



Energy and Technology Perspectives: Insights from IEA modelling

**Fridtjof Unander
Carmen Difiglio**

**Energy Technology Policy Division
International Energy Agency**



Overview of Presentation

- **Highlights from IEA World Energy Outlook 2002.**
- **IEA Energy Technology Perspectives Project: Investigating the role of technologies in future energy markets.**



World Energy Outlook 2002

Two Scenarios analysed

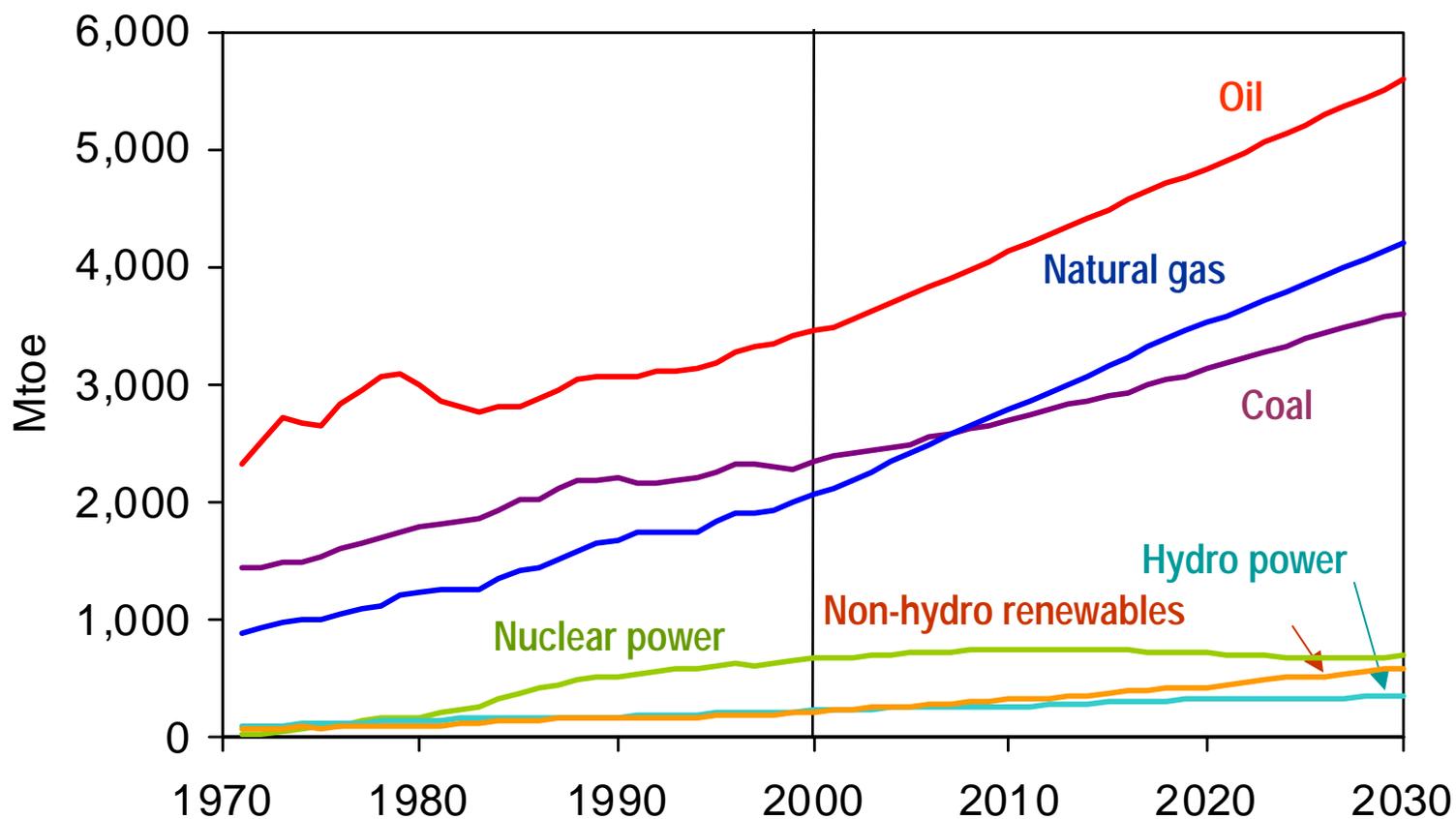
Reference Scenario:

- A baseline vision of how global energy markets might evolve up to 2030 if governments do nothing more than what they have already committed themselves to do.

Alternative Policy Scenario:

- Analyses impact of new policies & measures being considered by OECD countries on energy use & CO₂ emissions.

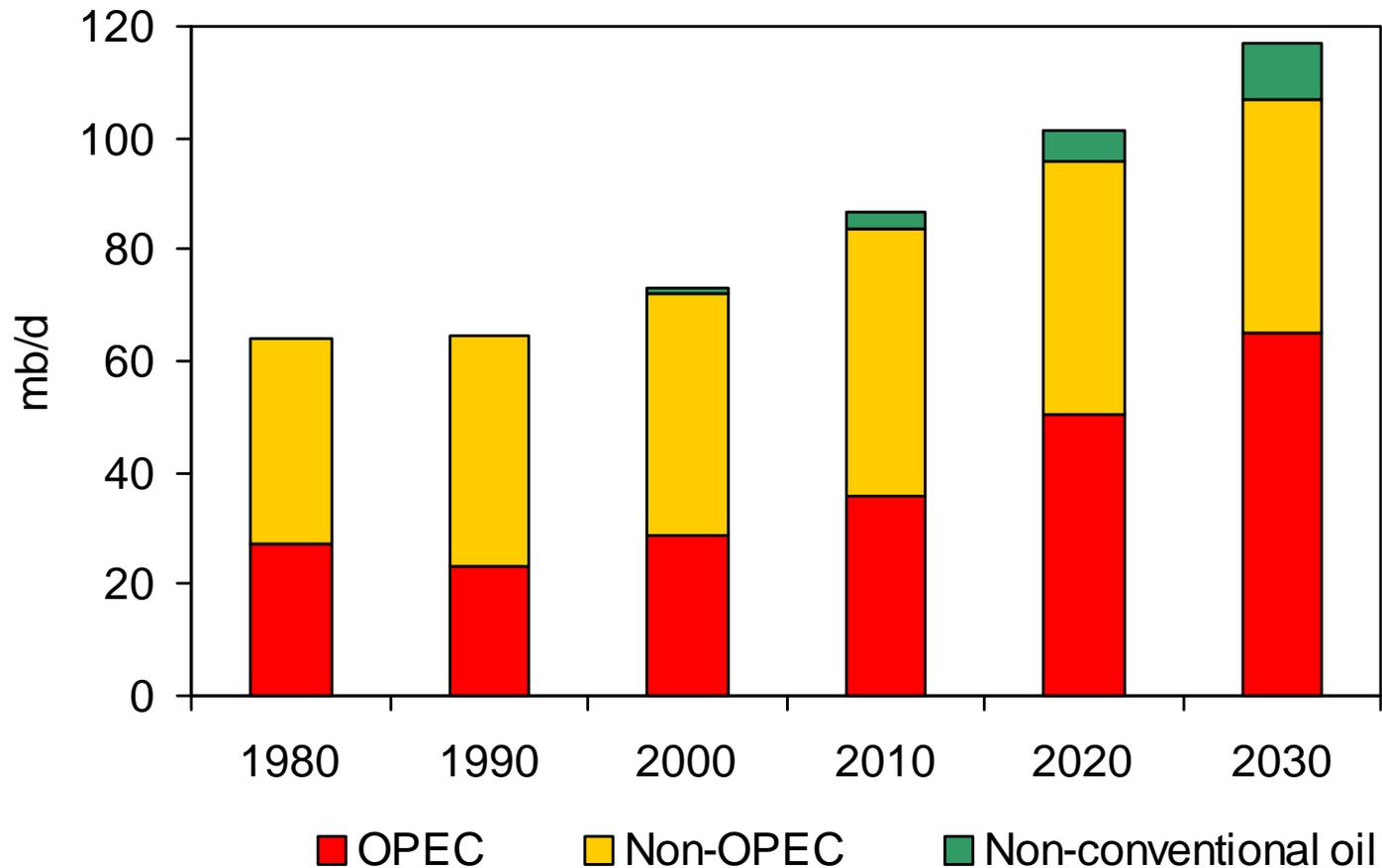
World Primary Energy Demand Reference Scenario



*Gas grows fastest in absolute terms & non-hydro renewables
fastest in % terms, but oil remains the dominant fuel in 2030*

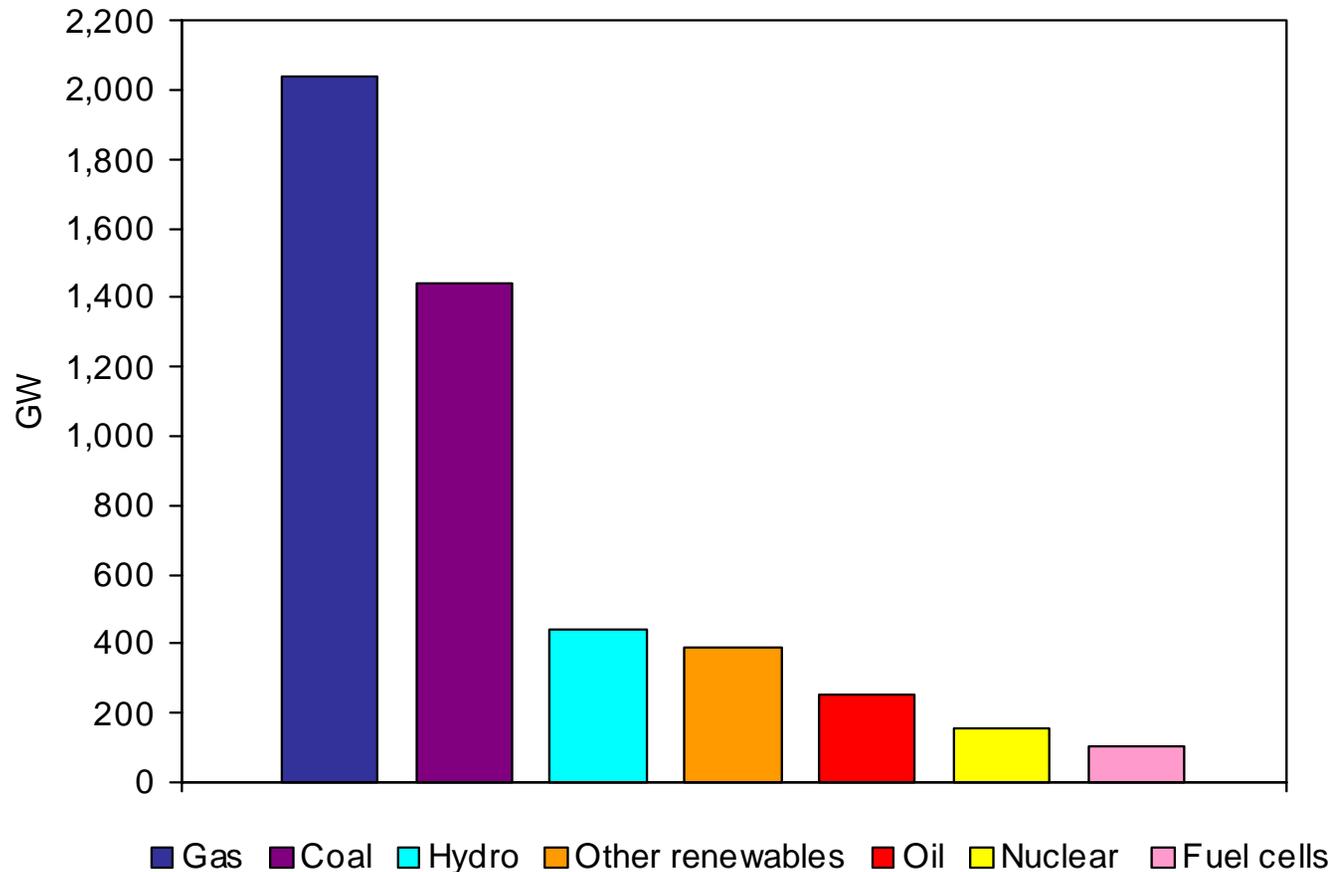


World-Oil Production



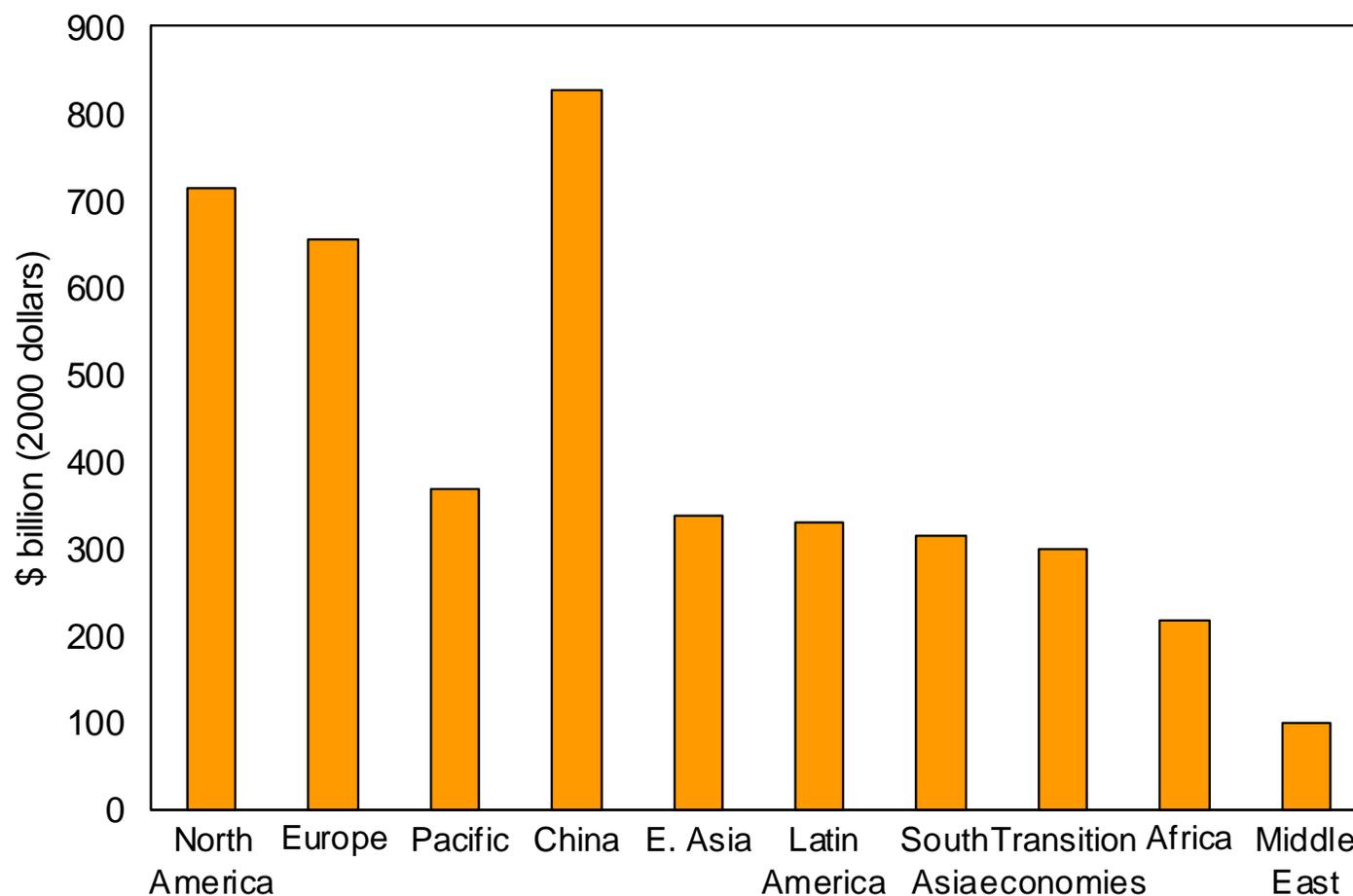
Non-conventional oil emerges as a major new source

World Power-Generation Capacity Additions, 2000-2030



More than 40% of new capacity worldwide is gas-fired

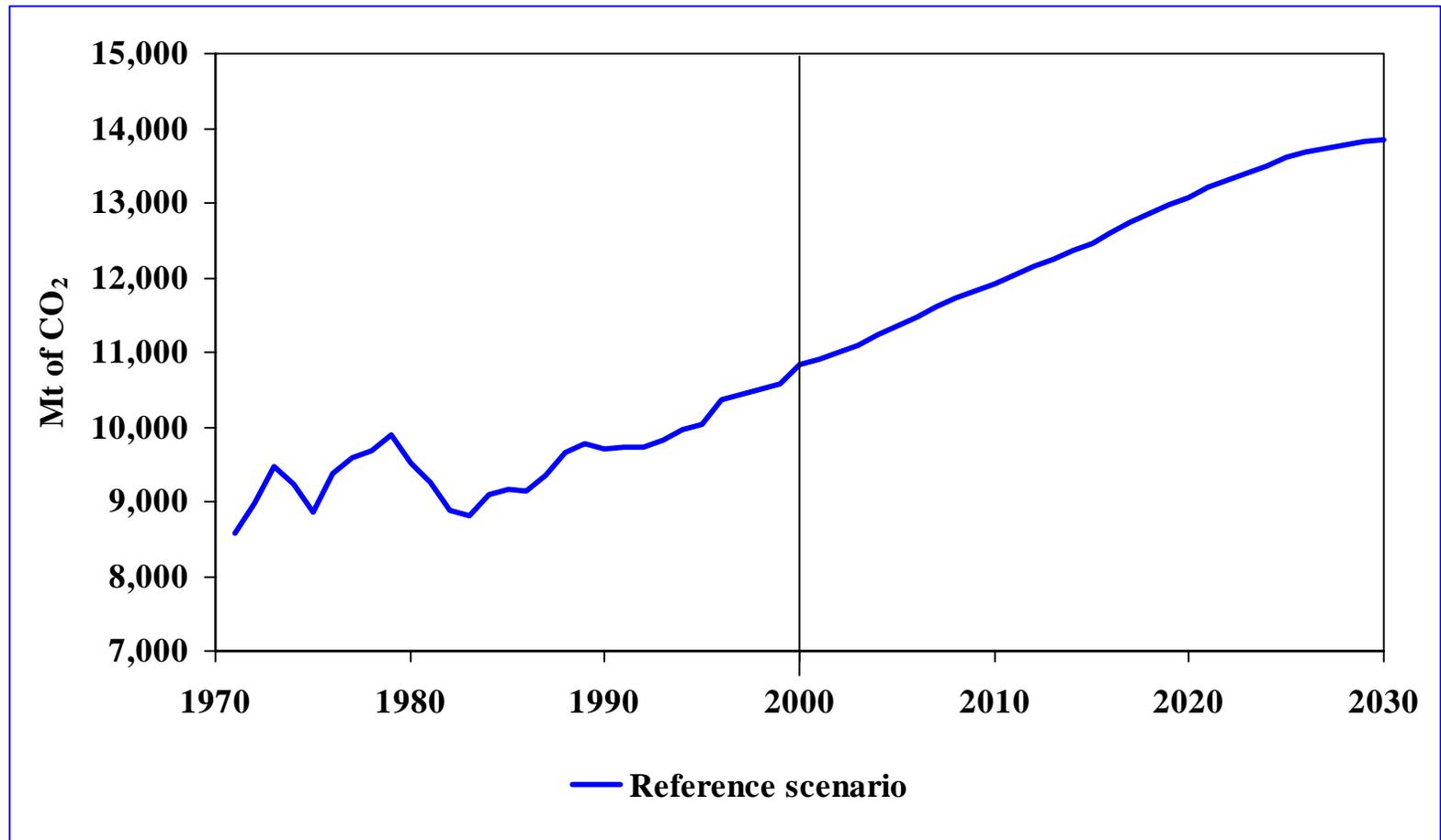
World Power-Generation Investment, 2000-2030



Cumulative worldwide investment in new power plants amounts to \$ 4.2 trillion, more than half in developing countries



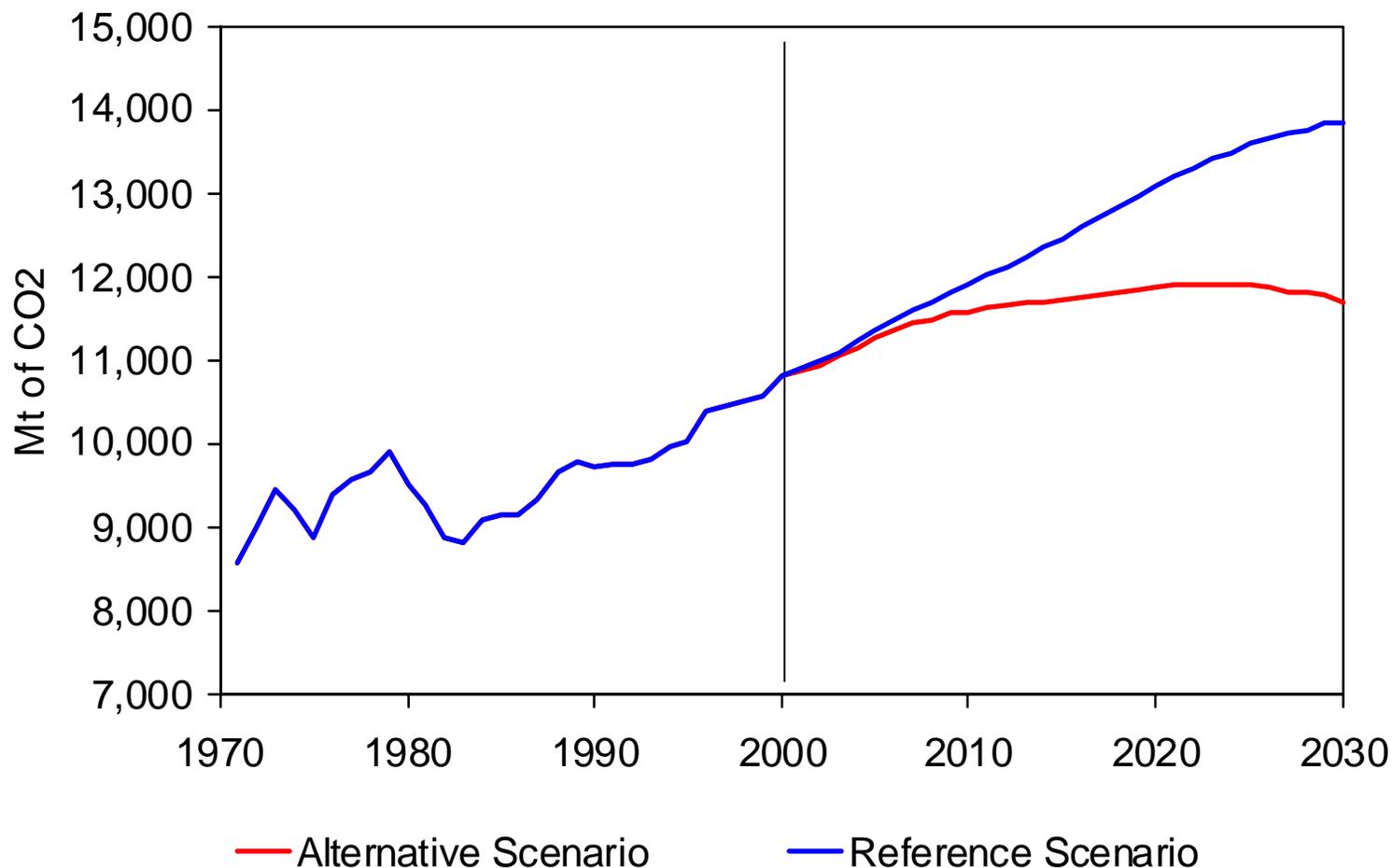
OECD CO₂ Emissions Reference Scenario



***OECD Reference Scenario emissions increase by
almost 1% per year between 2000 and 2030***

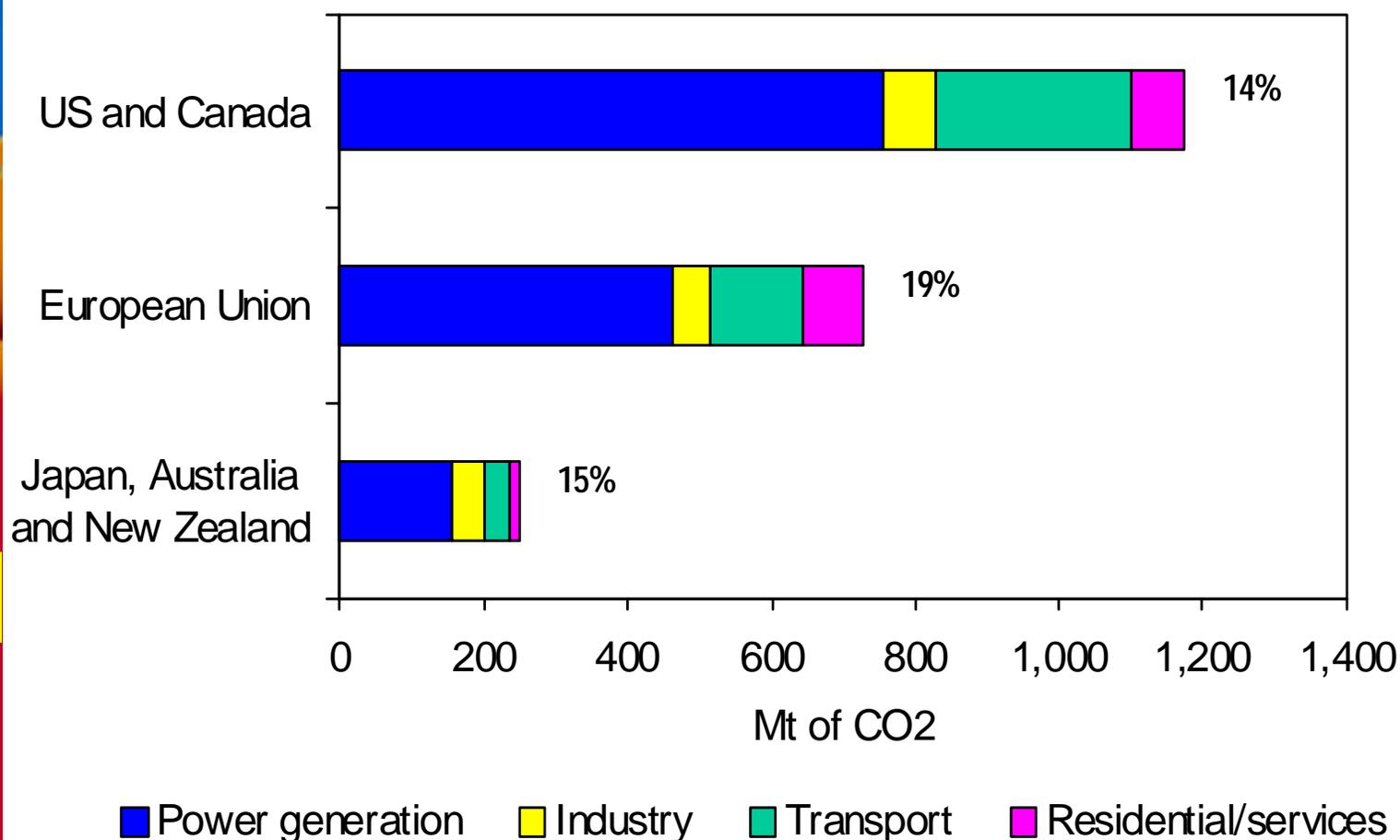
OECD CO₂ Emissions

Reference and Alternative Scenarios



CO₂-Emission Reductions in Alternative Scenario (2030)

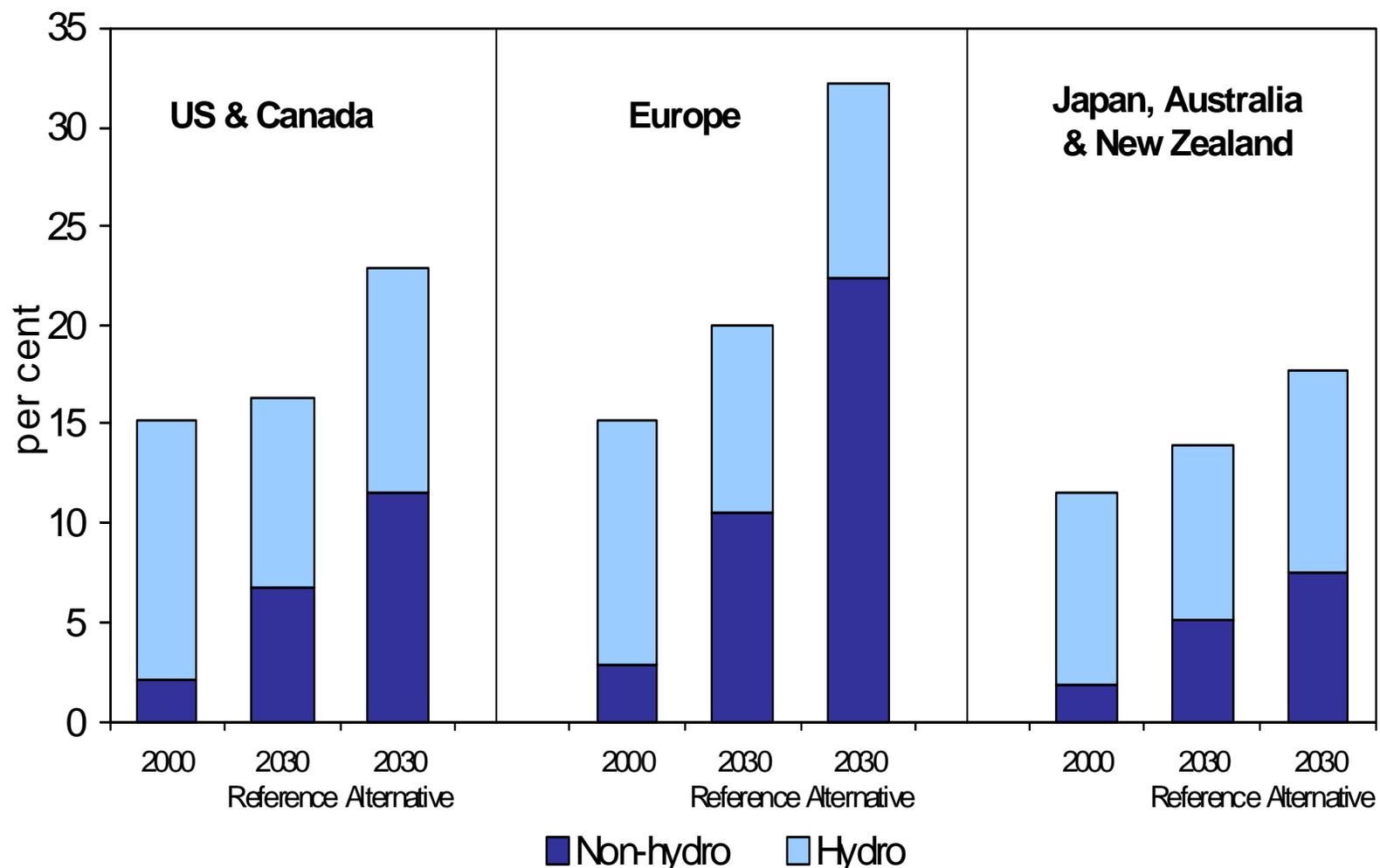
Reduction in Emissions Compared to Reference Scenario



2002



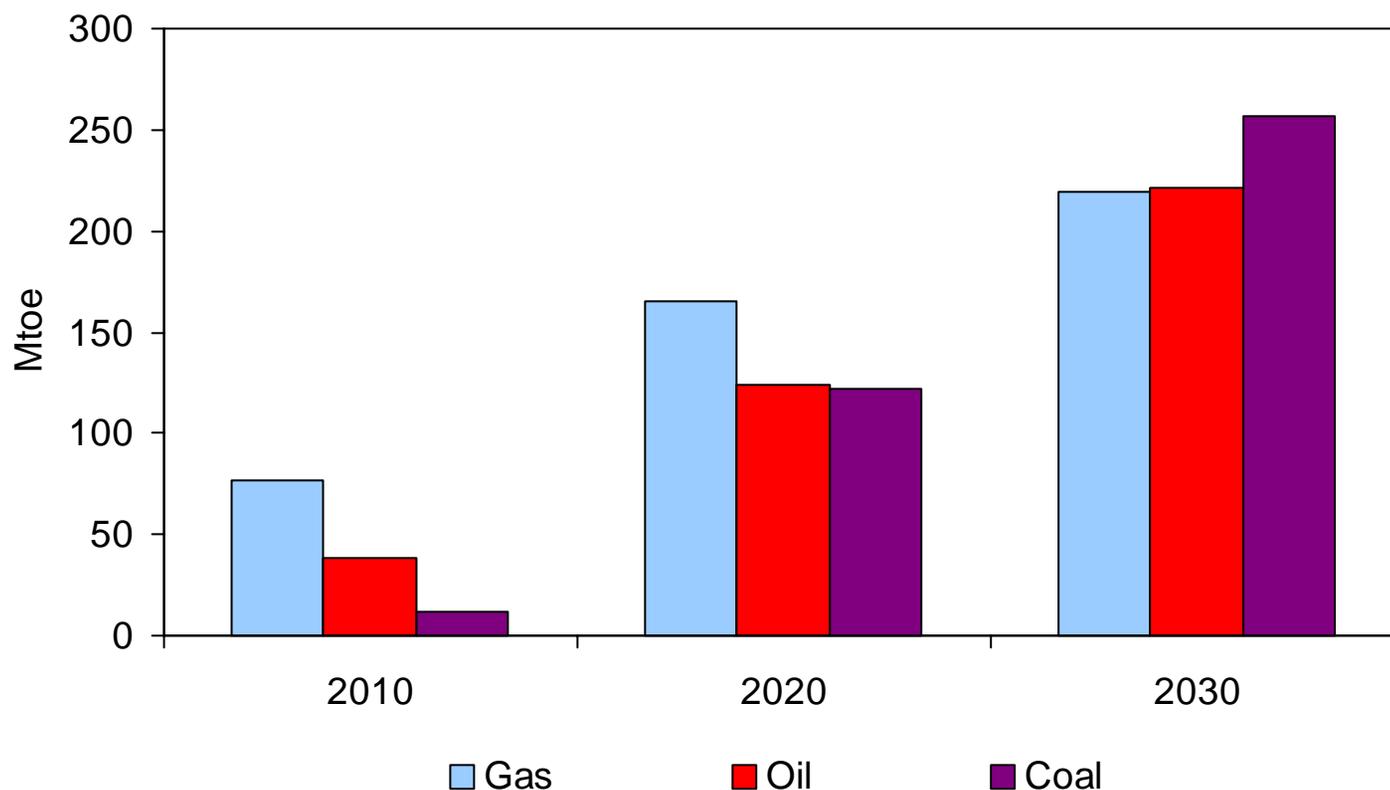
Share of Renewables in Electricity Generation





Fossil-Fuel Savings in the Alternative Scenario

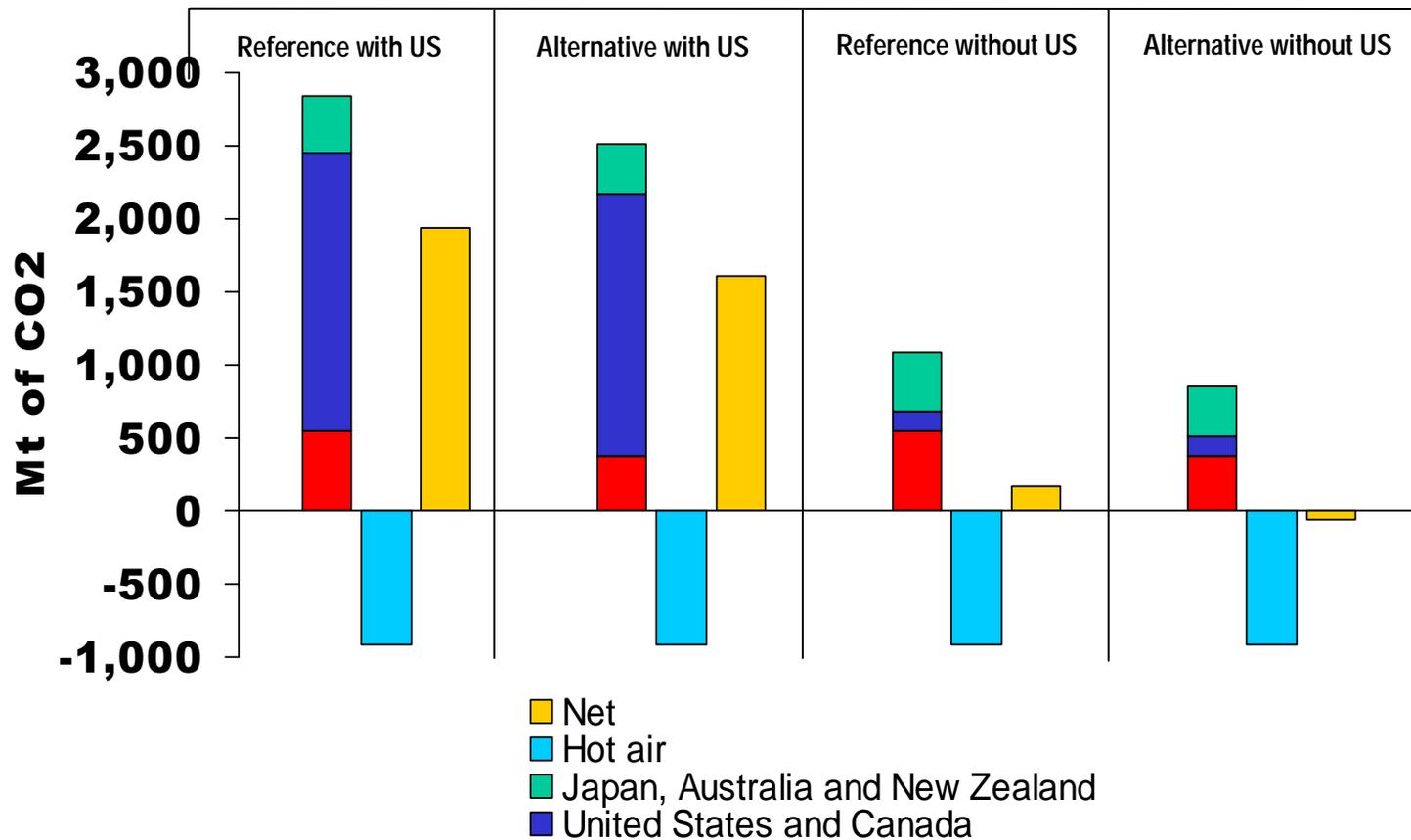
Reduction in Primary Energy Use Compared to Reference Scenario



Energy savings would be 9% of projected demand in the Reference Scenario in 2030



Bridging the Kyoto Gap



Emissions in each OECD region would still be above target, but "hot air" would fill the gap if the US is excluded



Central Findings of WEO 2002

- *Unless policies change, energy demand will continue to grow steadily.*
- Most of the growth in demand will come from developing countries.
- Fossil fuels will continue to dominate the energy mix.
- Policy challenges:
 - Security of energy supply
 - Uneven access to commercial energy
 - Increasing emission levels
 - Infrastructure investment



Policy Challenges

Technology the solution?

- **Technology development poses both uncertainties and opportunities for long-term energy markets.**
- **Examples;**
 - **oil recovery**
 - **non-conventional oil**
 - **carbon capture and storage**
 - **hydrogen**
 - **fuel cells**
- **Driving factors;**
 - **R&D**
 - **Deployment - learning effects**
- **Opportunities for government actions.**

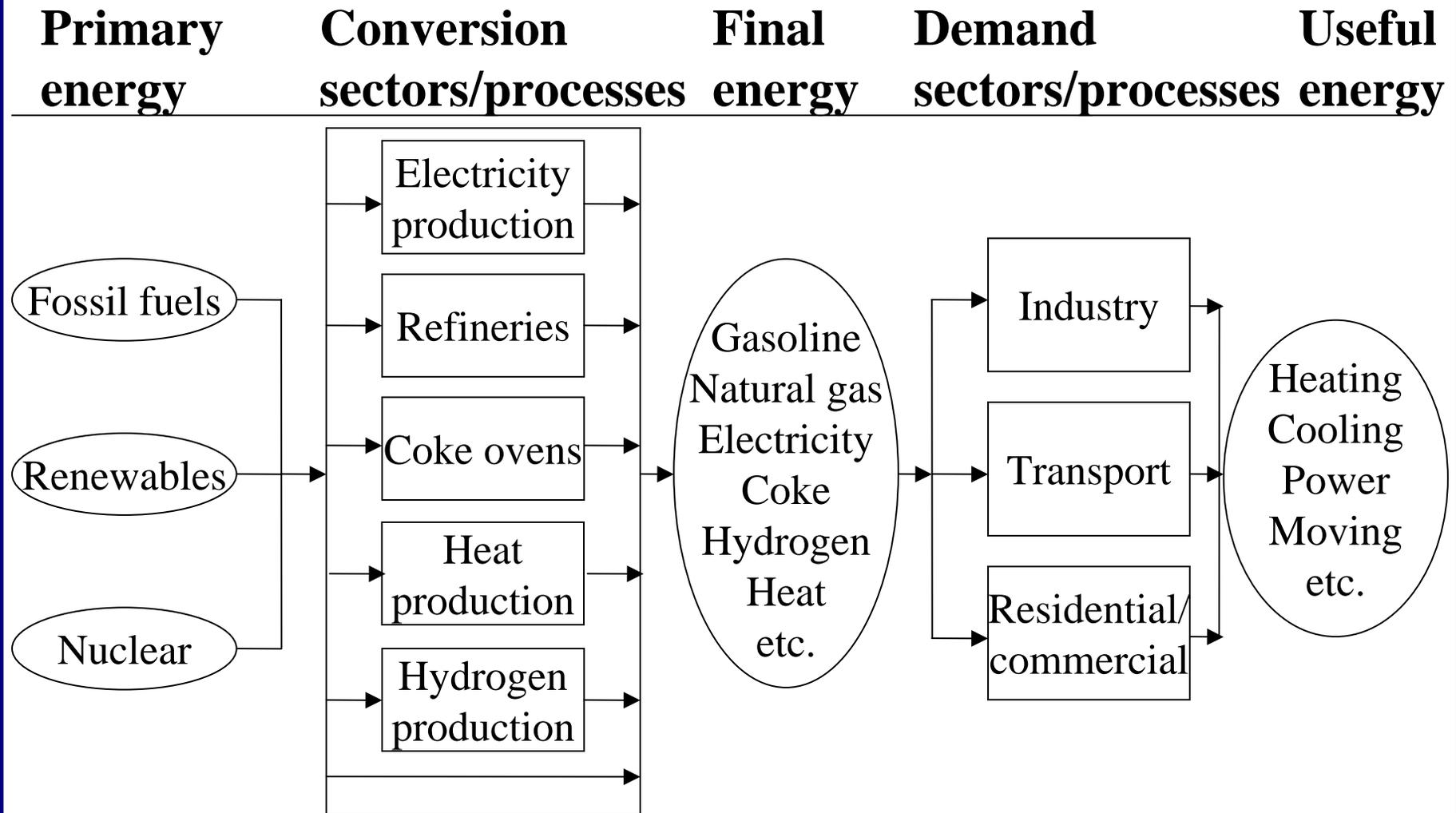


IEA Project: ***Energy Technology Perspectives***

- **Studies how governmental actions can bring about changes needed to meet energy policy goals.**
- **Main tools are a global energy technology model (MARKAL) and a technology database.**
- **Provides IEA with analytical capacity to better address how technology can impact energy markets.**
- **Provides input to several IEA projects and the World Energy Outlook.**
- **Co-ordinated with IEA Economic Analysis Division.**



Total Energy System Coverage





Plan for Scenario Analysis

- **Scenarios reflecting different market conditions will be developed to explore alternate policy paths.**
- **Scenarios will build on WEO-2002 and focus on long-term technology impacts (beyond 2030).**
- **Results of first set of scenarios expected ready fall 2003.**



Input to IEA technology studies

- **The role of carbon sequestration and renewables to reduce emissions from electricity generation.**
- **The impact of technology development in oil and gas exploration and production.**
- **Strategies to meet global transport needs with minimal environmental impacts.**
- **Road map for the development of a H₂ economy.**



Preliminary ETP results

Example: OECD Electricity output Role of Renewables and CO2 Capture

