



Middle Eastern Supply and Sustainability Challenges

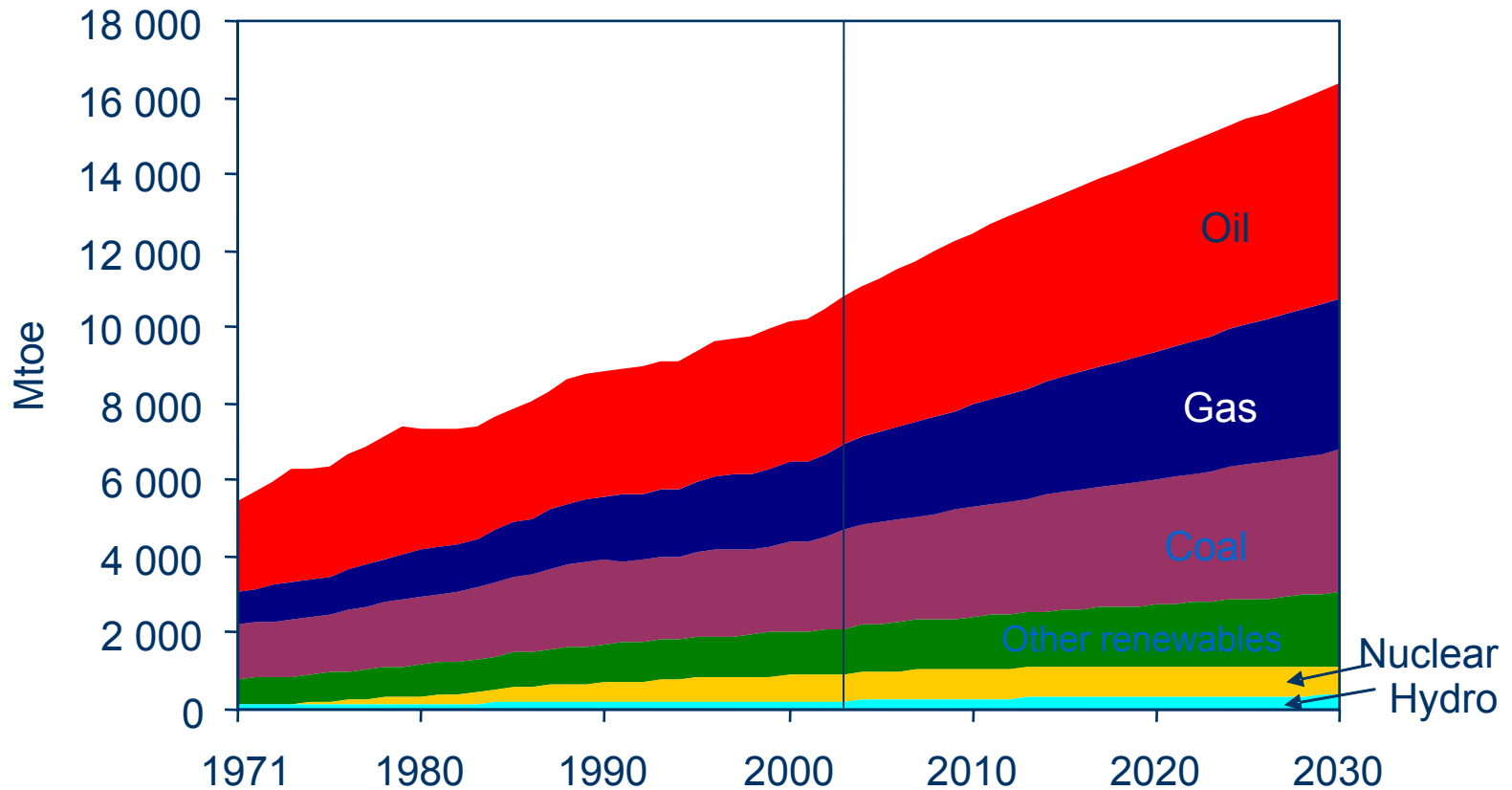
Insights from the World Energy Outlook 2005

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Executive Director
International Energy Agency**

Berlin, Tuesday 22 November 2005



World Primary Energy Demand



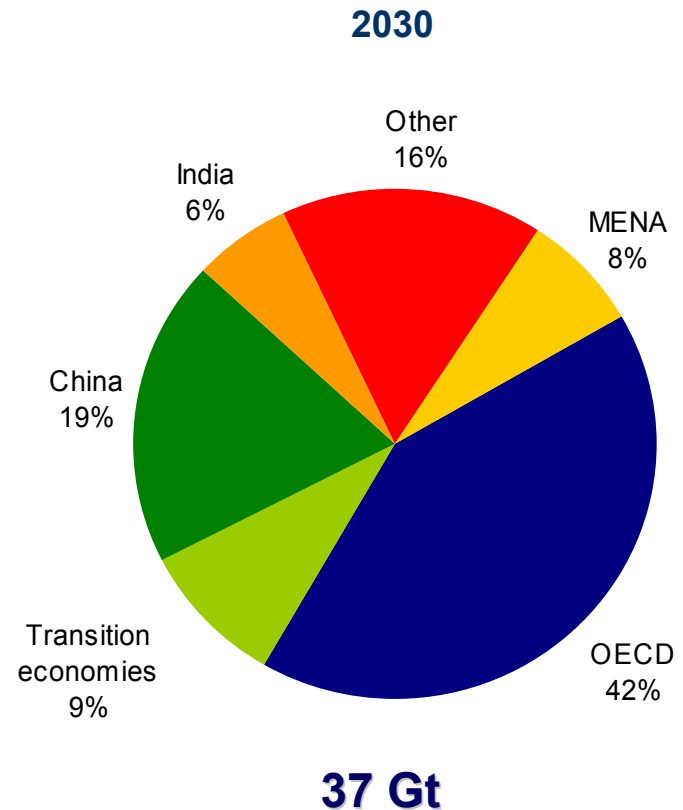
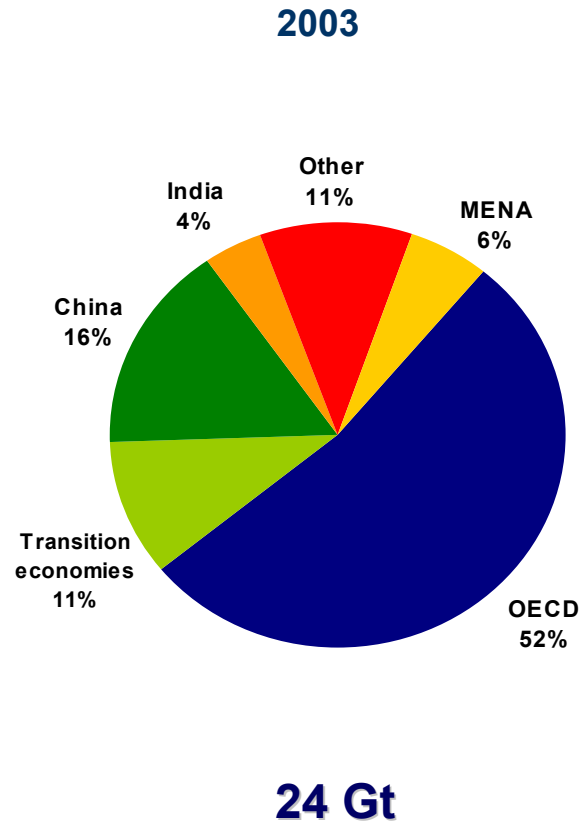
World Energy Demand rises by 52 % between now and 2030 in the Reference Scenario



**This is Not
Sustainable!**



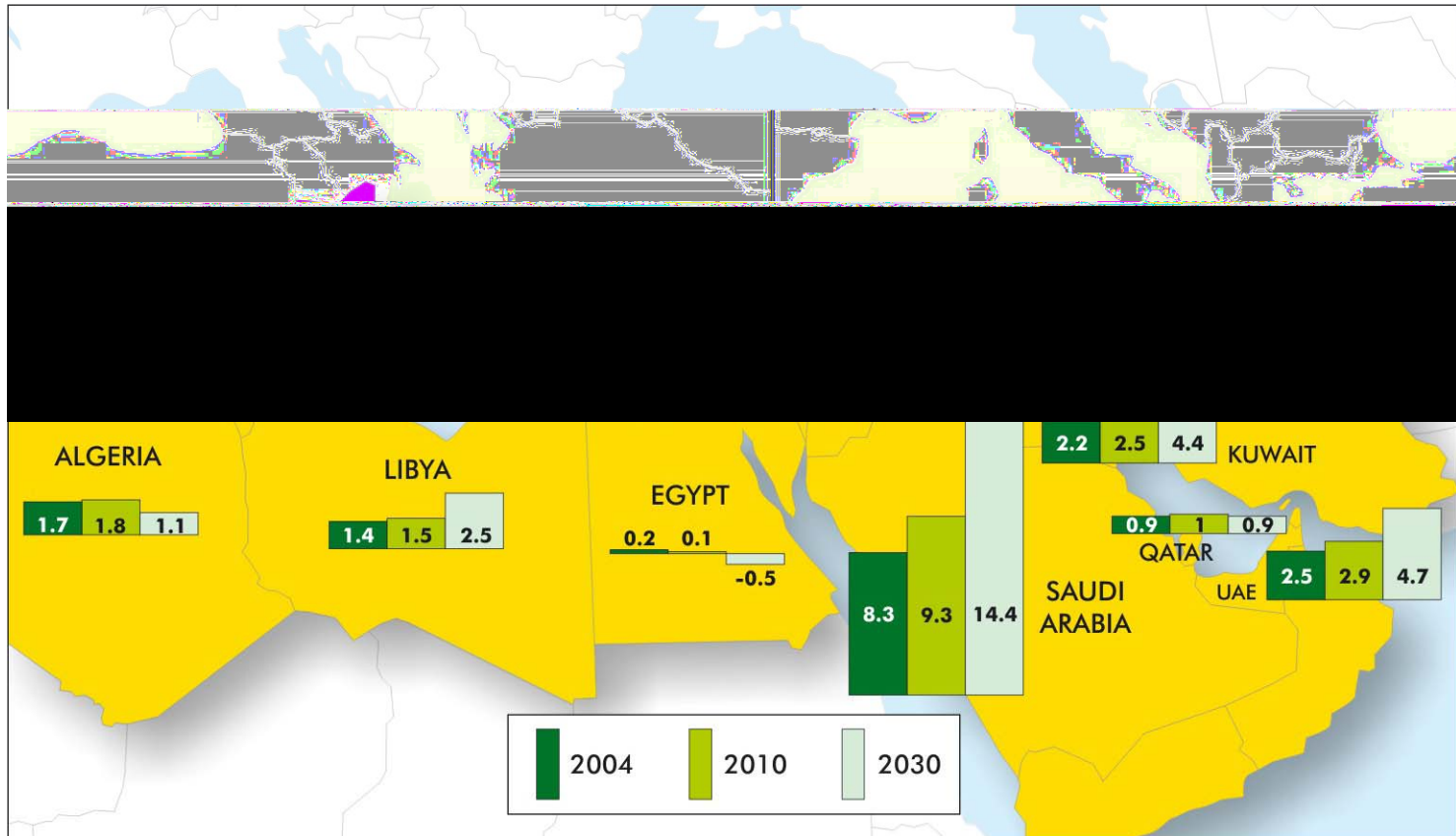
Global Energy-Related CO₂ Emissions



Emissions grow by just over half between now and 2030, with the bulk of the increase coming from developing countries

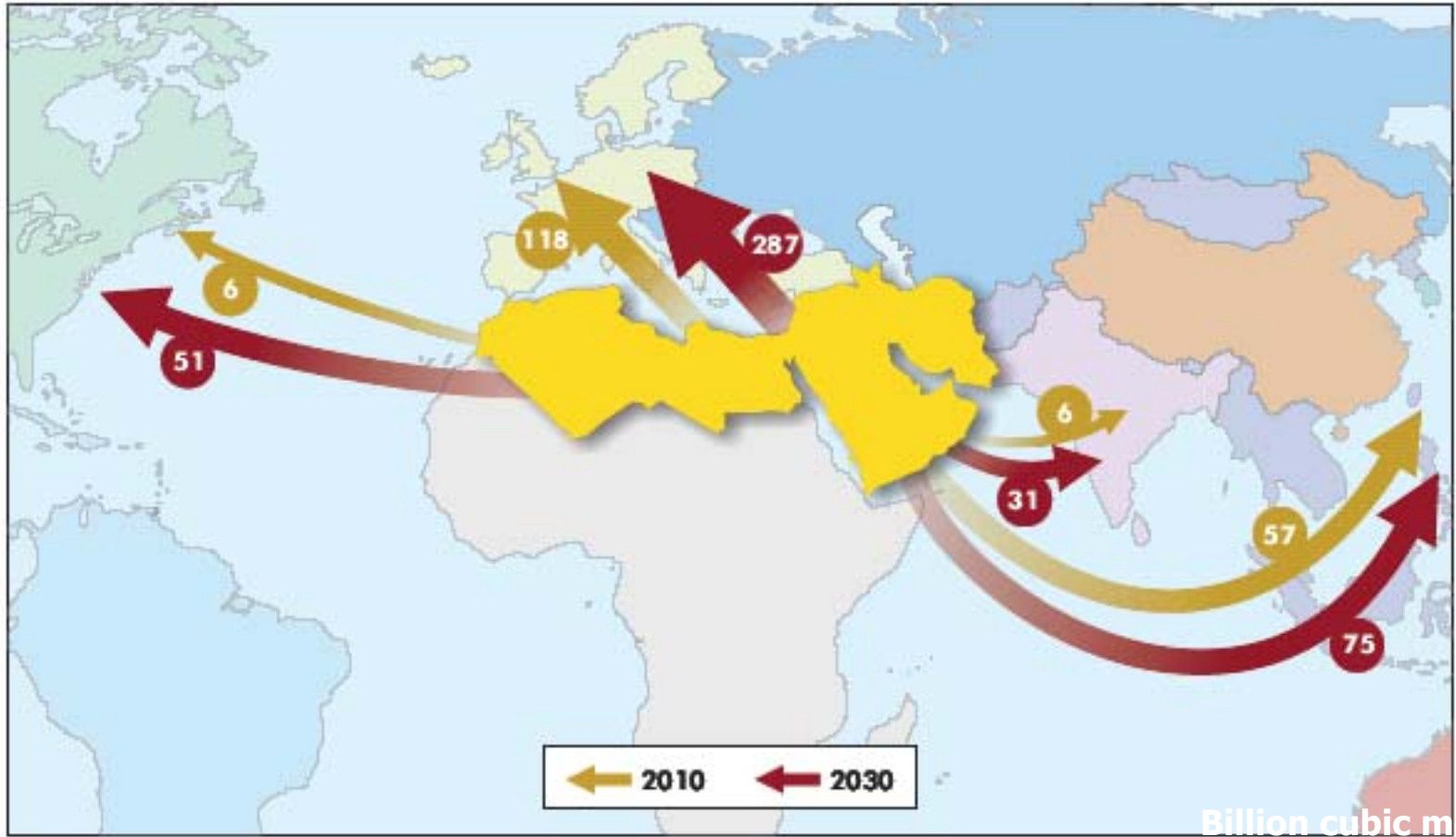


MENA Net Oil Exports



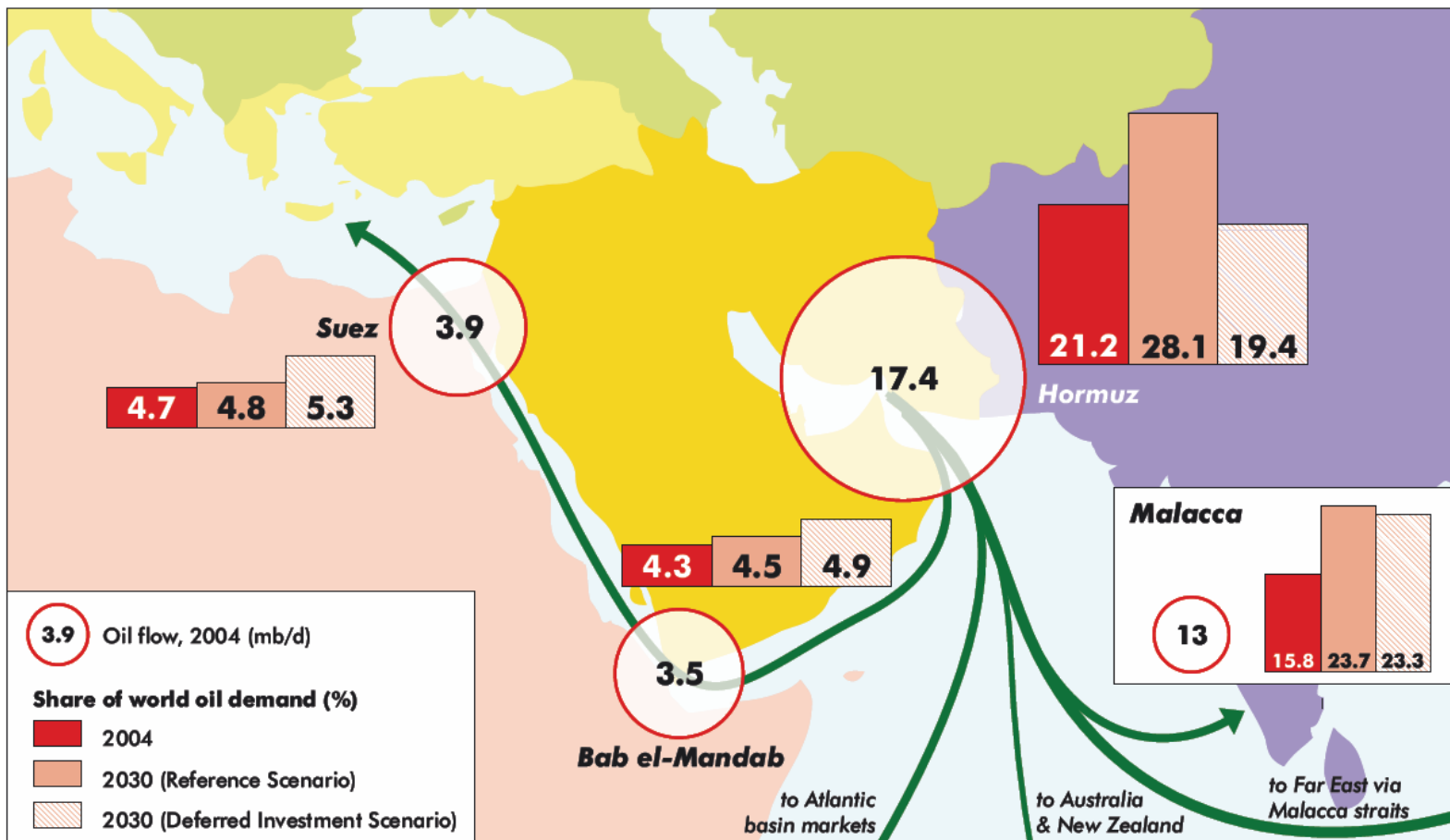
MENA plays an increasingly important role in international trade, its net exports surging from 22 mb/d in 2004 to 39 mb/d in 2030

MENA Natural Gas Exports



MENA becomes the world's leading gas exporter, with most of the increase in exports meeting surging European & US LNG demand

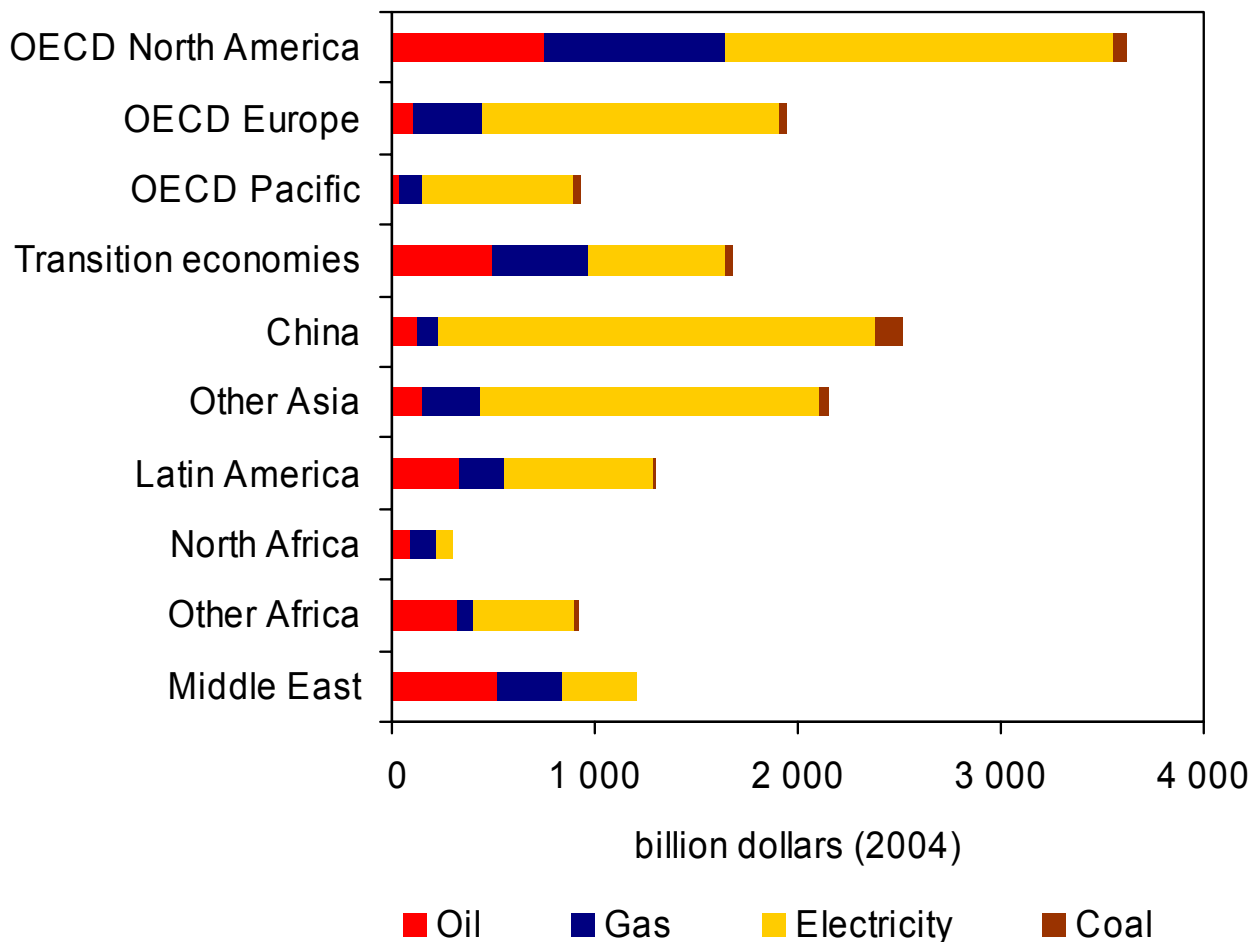
Exports through the “Dire Straits”



Much of the additional oil and LNG exports from MENA in the future will be shipped through just three maritime routes



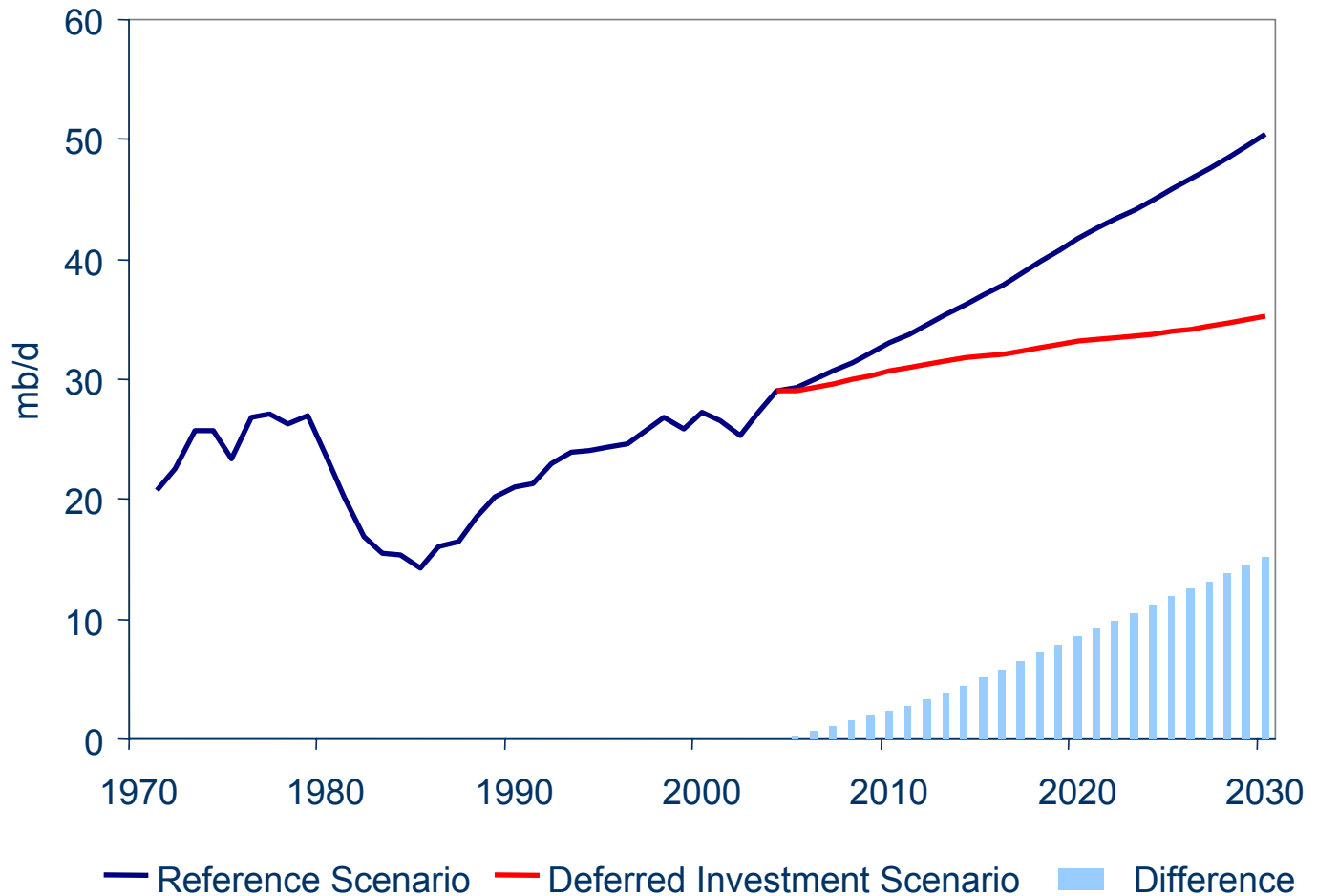
Global Energy Investment 2004-2030



Energy sector investment of \$17 trillion will be needed through to 2030

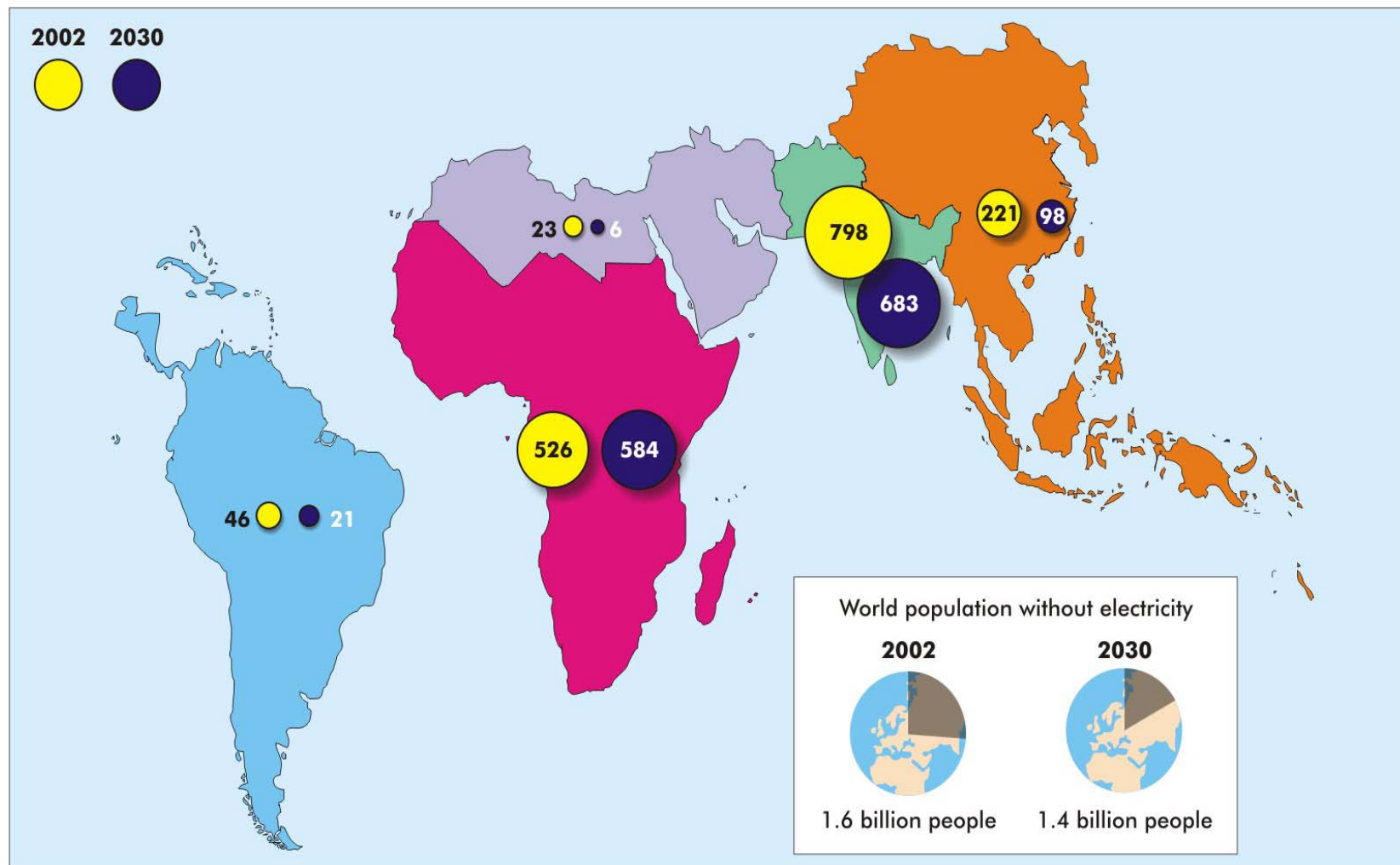


MENA Crude Oil Production in the Deferred Investment Scenario



In the Deferred Investment Scenario, MENA's share of global oil production falls from 35% in 2004 to 33% in 2030

Electricity Deprivation



In 2030, if no new policies are implemented, there will still be 1.4 billion people without electricity



**But the future is not
predetermined...**

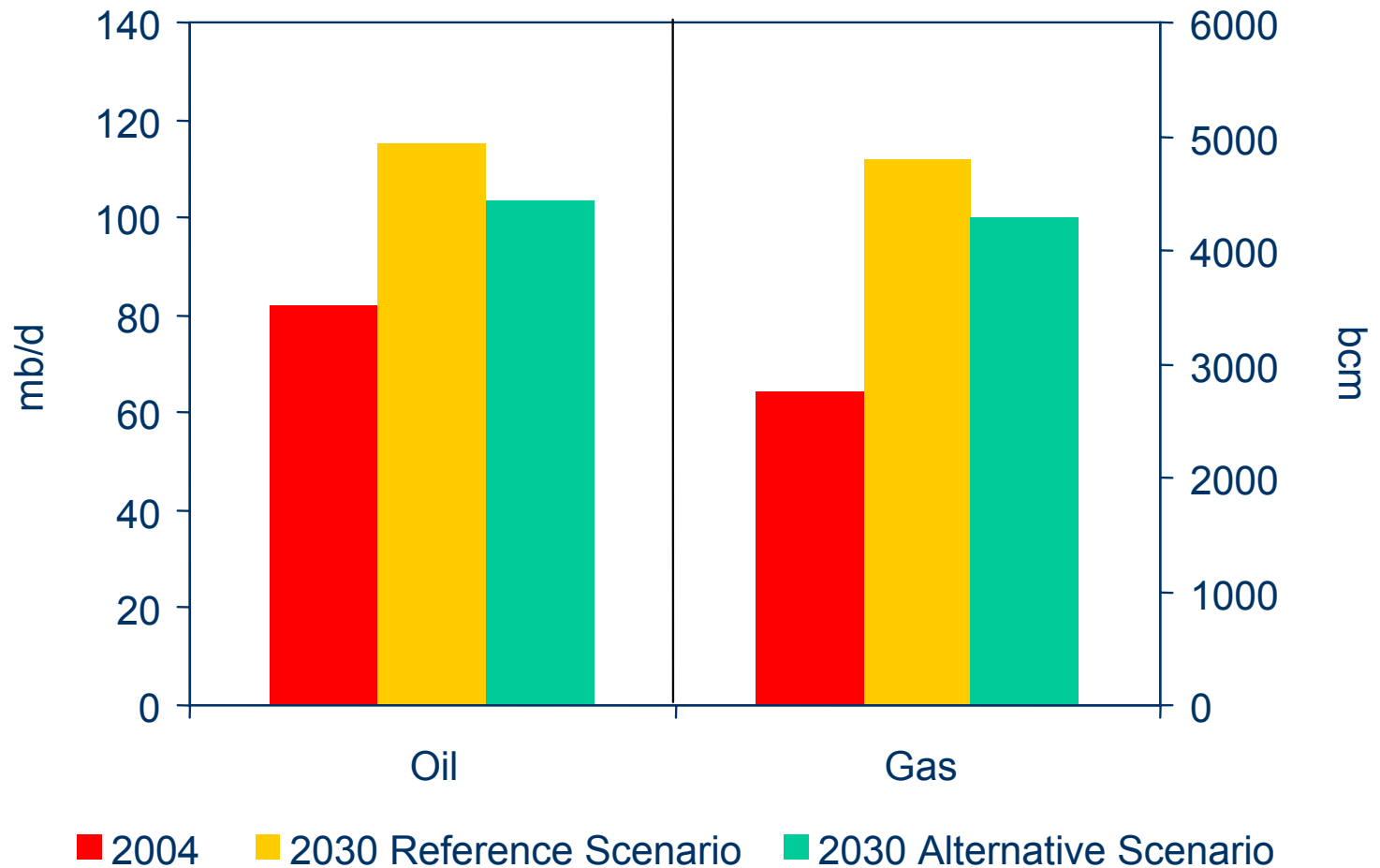


The World Alternative Policy Scenario

- Analyses impact of new environmental & energy-security policies worldwide
 - ◆ *OECD: Policies currently under consideration*
 - ◆ *Non-OECD: Also includes more rapid declines in energy intensity resulting from faster deployment of more-efficient technology*
- Impact on fuel mix, CO₂ emissions & investment needs
- Basic macroeconomic & population assumptions as for Reference Scenario, but energy prices change



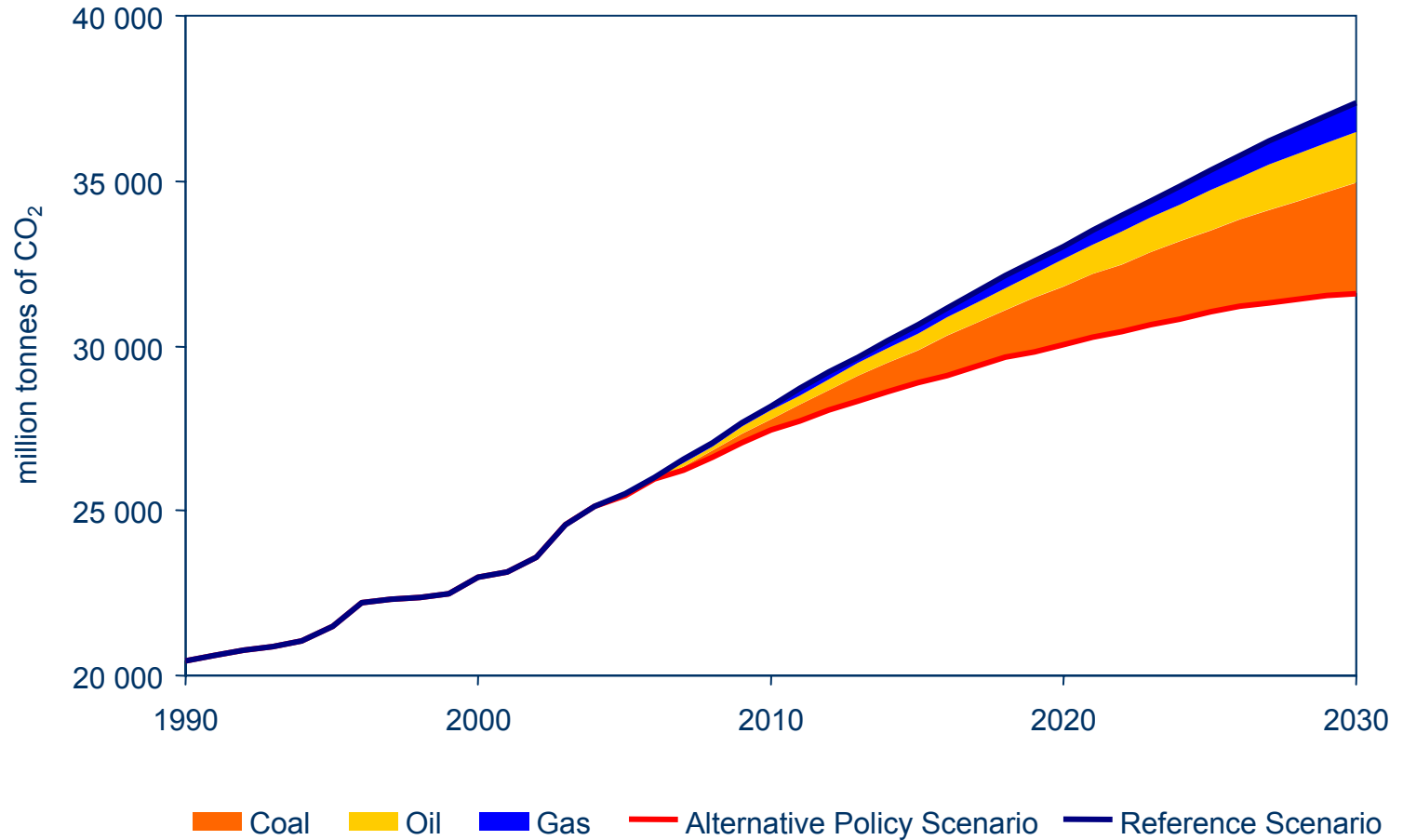
Oil/Gas Demand in the Reference and Alternative Policy Scenarios



Oil & gas demand in the Alternative Scenario are 10% lower in 2030 due to significant energy savings and a shift in the energy mix



CO₂ Emissions in the Reference and Alternative Policy Scenarios



CO₂ emissions are 16% lower than in the Reference Scenario by 2030, but are still more than 50% higher than 1990



Energy Efficiency Has A Key Role To Play And Is Available In The Short Term



High performance buildings



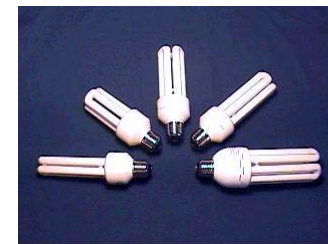
Least life-cycle cost appliances



Labelling and certification

Energy efficiency offers:

- **substantial energy and greenhouse gas savings at low or negative cost**
 - ◆ 470 Mt/y CO₂ in IEA region by 2020 in appliances alone
 - *At negative cost: -€169/t CO₂ (IEA)*
- **energy security and reliability benefits**
 - ◆ Up to 1.5 Gt/y C by 2010; 2.7 Gt/y by 2020
 - Half of this at negative cost (IPCC)
- **enhanced business competitiveness and social welfare**



Compact Fluorescent Lamps



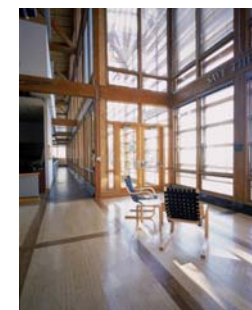
LED traffic lights



Efficient information and communication technologies



Reducing standby power consumption



Super windows & daylighting



But this is still not enough...

- To achieve a truly sustainable energy system new technologies will be needed for which demonstration and R&D efforts must be scaled up
- But changes in energy infrastructure take time, thus action is urgent

The Technology Challenge

Stabilising Greenhouse Gas Concentrations in the Atmosphere

No single technology or policy can do it all

Different

- regions
- markets
- scale-up requirements
- infrastructures
- resources
- preferences
- technology timing



Vehicles: Efficiency, Bio-fuels, Hydrogen Fuel Cells



Zero Net Emission Bldgs., Industrial Efficiency, CHP



Nuclear Power Generation IV



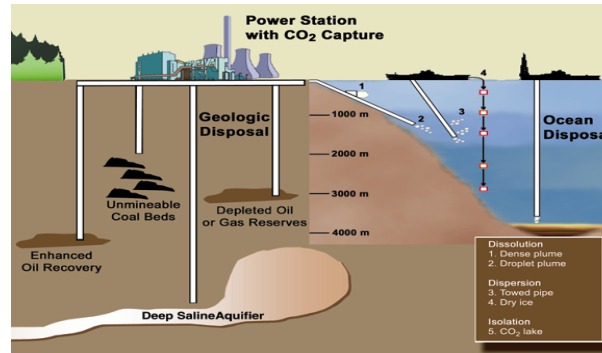
Renewable Energy Technologies



Bio-Fuels and Power



Advanced Power Grids



Carbon (CO₂) Sequestration



Avoiding 1 Billion Tons of CO₂ per Year

Coal

Replace 300 conventional, 500-MW coal power plants with “zero-emission” power plants, which means.....

CO₂ Sequestration

Install 1000 Sleipner CO₂ sequestration plants

Wind

Install 200 x current US wind generation in lieu of unsequestered coal

Solar PV

Install 1300 x current US solar generation in lieu of unsequestered coal

Nuclear

Build 140 1-GW power plants in lieu of unsequestered coal plants

To meet the energy demand & stabilize CO₂ concentrations unprecedented technology changes must occur in this century

[Adapted from Pacala & Socolow, *Science* 2004]



Technology Opportunities

- No one solution, but some features are clear:
 - ◆ *Accelerating energy efficiency improvements can make a difference in the short and long term*
 - ◆ *CCS is crucial in the medium and long term but needs full scale demonstration*
 - ◆ *Renewables are key for the long-term sustainability but must be cost-effective*
 - ◆ *Nuclear can contribute more but must improve technology and waste handling*
- Need to pursue a “portfolio” policy approach for technology deployment and R&D



The G8 Initiative

- The G8 Plan of Action:
 - *Energy Efficiency*
 - *Clean Fossil Fuel*
 - *Renewables*
 - *Technology Collaboration*
- Focuses on areas that can make the most difference
- Relevant to all consuming nations
- Dialogue leading to urgent action



The Role of the IEA

- The Means
 - *A major international programme of analysis, workshops, sharing knowledge and experience*
 - *Partnership with the World Bank and IFIs*
- The End
 - *Energy scenarios and strategies for a clean energy future*
 - *Best practice for policy and regulation*

Key Messages



- Based on current policies, global energy needs in 2030 will be more than 50% higher than today
- THIS IS NOT SUSTAINABLE !
 - ◆ *Rising CO2 emissions*
 - ◆ *Increased vulnerability to supply disruptions*
 - ◆ *Huge energy-investment needs*
 - ◆ *Persistent energy poverty*
- More vigorous policies would curb rate of increase in energy demand and emission significantly
- But a truly sustainable energy system will call for faster technology development & deployment and institutional change
- Urgent and decisive government action needed