Cooperation on Key Sustainable Energy Issues

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IAEA

International Atomic Energy Agency

Overview

1. SED: PESS mandate and implementation
2. IAEA assistance to interested MSs
3. International cooperation: UN Energy
4. Main messages

1. SED: PESS mandate and implementation

Capacity building for sustainable energy development – SED:

comprehensive energy system, economic, environmental analyses to assist Member States (MSs) in:

- decision making for SED by considering *all* aspects and criteria
- understanding environmental and climate change issues related to energy production and use
- assessing the role of nuclear power in SED

Implementation tools and mechanisms:

models, training and technical advice, networks and partnerships, data banks, 3E analyses, global analyses and UN activities

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1. SED: Energy-economy-environment (3E)

Sustainable energy development: Key component of SD

Multi-agency report on *Indicators for SED*

with UN DESA: MS applications; *country initiatives*

Main *criteria* of SED – 3 dimensions:

Social: accessibility, affordability, equity, safety

Economic: overall productivity, energy system efficiency, end-use efficiency, reserve and resource availability, supply security, energy system diversity, end-use pricing

Environmental: atmospheric emission ratios (GHGs, ADSs, CxHx), water pollution ratios (power plant heat, oil, mines), solid waste ratios (ash, radioactive waste)

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2. IAEA assistance to interested MSs

- Energy system planning for a national energy strategy includes and IAEA tools cover:
  - Energy *demand* by economic sector and fuel
  - Demand side management
  - Energy *supply* by fuel, source of fuel, production and conversion technology
  - Economics, including finance
  - *Environmental* impact analyses & externalities
  - Social acceptance
  - Life cycle analysis (CO2)
  - Infrastructure analysis

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2. IAEA assistance to interested MSs

- Transfer planning models tailored to developing & ET countries
- Transfer data on technologies, resources and economics
- Train local experts
- Jointly analyze national options
- Help establish lasting local expertise

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2. IAEA assistance to interested MSs

- **Model for the Analysis of Energy Demand**

- **Model for Energy Supply System Alternatives and their General Environmental impacts**

- **Financial Analysis of Electric Sector Expansion Plans**

- **Simplified Approach for Estimating Impacts of Electricity Generation**

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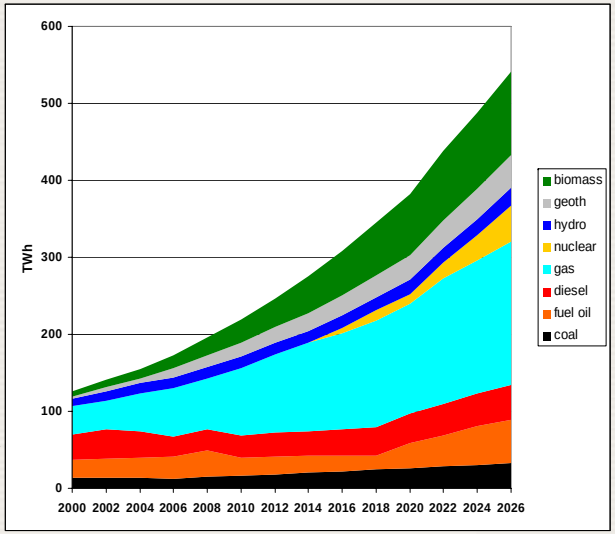
MESSAGE: Model for Energy Supply System
Alternatives and their General Environmental Impacts

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

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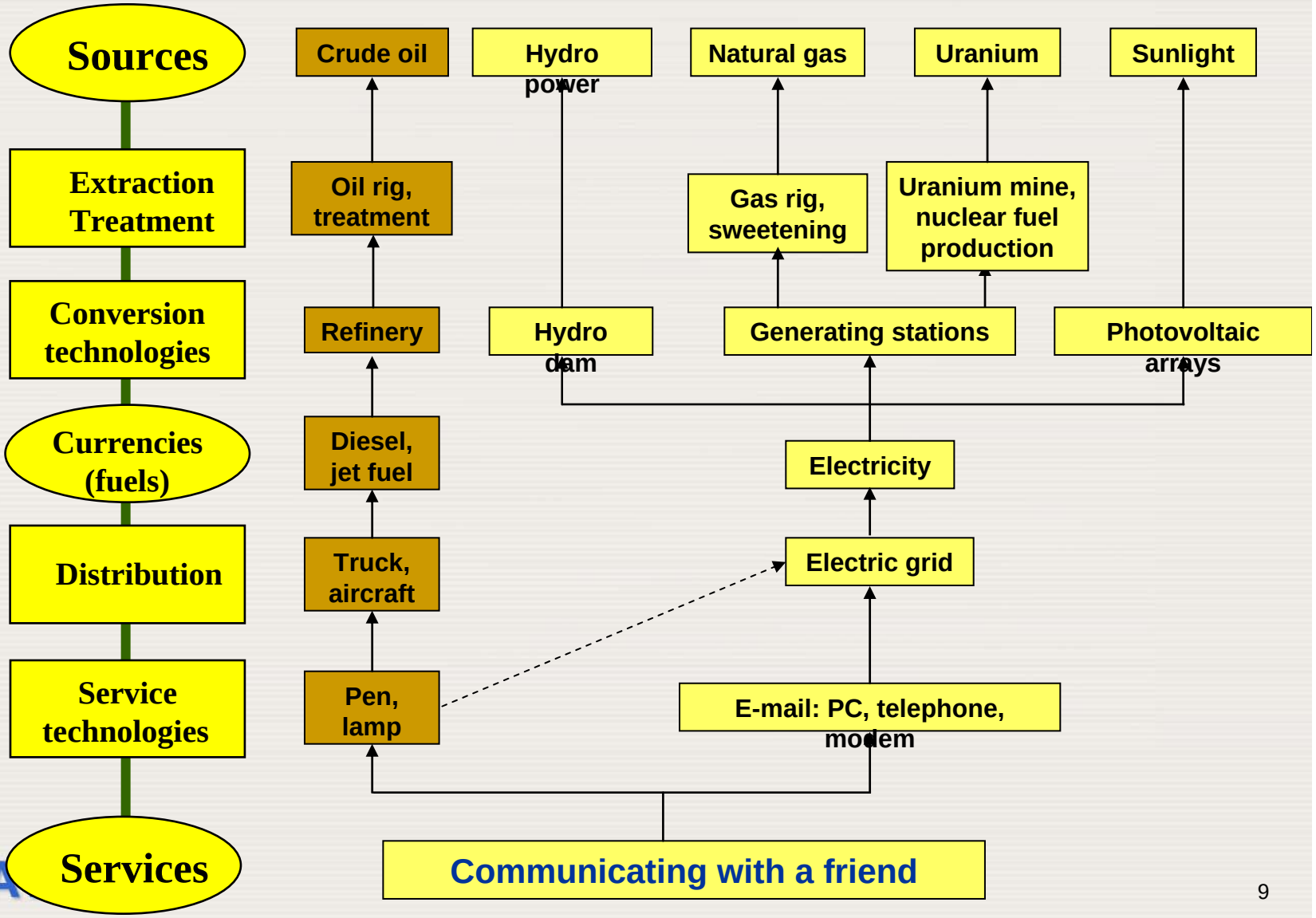
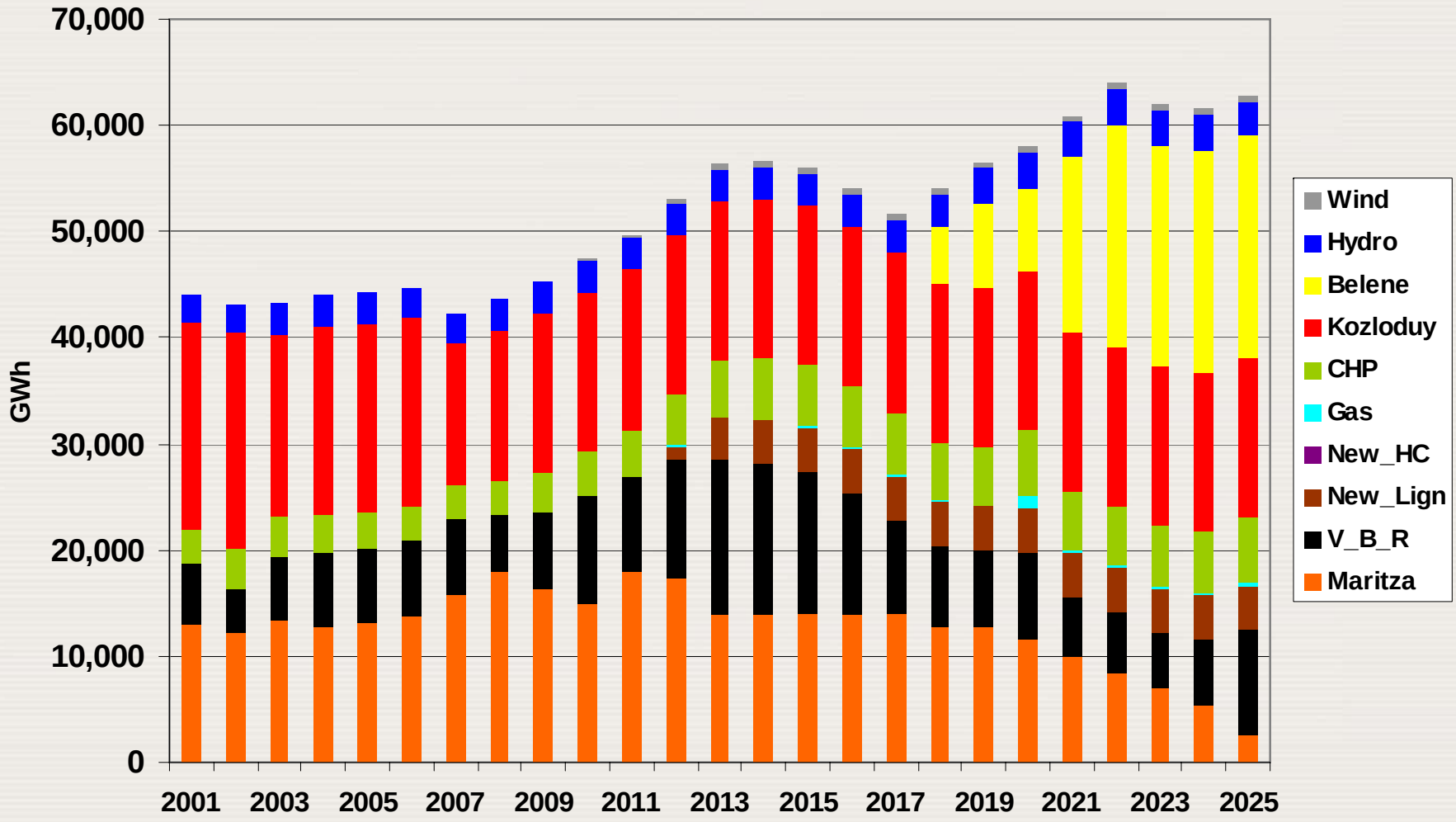
2. IAEA assistance to interested MSs



2. MESSAGE:
Electricity supply expansion



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2. MESSAGE results: scenario comparison

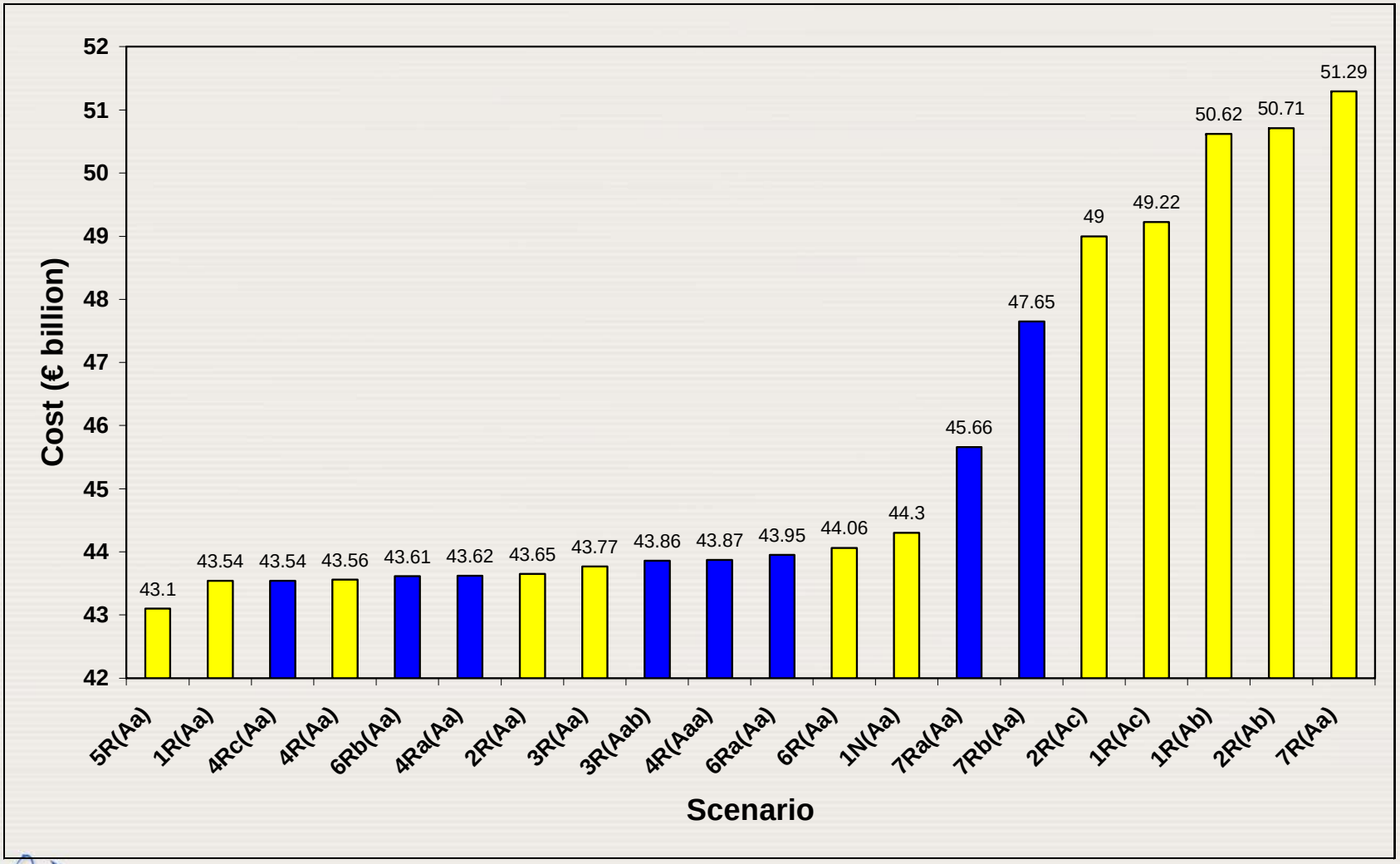

Figure 8.1. Cost comparison of the main scenarios and the sensitivity cases.

3. International cooperation: UN Energy

About 15 UN organizations:

- joint programme
- subsets working on projects
- presentations and side events at UN CSD, UN FCCC, …

Here an example: Ghana

A UN-ENERGY Demonstration Study

conducted by

- **Department of Economic and Social Affairs (DESA)**
- **Food and Agriculture Organization (FAO)**
- **International Atomic Energy Agency (IAEA)**
- **United Nations Environment Programme (UNEP)**
- **United Nations Industrial Development Organization (UNIDO)**

with assistance form the Ghana Energy Commission

3. Ghana: Objectives of the study

- Implement a case study on the implementation of the WSSD JPOI recommendation
  - **Increasing the share of renewables in the energy mix**
- Test the effectiveness of different policy options
- Advance thinking in energy systems
- Build capacity
- Foster UN-Energy cooperation

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3. Ghana: Key energy issues

Three key issues will shape the future of Ghana's energy sector:

1. unavailability or inaccessibility of modern energy sources to a large fraction of the population,

2. non-affordability of commercial fuels, and

3. high energy import dependence

3. Ghana: Approach

- Energy system analysis
  - **Detailed demand analysis distinguishing rural and urban areas (MAED)**
  - **Detailed energy supply analysis (MESSAGE)**
  - **Assessment of policy options**
- Data input provided by Ghana Energy Commission, DESA, FAO, IAEA, UNEP and UNIDO

Modeling and analysis support by IAEA

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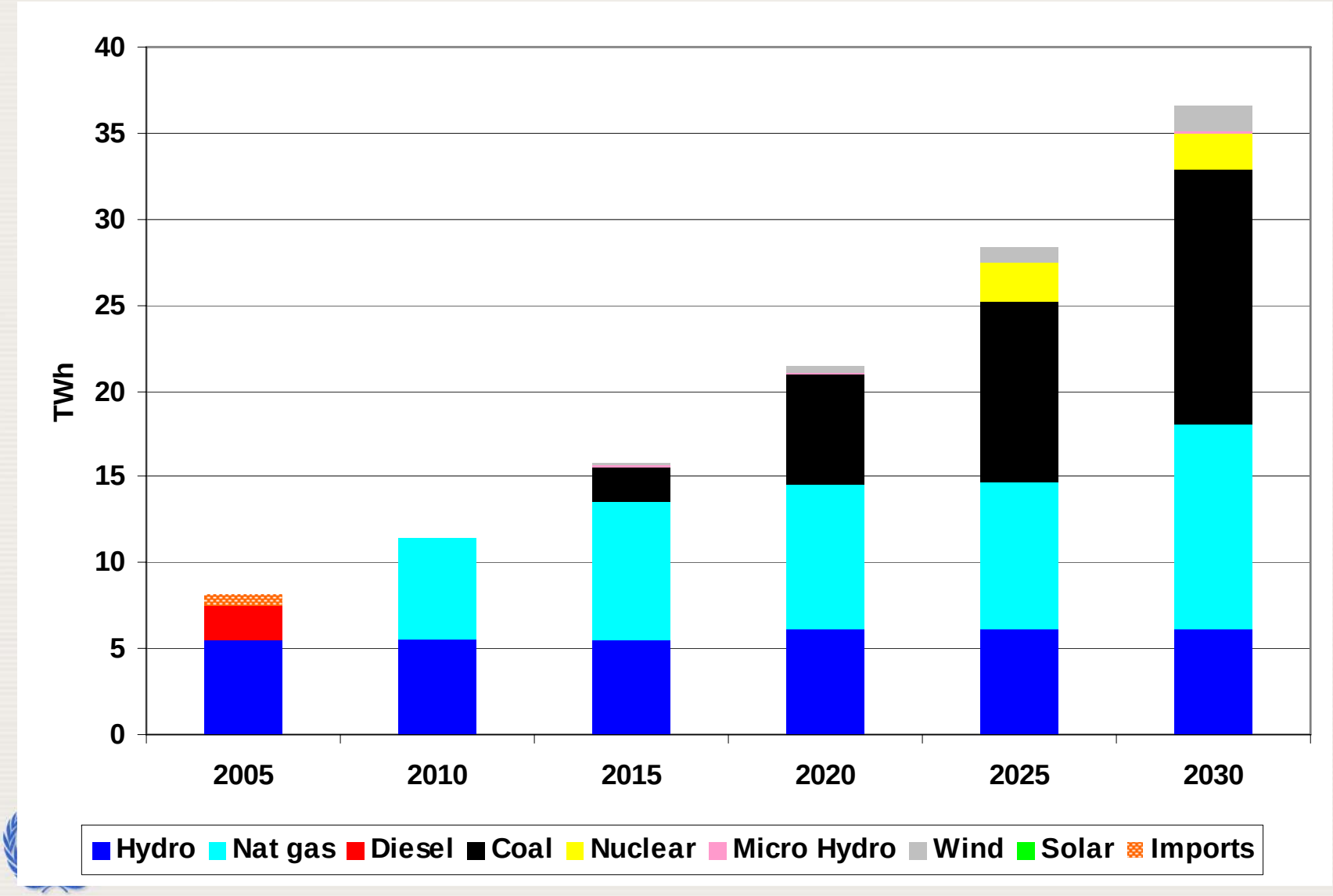
3. Ghana: Electricity generation: Base case – least-cost supply



3. Ghana: Policies and measures to promote renewable energy sources

- **Portfolio Standard/Renewable Energy Quota (REQ) Scenario**

A minimum share of renewable energy is imposed on electric utilities, rising from 2% in 2010 to 20% in 2030

- **Public Benefit Fund (PBF) Scenarios**

Fund is created through levy on electricity transmission: US$1 per MWh to cover up to one-third of investments in renewable energy technologies

- **Clean Developmt Mechanism (CDM) Scenario**

A price of US$15/tonne of CO2 avoided assumed

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3. Ghana: Impacts of different policies

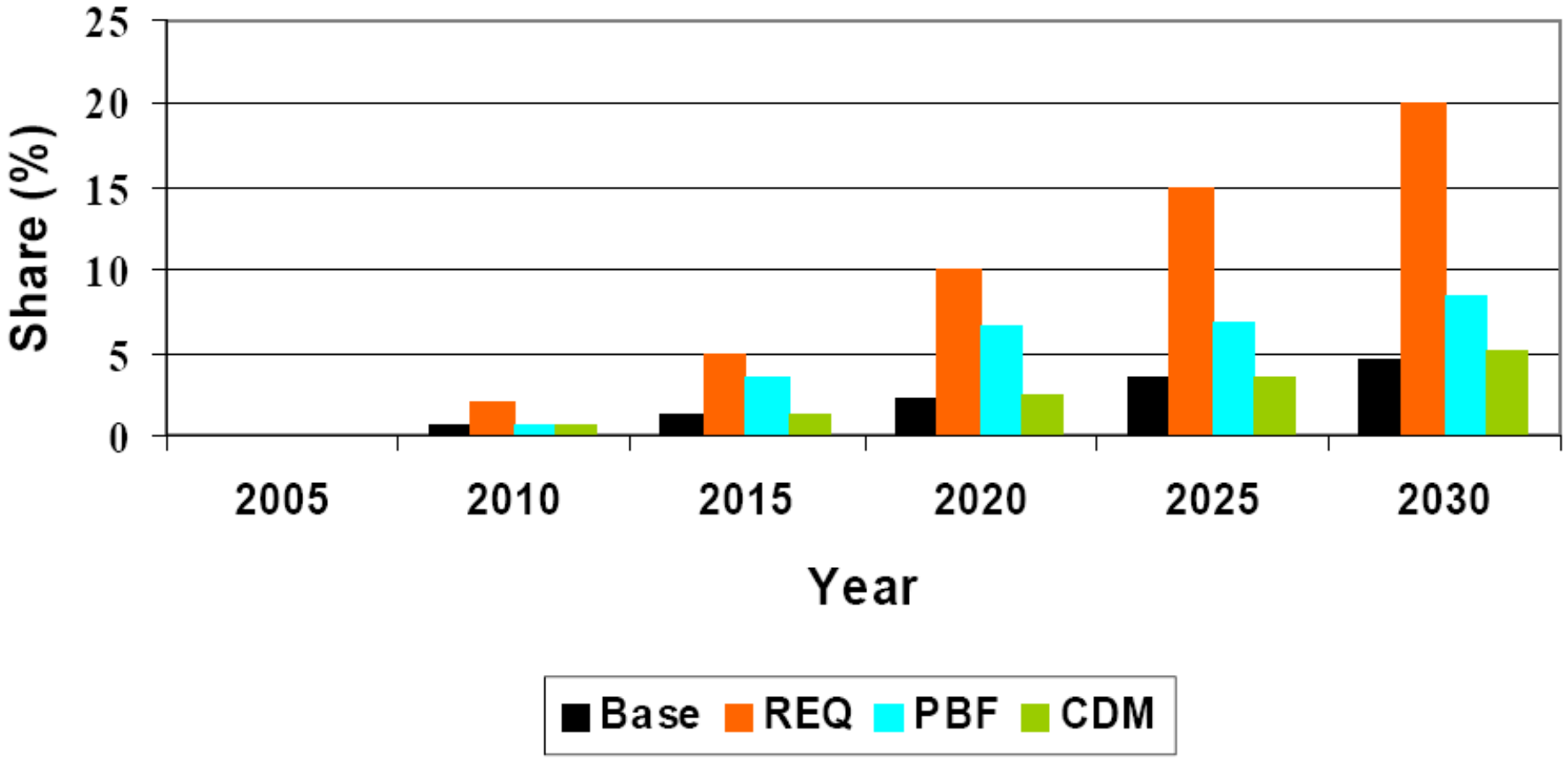


Figure 11: Share of renewable energy sources in electricity generation under different scenarios

3. Ghana: Investment & Operating costs – alternative policies

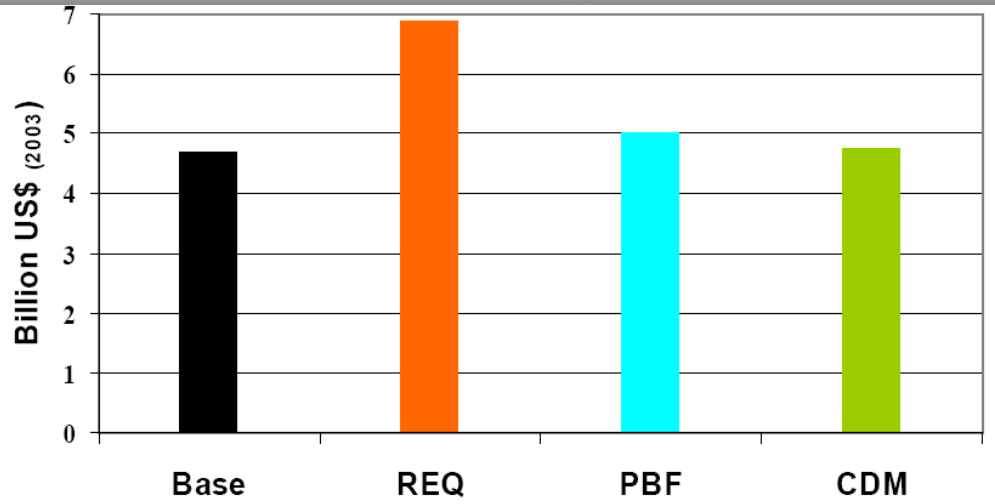


Figure 12: Total investments required for electricity generating capacity (2005-2030)

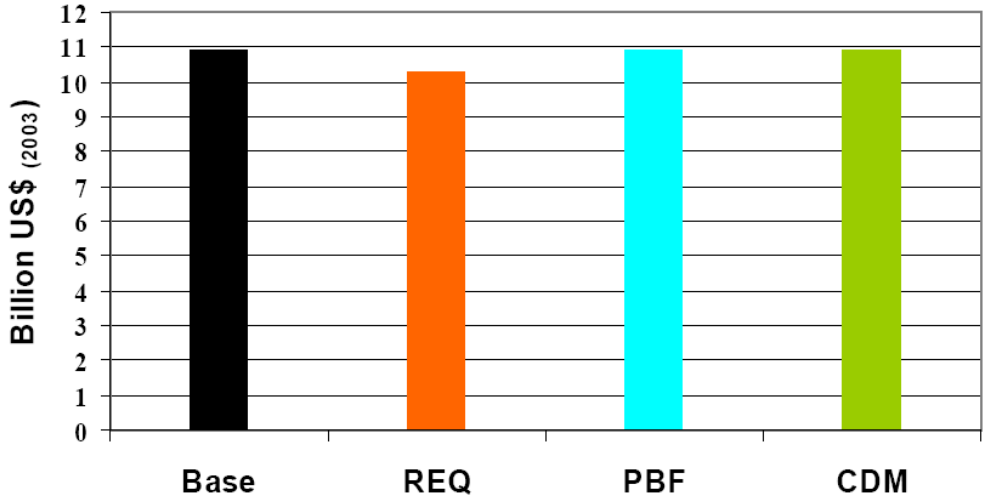


Figure 13: Total O&M costs (including fuel costs) for electricity generation (2005-2030)

3. Ghana: Main insights

Current econ conditions (BL): role for renewables limited ➔ Supporting *polices needed* to promote market penetration;

Ghana's energy policy *already* includes diversification based on renewables: micro hydro, wind, and solar PV;

Additional policy measures can help increase contribution of renewables *but* effectiveness and economic costs differ;

Soft-measures (Public Benefit Fund and CDM):

economic advantages: investments partly financed by internally generated funds or earnings from CO2 credits;

Hard measures (Portfolio Standard/Renewable Energy Quota): more effective, but involve inefficiencies and higher costs;

Demonstrated: suitability of IAEA's energy models for analyzing the role of various energy technologies and for evaluating various policy measures

4. Main messages

IAEA: *not only*

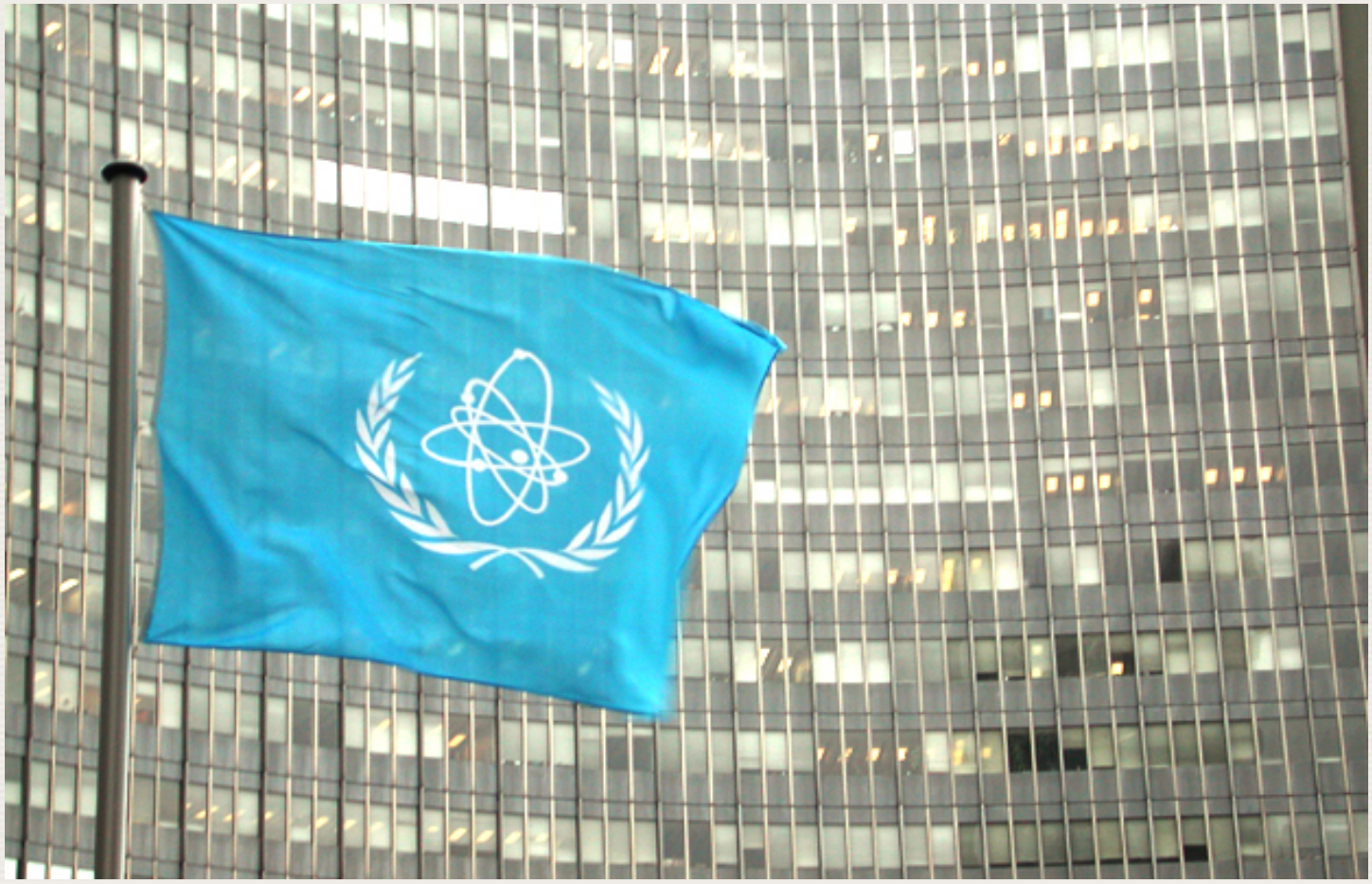
- *atomic*: SED, 3E analysis, national energy planning – full set of resources and technologies

- *energy*: nuclear applications in many areas – medicine, agriculture, water mgmt, …

Capacity building: energy planning, 3E analysis – models, methods, indicators, data + training

UN Energy: joint projects; case studies: thematic (energy efficiency w/ UNIDO), national (Ghana): to demonstrate SED concepts, applicability, implementation

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



…atoms for peace.