

The Future of Nuclear Power: An OECD Perspective

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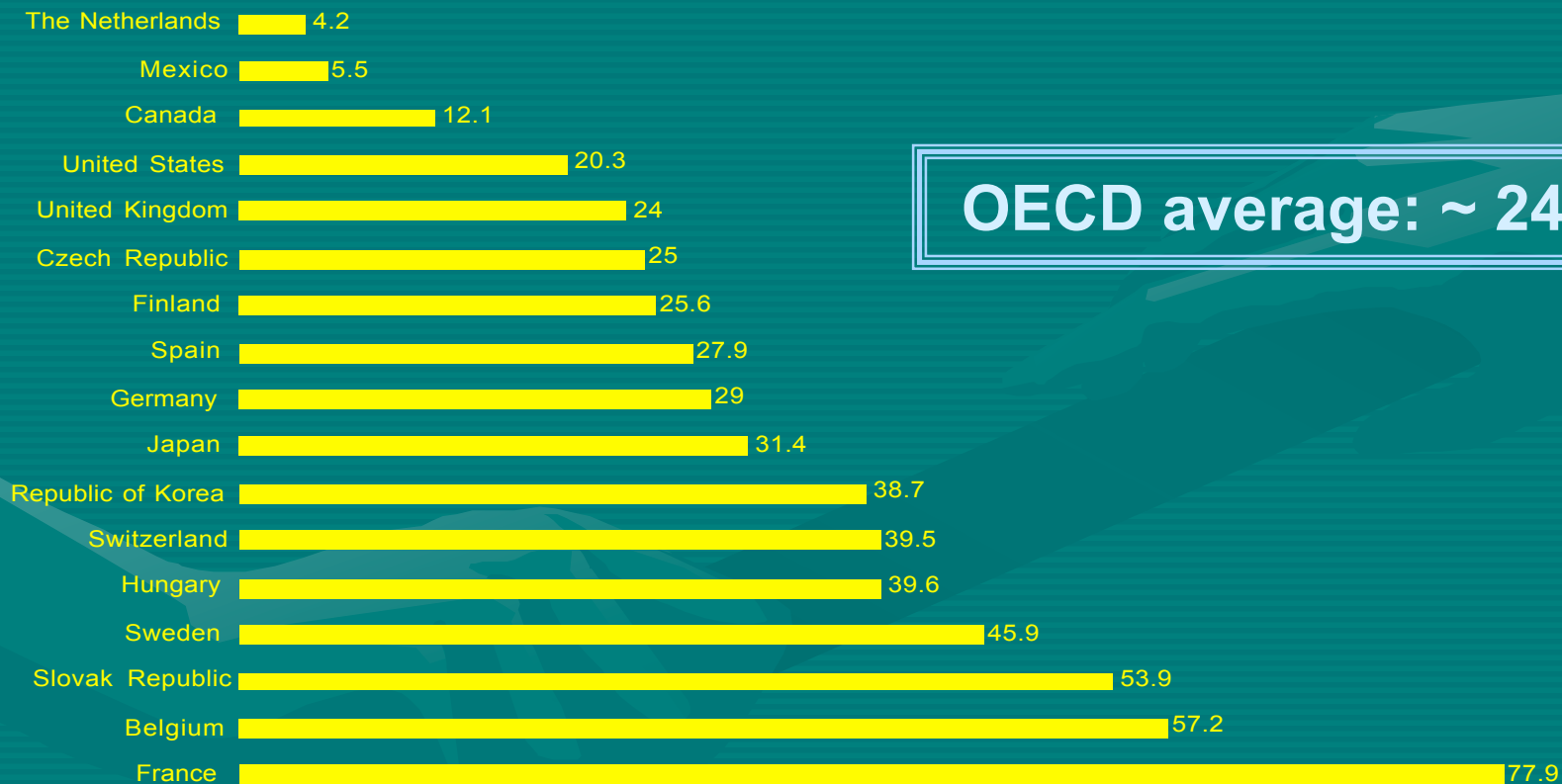
OVERVIEW

- Nuclear energy today
- Tomorrow's needs
- Opportunities and Challenges
- Concluding remarks

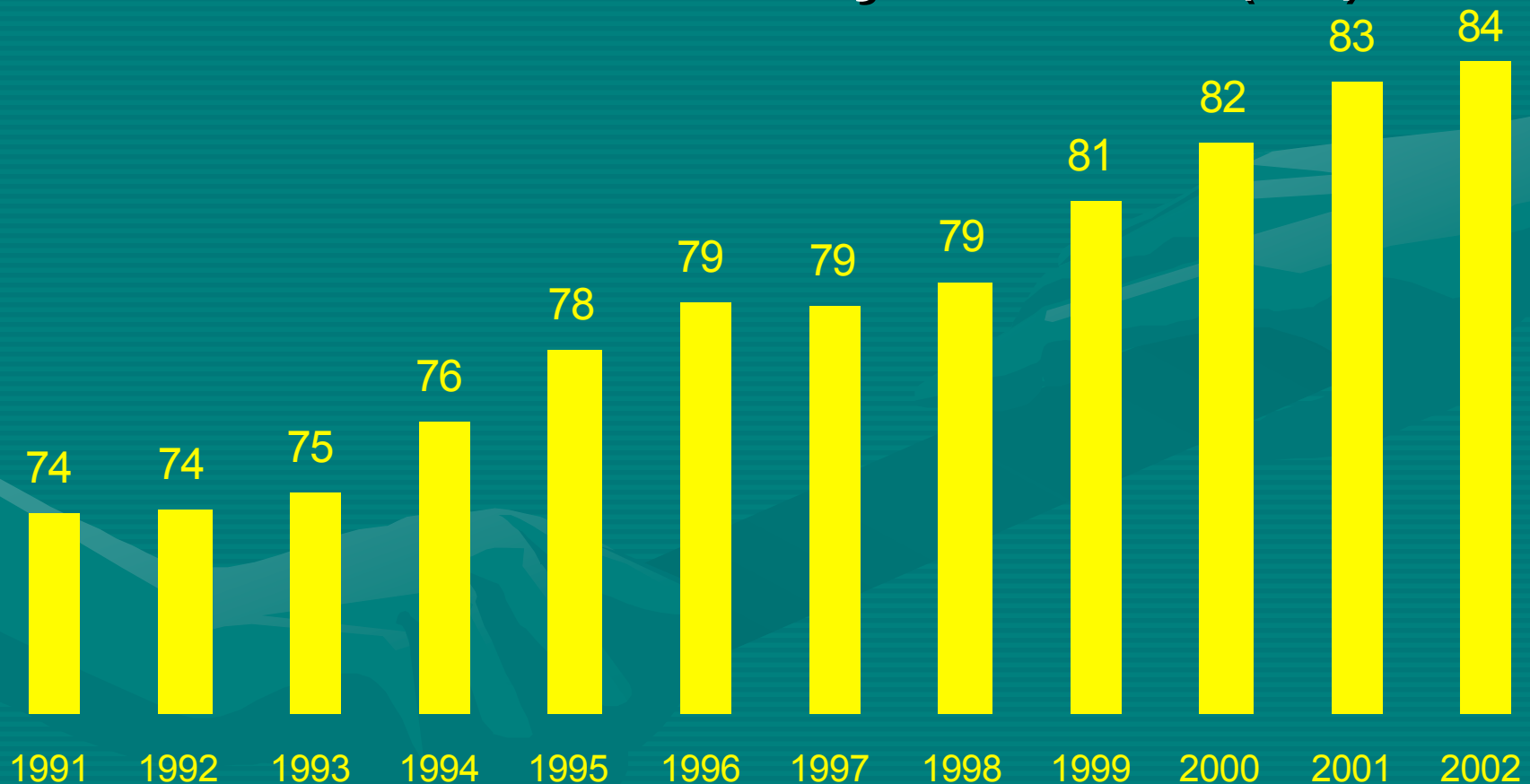
Nuclear energy in OECD countries

- More than 300 GWe providing ~ 25% of electricity supply
- More than 9 000 reactor x year of operating experience
- Large, diversified industrial sector
- Robust R&D infrastructure
- Highly qualified manpower

Nuclear Share in Electricity Generation of OECD Countries in 2002 (%)

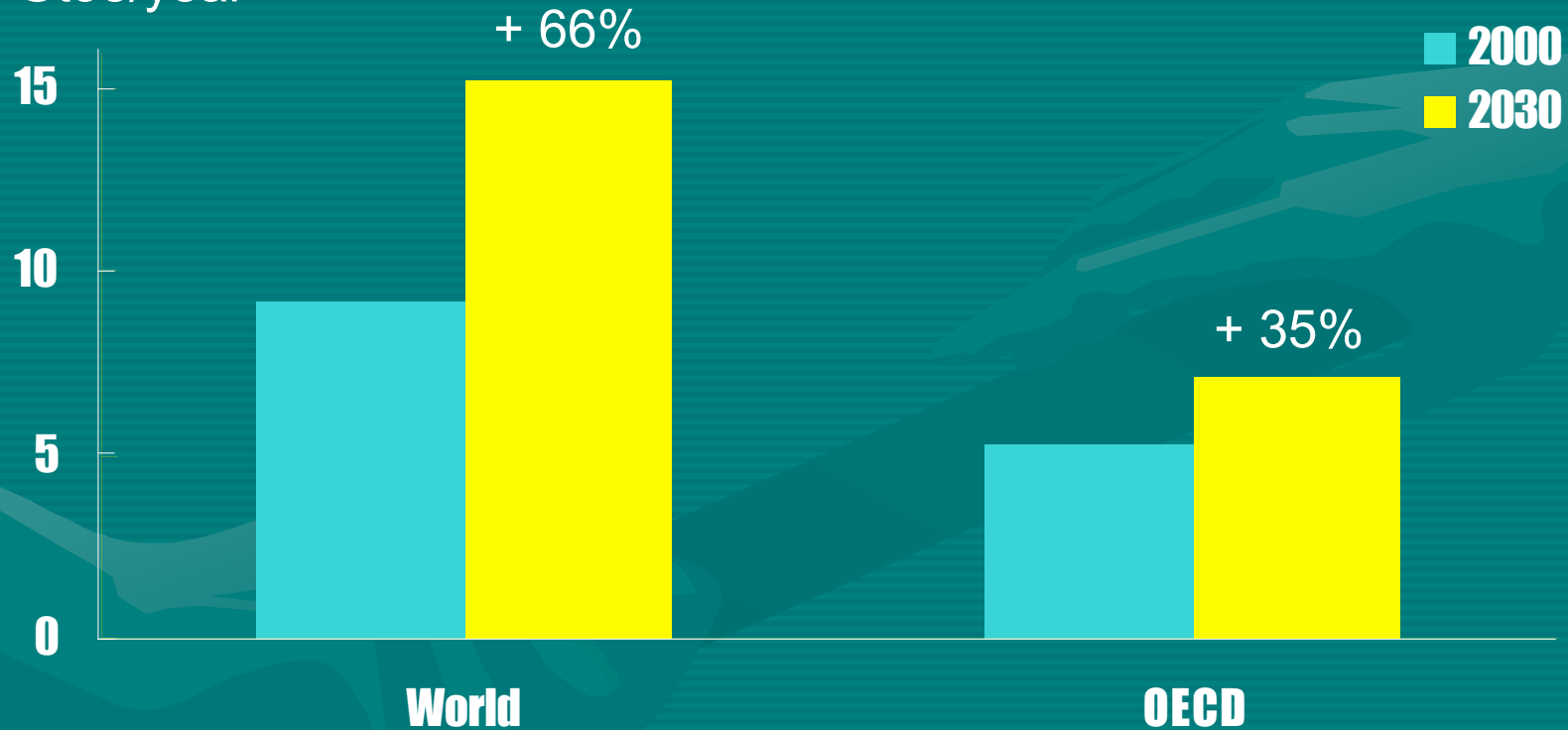


World Average Nuclear Power Plant Availability Factor (%)



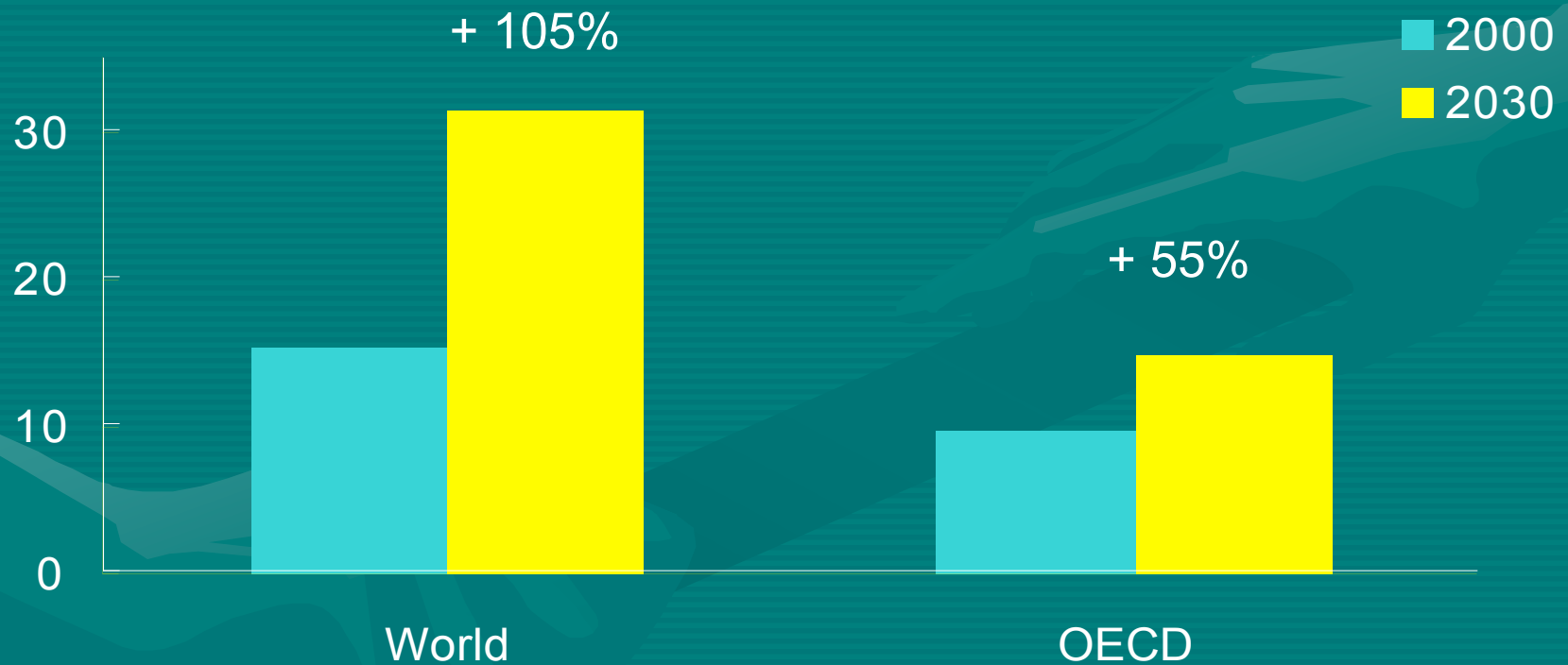
Energy Demand Growth

Gtoe/year



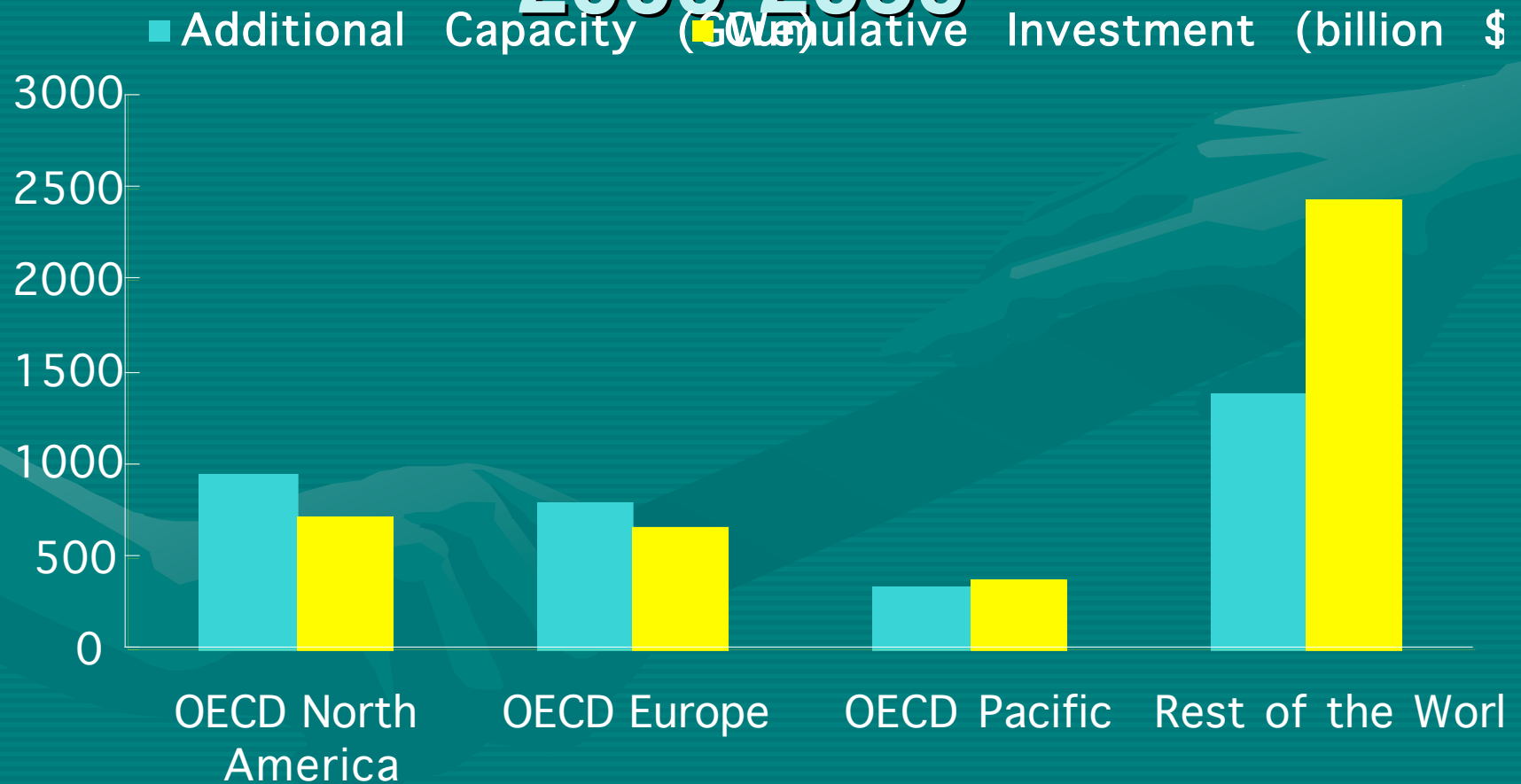
Electricity Demand Growth

TWh/year



Source: IEA/WEO 2002

New Electricity Generation Capacity 2000-2030



Other Energy Product Demand

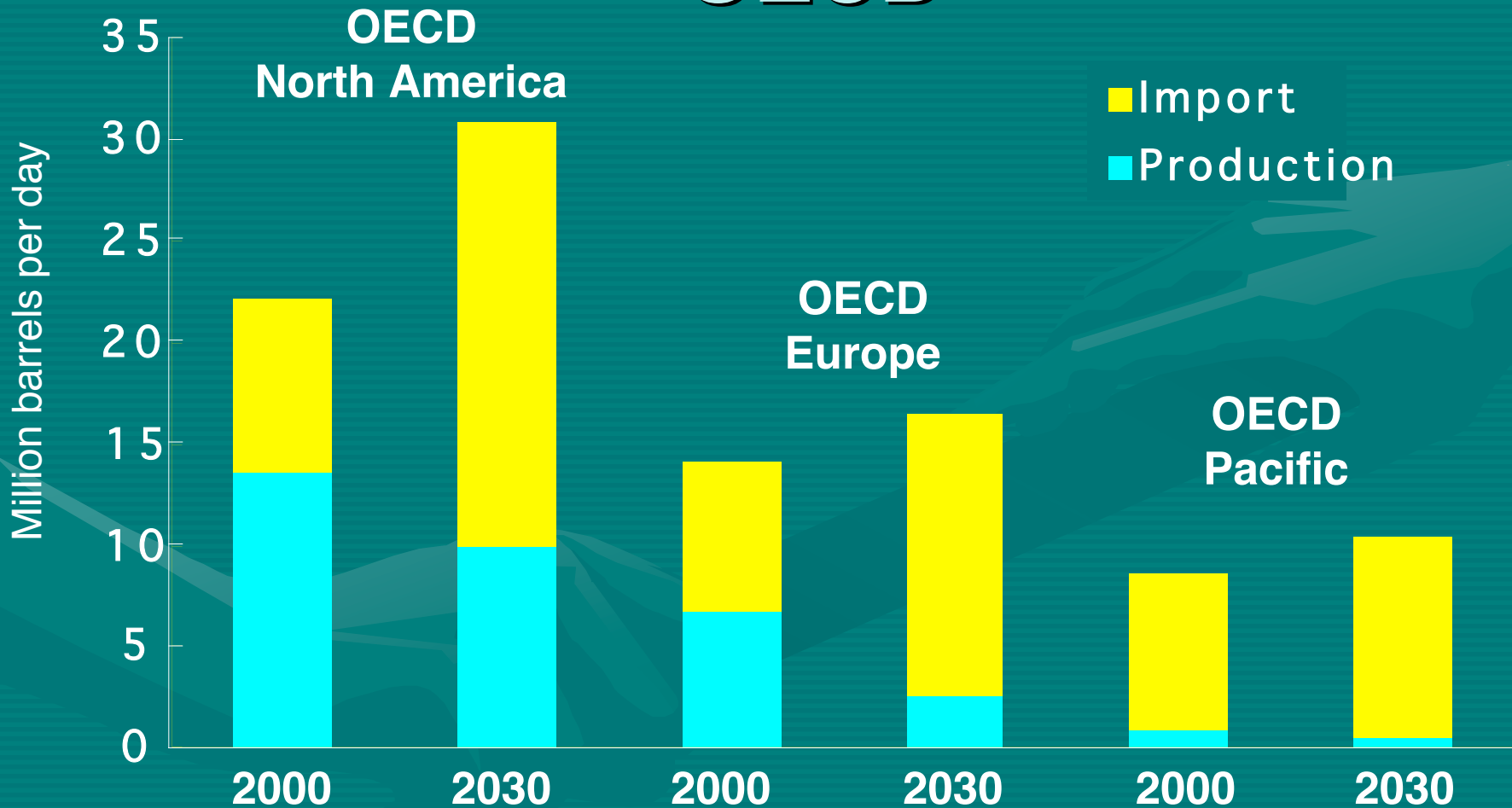
- Process and district heating
- Desalinated potable water
- Motive power
 - *Hydrogen*

Energy Policy Challenges

- Security of supply
 - Increasing demand
 - Imports of resources and technologies
- Environmental protection
 - Local pollution
 - Climate change
- Market competition

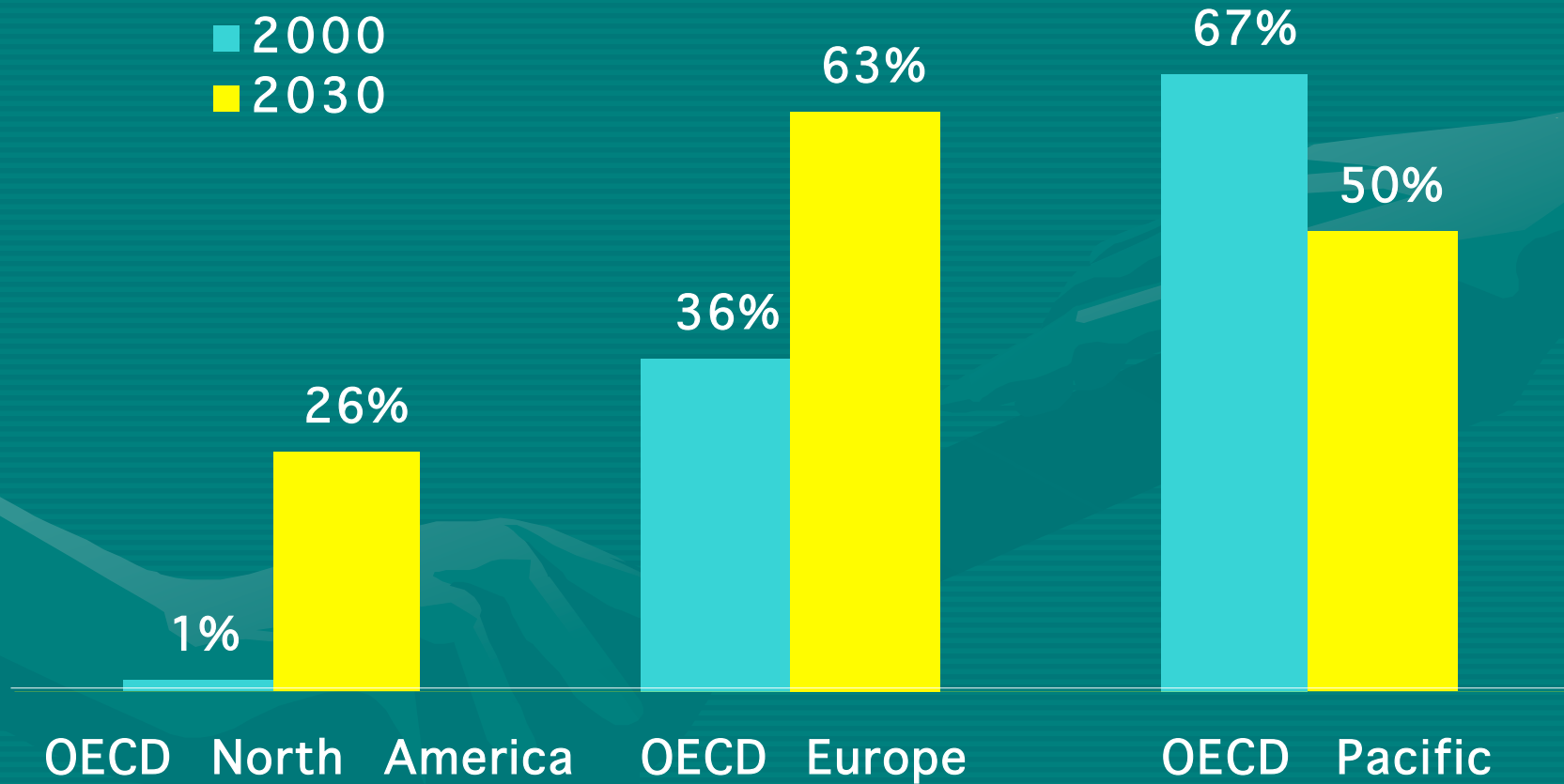
Towards sustainable energy supply systems

Oil Production and Import in OECD



Source: IEA/WEO 2002

Natural Gas Dependence in OECD



Global Climate Change Threat

- Greenhouse gas emissions are growing
- Energy consumption is a major cause of GHG emissions
- Concentration of GHG in the atmosphere is increasing
- Increased GHG concentration may cause global warming

Climate Change Policy

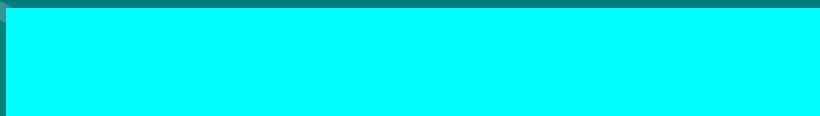
- **Kyoto Protocol Commitments**
Reduce GHG emissions by 5.2%
as compared to 1990 level in 2008-
2012
- **Reality**
GHG emissions, in average,
are not decreasing

Additional CO₂ Emissions 1990-1999 (million tCO₂/year)

Without nuclear energy

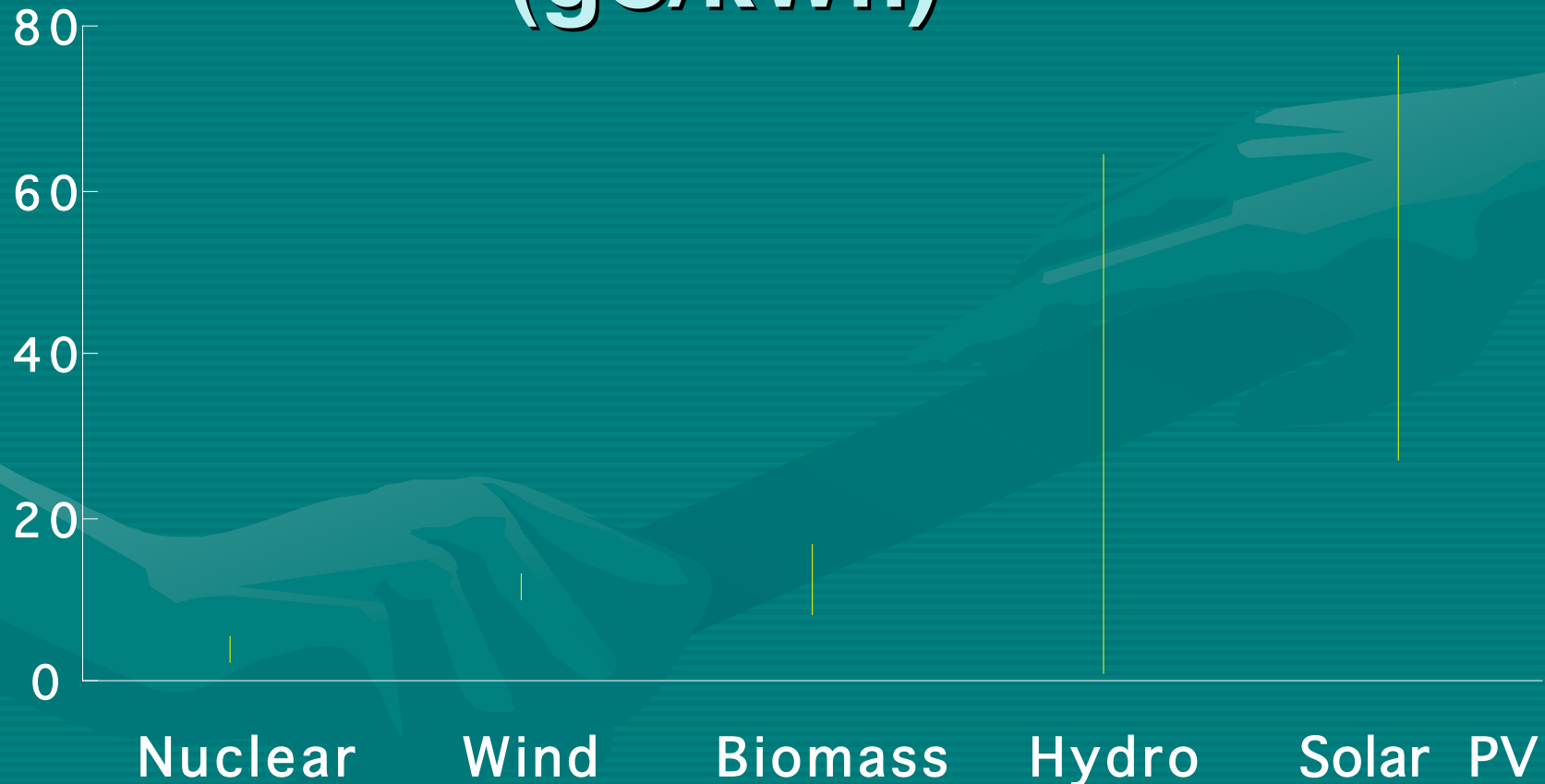


Actual with nuclear energy



0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000

Range of GHG emissions from electricity generation (gC/kWh)



Source: IAEA

Climate Change Policy

- **What if Russia never ratifies?**
- **Will national initiatives suffice?**
- **Does nuclear energy stand a better chance?**
- **If “Kyoto” dies, what instead?**

Role and Future of Nuclear Energy

- Strengthen energy security and diversity of supply
- Large scale nearly carbon-free source, among the cheapest ways to reduce GHG emissions
- Competitive in deregulated market when efficiently managed
- Innovative concepts are under development, significant technology breakthroughs are possible

Market deregulation

- Existing nuclear power plants are competitive on deregulated markets
- Technical, safety and economic performance of nuclear units have improved with market competition
- Deregulated markets are not favourable to investments in new nuclear units

But...

- Geopolitical dimension and world politics cannot be ignored
- Proliferation and security concerns need to be addressed
- Survival of the technology will depend not just on the usual parameters (safety, economics, waste management, etc...) but on the demonstration ethical values as well...

So action is needed. What can WE do about it?

Nuclear Energy R&D goals

- Reduced investment costs
- Enhanced safety and reliability
- More efficient use of resources
 - Lower U consumption
 - Smaller volume and lower toxicity of waste
- Strengthened security and proliferation resistance

Nuclear R&D Programs

- Focus on selected promising concepts
- Identify technology gaps and show stoppers
- Develop innovative materials and processes
- Build on experience and know-how
- Take advantage of synergies with other industries
- Enhance international cooperation
α (Generation IV Forum)

Concluding remarks

- Nuclear energy is an essential option for the 21th century– Pacific Basin will have the highest growth rate in terms of nuclear
- Technology progress is needed
- Required R&D programs are challenging
- International cooperation is a key element
- International organisations are