Mitigation in Energy Systems: IAEA Services to Member States in Climate Change Mitigation

Ferenc L. Toth

Planning & Economic Studies Section (PESS)

Department of Nuclear Energy

UN System Side Event on Mitigation at COP 18

QNCC, Doha, Qatar, 1 December, 2012

IAEA

International Atomic Energy Agency

Overview

1. Context: Current energy concerns

2. The mitigation challenge

3. IAEA support: Energy models

4. IAEA support: 3E analysis

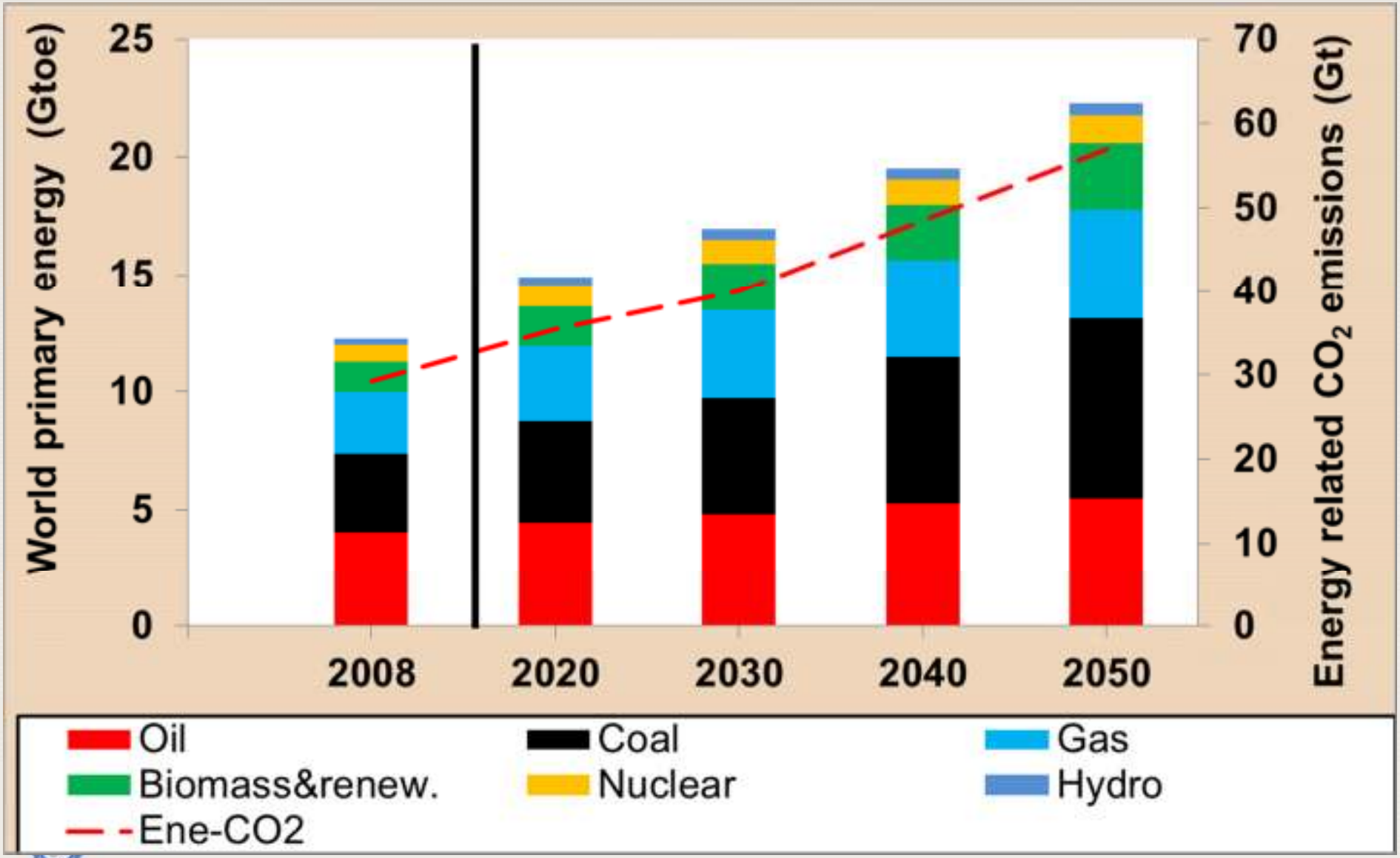
5. Main messages

1. Context: Current energy concerns

Recent years: many concerns about sustainable energy development *worldwide*:

- fast growing energy and electricity demand (dev'ing)
- energy supply security and diversification (all)
- economic efficiency and competitiveness (mainly dev'd)
- climate change mitigation (Durban Platform – all)
- local/regional air pollution (East + Southeast Asia)
- limited domestic fossil sources or export opportunities
- fossil fuel price level and volatility
- development, food, water security (mainly developing)
- sustainable development
- non-fossil technologies yet to improve (cost, performance)
- … many others

2. The mitigation challenge



2. The mitigation challenge

UNFCCC Article 2: stabilize atmospheric GHG concentrations to avoid dangerous CC (side-lined?)

IPCC AR4 (2007) confirmed:

Dangerous anthropogenic interference

not a scientific question; science informs;

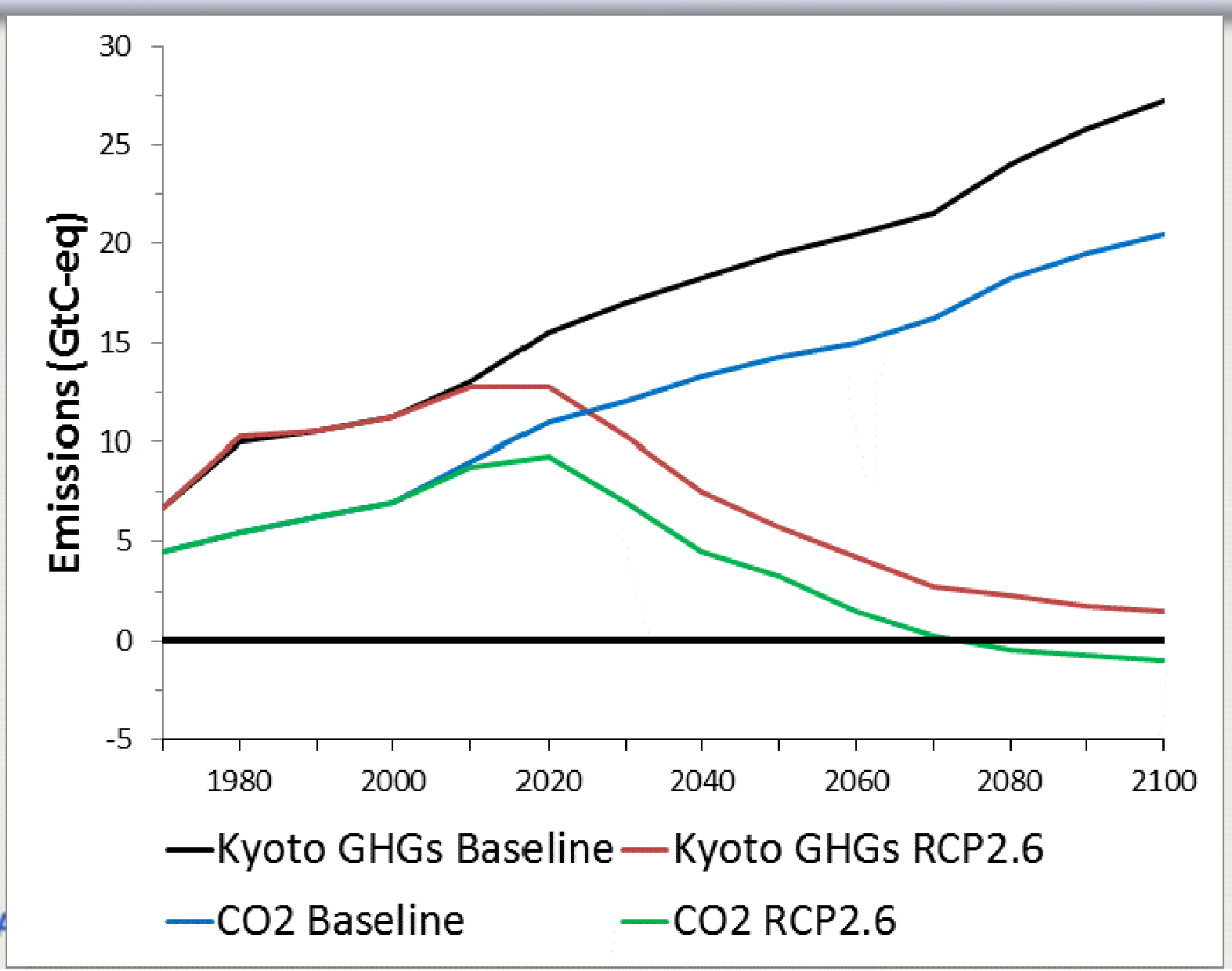
a *social and political* decision

CPH target: 2°C GMT above pre-industrial,

confirmed by G8 and G20 → Durban decision

New emission scenarios: Representative Concentration Pathways (RCPs) to radiative forcing of 2.6 and 8.5 W/m^2; low-end: 2.6 W/m^2 ≈ 2°C GMT stab.

2. The mitigation challenge



3. IAEA support: Energy models

PESS Mandate (1): *Energy modeling & capacity building*

- develop energy planning tools
- build capacity for applications
- training and technical support

For:

- Energy system modeling
- Economic, financial and environmental assessments
- Analysis of options for energy strategies, including CC mitigation

3. IAEA support: Energy models

- **M**odel for the **A**nalysis of **E**nergy **D**emand

- **M**odel for **E**nergy **S**upply **S**ystem **A**lternatives and their **G**eneral **E**nvironmental impacts

- **Fin**ancial Analysis of Electric Sector Expansion **Plan**s

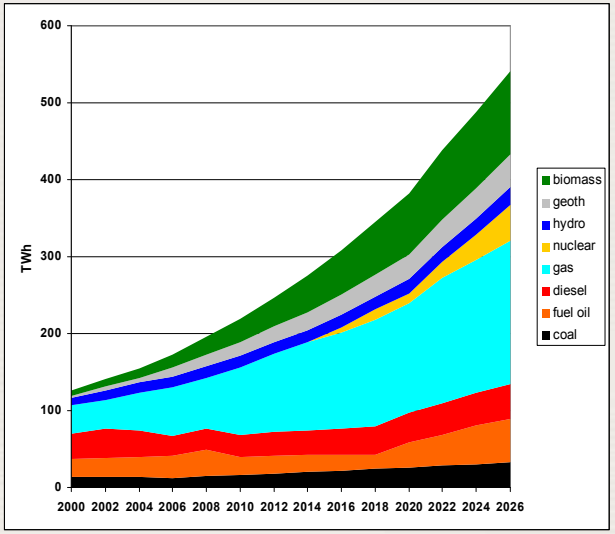
- **Simp**lified Approach for Estimating **Impacts** of Electricity Generation

MESSAGE: Model for Energy Supply System
Alternatives and their General Environmental Impacts

INPUT

- Energy system structure (including vintage of plant and equipment)
- Base year energy flows and prices
- Energy demand projections (MAED)
- Technology and resource options & techno-economic performance profiles
- Technical & policy constraints

OUTPUT



- Primary and final energy mix
- Emissions and waste streams
- Health and environmental impacts (externalities)
- Resource use
- Land use
- Import dependence
- Investment requirements

IAEA

3. IAEA support: 3E analysis

PESS Mandate (2): Economics and

Energy-economy-environment (3E) analysis

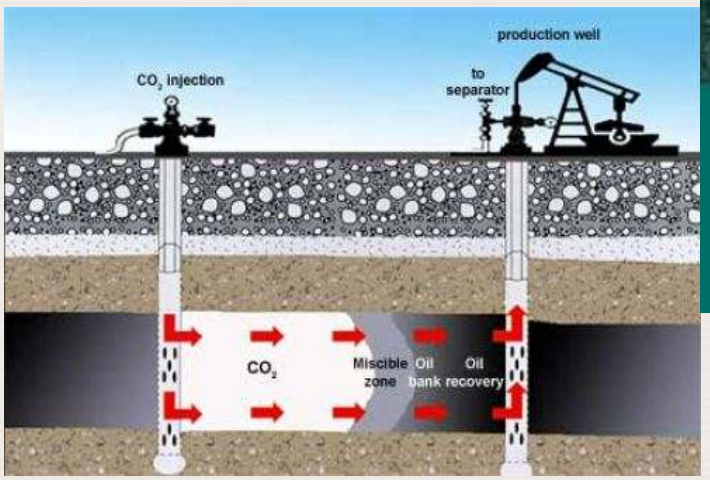
- Techno-economic analysis
- Analysis of (N)E-developmt-environmt linkages:
  role of NE, energy security, CC mitigation, SED
- Contribution to related international efforts: UNCSD, UNFCCC, IPCC, many others

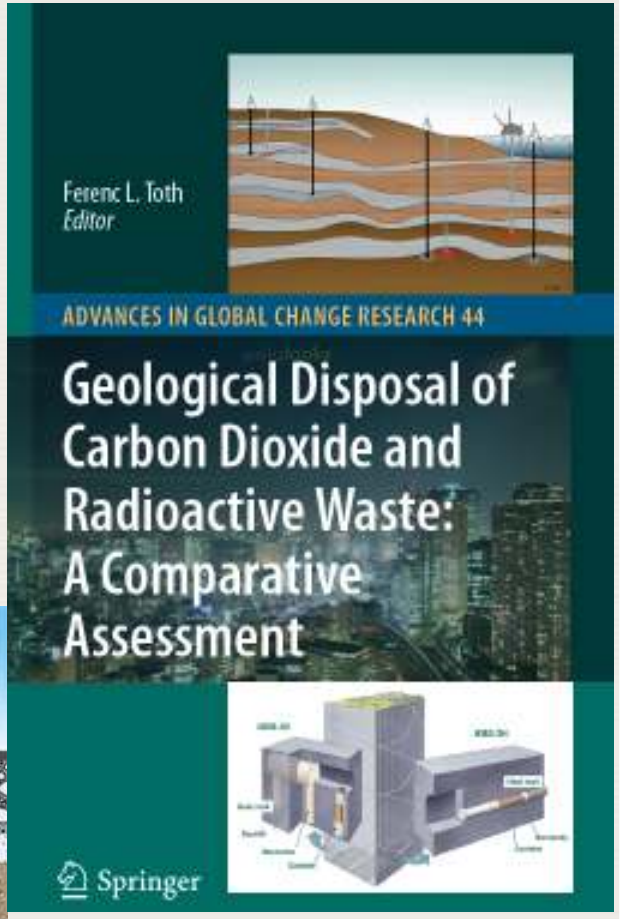
3. IAEA support: 3E analysis

Techno-economic analysis:

Comparative assessment of geological disposal of CO2 and radioactive waste:

- Similarities
- Differences
- Learning opportunities





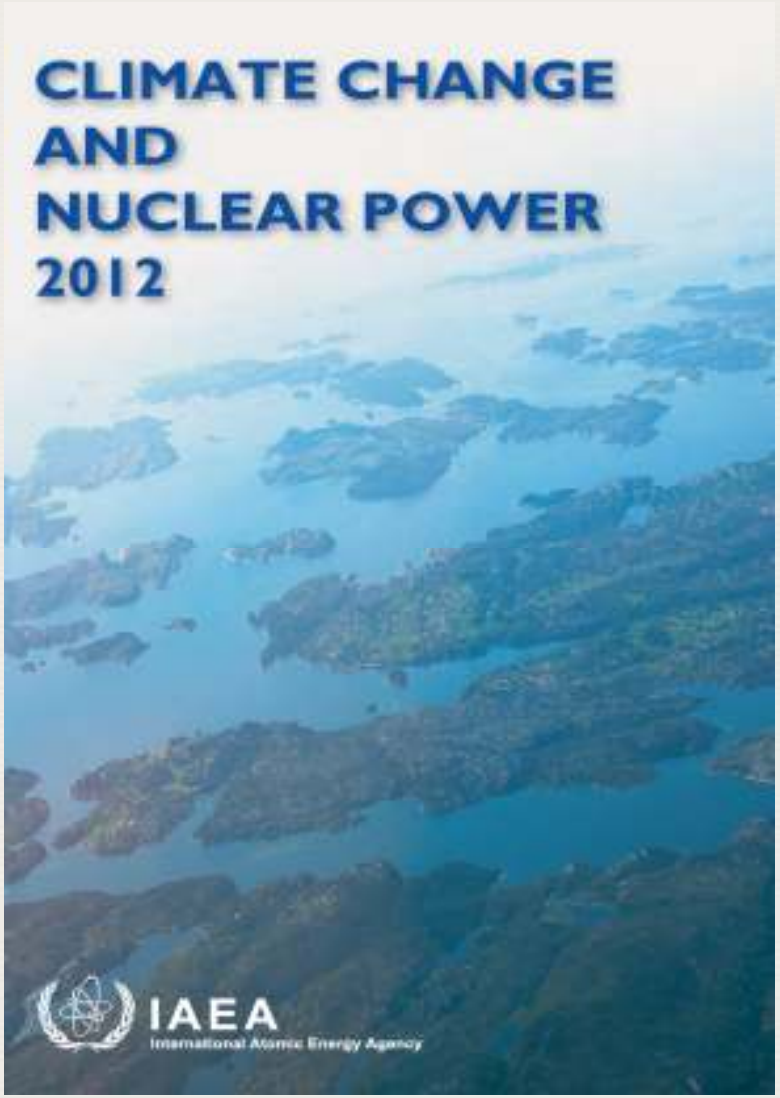
3. IAEA support: 3E analysis

Climate Change and Nuclear Power:

booklet updated annually for COPs

Mitigation benefits

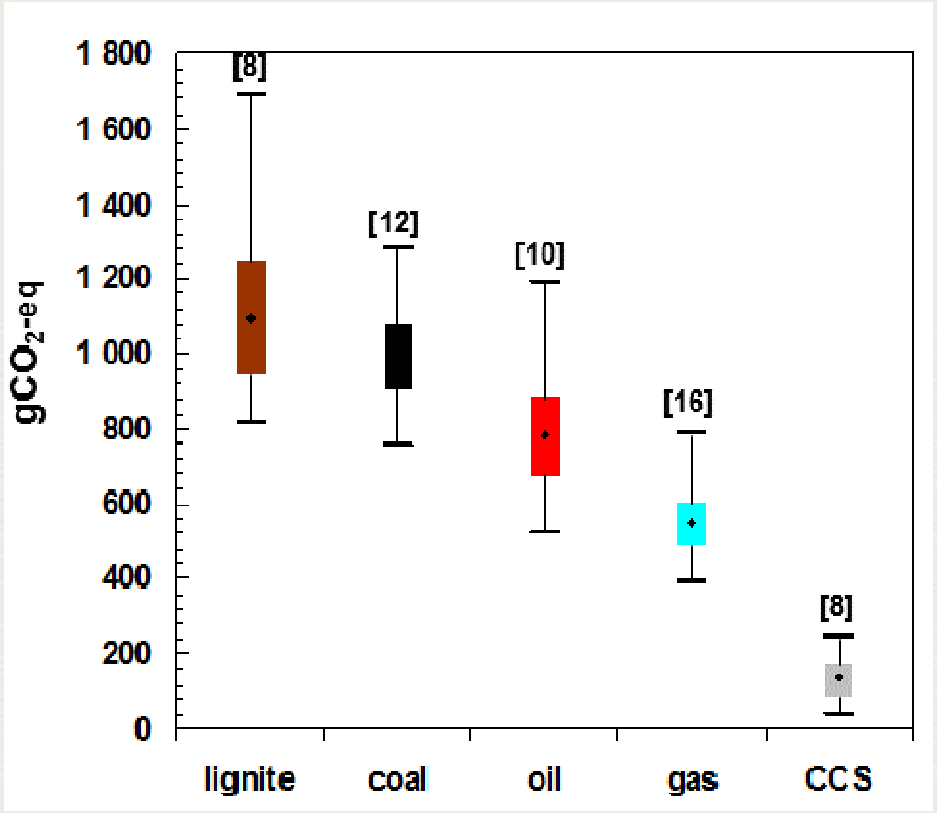
Concerns

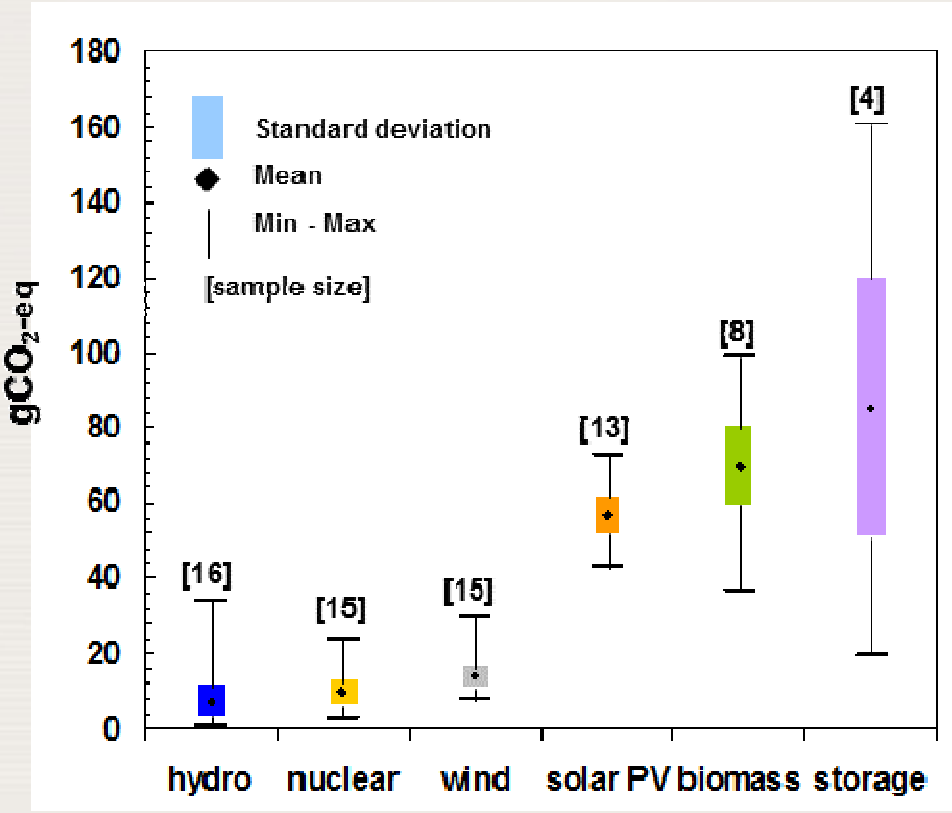


IAEA

3. IAEA support: 3E analysis

Life cycle GHG emissions of different electricity generating options

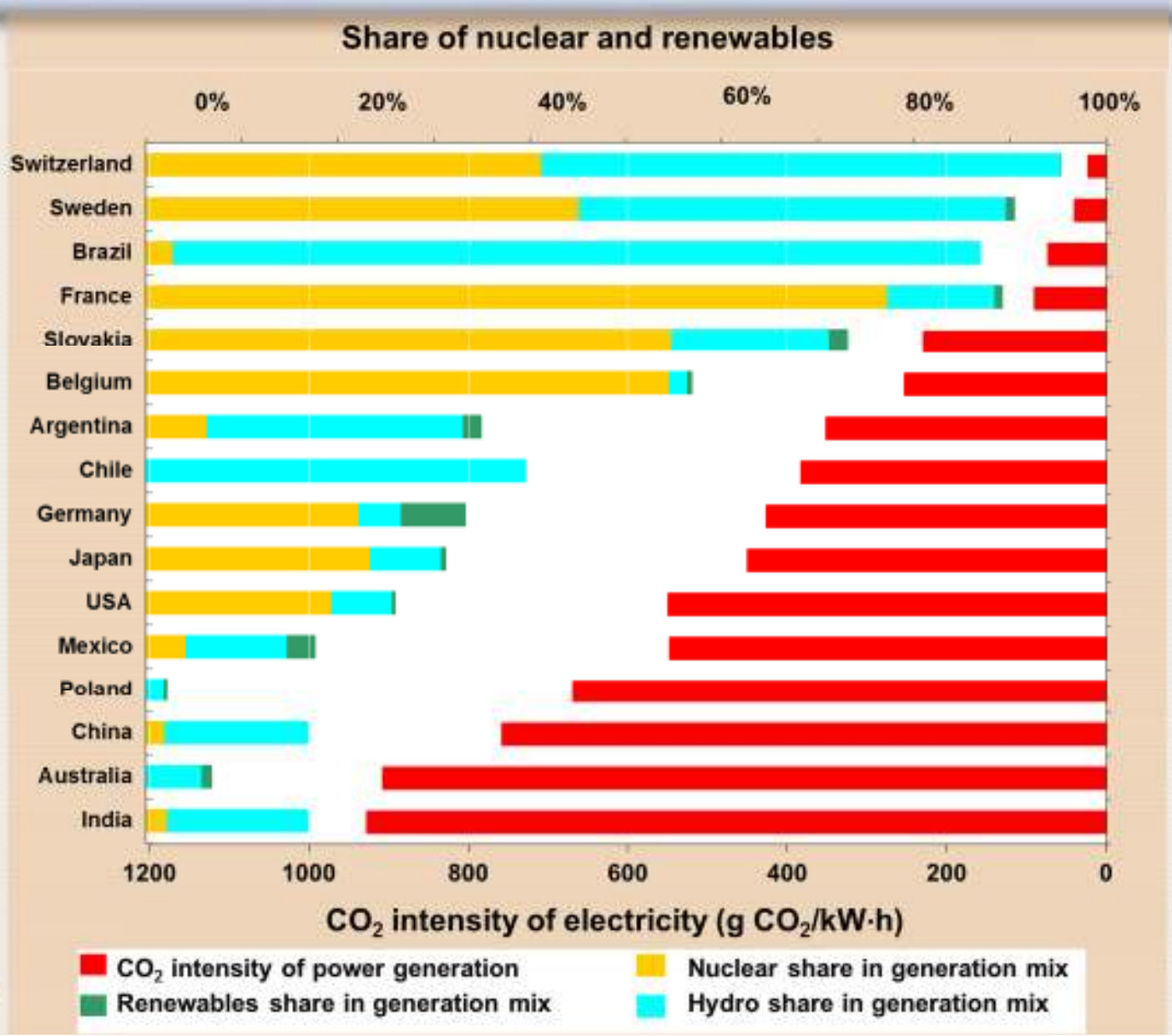




Nuclear power: Very low lifetime GHG emissions make the technology an effective climate change mitigation option

IAEA

3. IAEA support: 3E analysis



5. Main messages

Climate change mitigation and many *other energy concerns* worldwide: fast growing demand, supply security, other environmental problems, domestic resources, import prices and current account balance, competitiveness, sustainability...

➔ Need for energy planning tools and 3E analyses to explore options, costs, policy instruments, …

4. Main messages

Climate change mitigation, many other problems:

Nuclear energy is *not a magic cure*

but:

It could be *part of the remedy*

Where, when, how much, what arrangements:
depends on *national* circumstances and priorities → *decision of sovereign states*

IAEA mandate: support, tools, capacity building, expertise, analysis, publications

IAEA - http://www.iaea.org/OurWork/ST/NE/index.html

…atoms for peace.