment**

- more diverse and far more demanding
- maintain technical competence, broaden experience, and adapt to the fast paced work environment
- traditional formal education insufficient in supplying enough knowledge base for the entire journey

Behrouz Fatahi, Geneva, Switzerland, July 2009

Club de Nice, Decembre 2009