IAEA
International Atomic Energy Agency

IAEA Support to Member States

Energy Statistics and Balances

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Workshop on Energy Statistics

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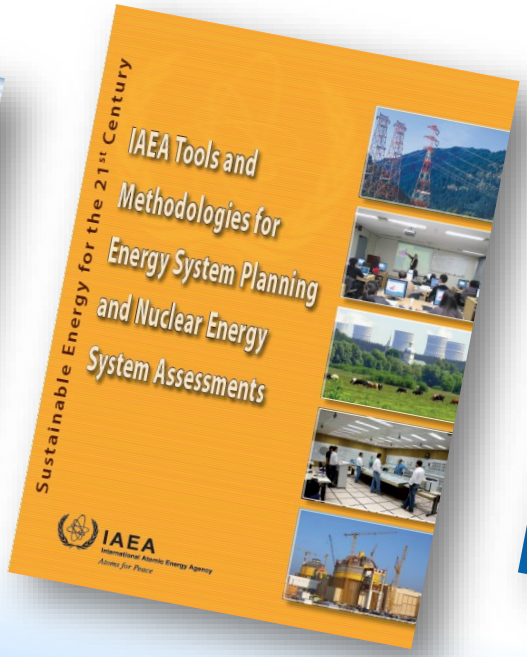
Role of Energy

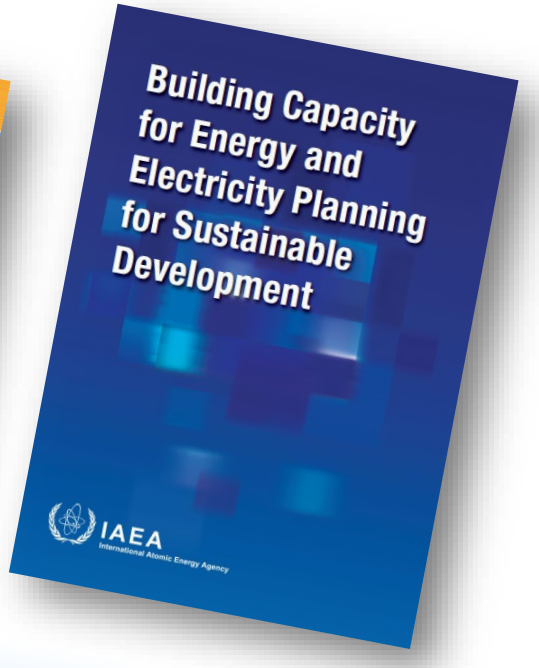
- Energy drives economic and social development
- Energy needs, options and development priorities differ among countries

- *Capabilities of countries to conduct energy system analysis also differ*
- *Many developing countries are facing issue of insufficient national expertise in this domain*

IAEA …

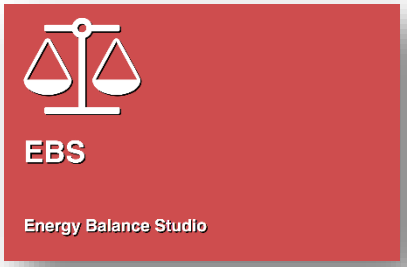
- … ***assist*** Member States in reinforcing national capabilities to conduct energy system analysis, so that countries can assess options and develop ***their own sustainable energy strategies,*** *i.e. support decision and policy making*



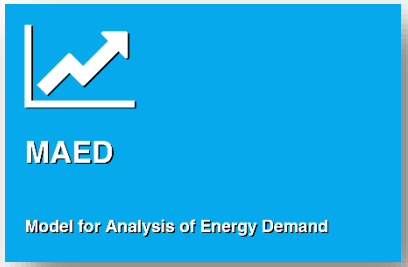


Energy System Assessment Tools

- Planning and Capacity Building activities are organized around set of own energy system assessment tools covering the whole energy planning process

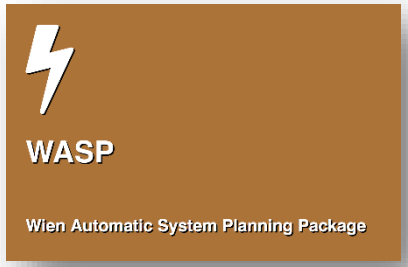


Energy Statistics and Energy Balances compilation

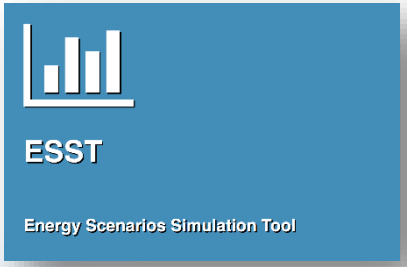


Energy Demand Analysis and Projections

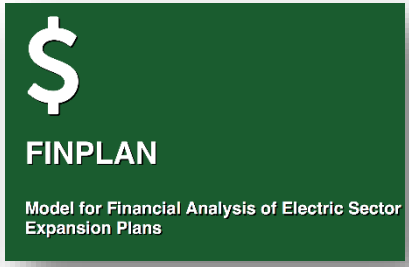
Energy Supply Optimization and Simulation



Power Generation Investments and Expansion Planning



Energy Scenario Simulation Tool for fast estimates



Analysis of financial viability of power generation projects

Analysis of Power Plants Environmental Impacts

Energy System Assessment Tools (cont.)

- ISED (Indicators of Sustainable Energy Development)
  - ISED framework is a series of 'snapshots' of indicators reflecting interaction of energy with economic, environmental and social pillars of sustainable development over time
- CLEW (Climate-Land-Energy-Water)
  - Climate, land-use, energy, and water methodology to analyse complex interactions between key resources and climate change
- EMPOWER (Macroeconomic analysis)
  - Enables Member States to quantify ex-ante and ex-post effects associated with construction and operation of nuclear power plant (NPP) programme and other energy options
- SEA (Strategic Environmental Assessment)
  - Process to ensure that environmental impacts arising from policies, plans & programmes are considered
  - PESS developed guidelines and organises training workshops for nuclear power programmes

Capacity Building Programme

- Energy tools
  - Development
  - Maintenance/updates
  - Documentation and support
  - Multi-lingual user interface
  - Free of charge for MSs and up to date!
  - Technology neutral and applicable to any country!
- Training programs
  - Distance learning, national trainings, expert missions, fellowship
  - Continuous training of national teams
  - Training of trainers
- Technical assistance in conducting national studies

Energy Planning and Statistics/Balances

- Realistic planning must have quantitative targets
- Statistics helps to visualize targets and measure achievements *quantitatively*
- Foundation of good planning and modelling is baseline statistics (as input data and for models-case studies calibration)

Roles of Data Collection/Statistics

Analysis	Planning	Monitoring
• Understanding the system behavior and driving forces • Energy Balances and other data sets	• Evaluation of alternatives • Policy and decision making • Management	• Measure • Assess • Compare • Check compliance

Who uses Energy Statistics/Balances? 1

- Governments
  - Social, energy and environmental planning departments – policy and decision makers
  - Regulatory agencies …
- Energy industry participants
  - Energy supply industry and market operators
  - Energy market analysts and consultants
  - Trade associations…

Who uses Energy Statistics/Balances? 2

- Public
  - Energy and environment commentators
  - Academic researchers and NGOs…
- International community / organisations / agreements
  - International organizations, groups, associations
  - Negotiations, implementation and monitoring of international treaties, agreements, protocols and other voluntary and/or obligatory documents

Examples of usage

- National Energy Balance
  - Input for the preparation of National Climate Change Communication and Emission Inventory and reporting of trans-boundary pollution
- Security of Supply planning
  - Import dependency
  - Fuel mix
- Energy commodities prices
- Analysis of future needs/requirements
- Modeling policy scenarios against set of targets, measures and actions
- Decision making
- Policy development and monitoring
- Market analysis
- Energy indicators development…

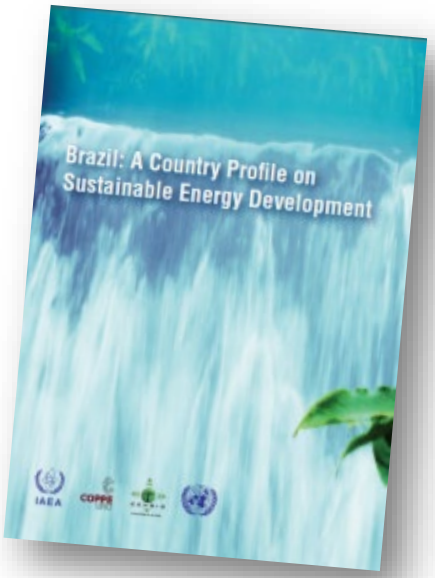
Data Needs for Energy planning

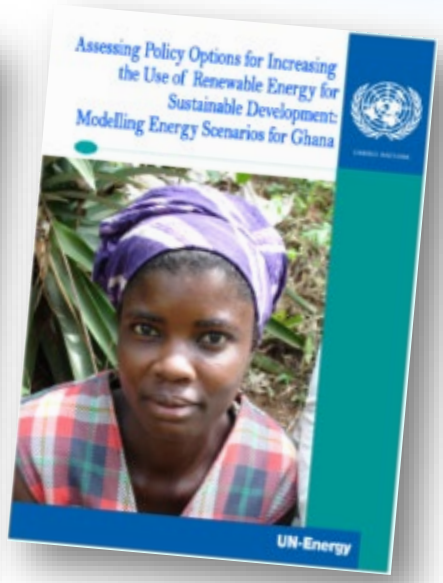
- Data needed for informed and reality based energy planning and development go well beyond the basic energy statistics and includes sets of other data, like:
  - Demographic changes
  - Geographic/climate localization and changes
  - Economy and other sectors interrelationships
  - Environmental impacts and limitations
  - Technological development
  - Financing mechanisms
  - Life style changes
  - …

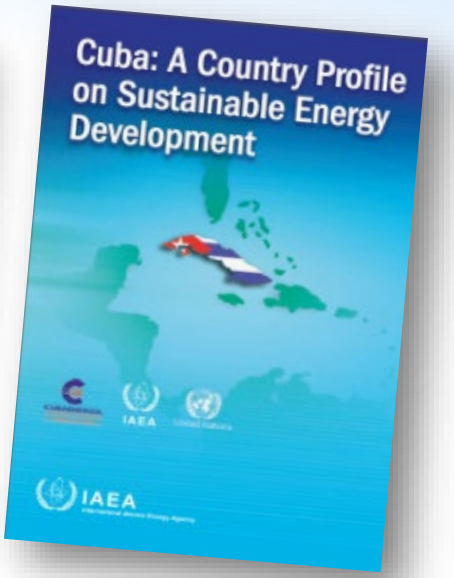
Use of Energy data with Demographic, Social and Economic Statistics

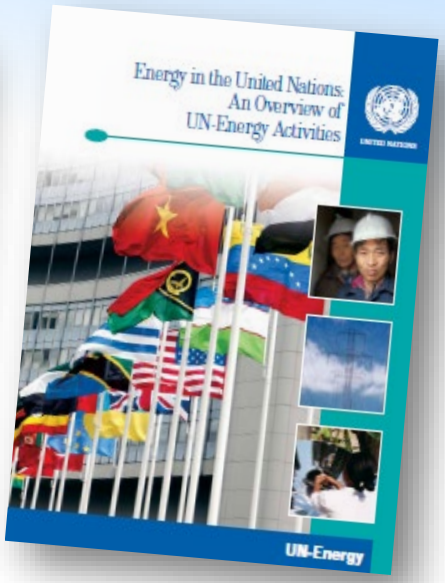
- Energy statistics used in combination with other data can give additional insight into relation between energy and overall development
  - E.g. Population, GDP and GDP-PPP (Power Purchase Parity)
- Produce combined indicators
  - Energy Production/TPES
  - TPES/GDP
  - TPES/Population
  - Electricity consumption/GDP
  - Electricity consumption/Population

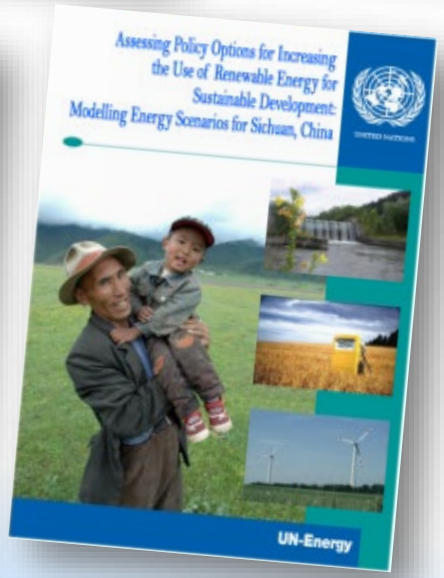
Examples of Our Work



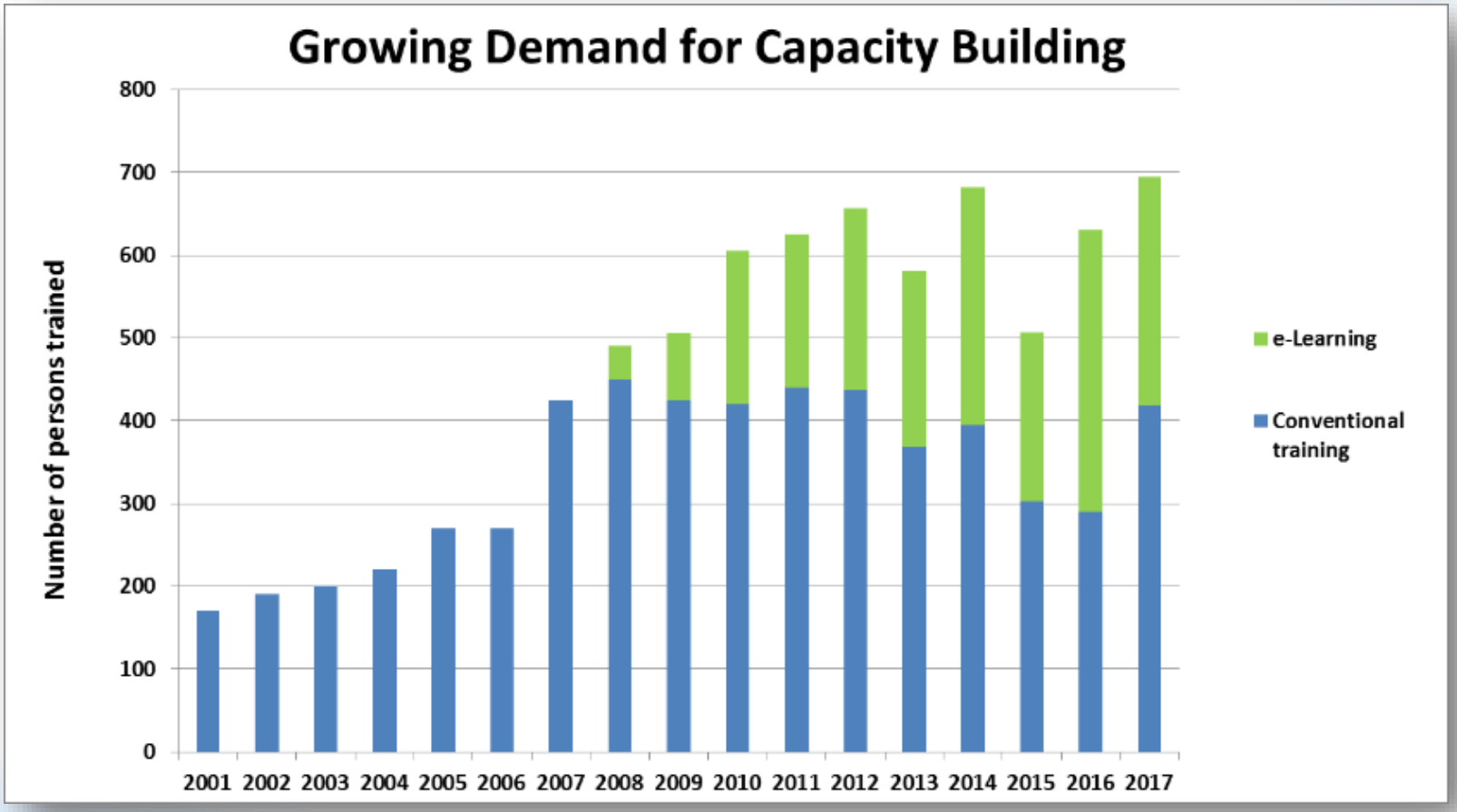








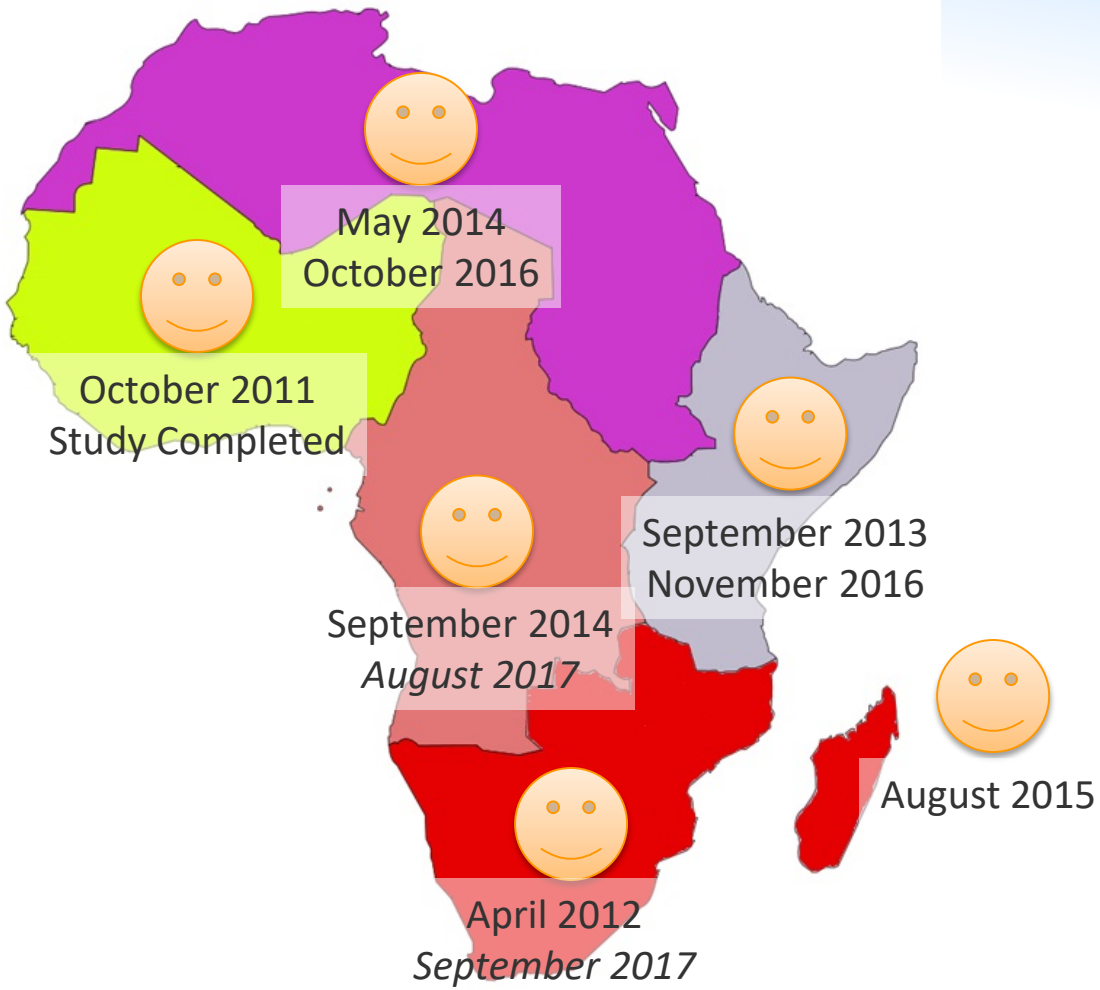
Number of trained experts



Support to African Member States

- National projects
  - Cycle 2018/19: Mozambique, Eswatini (till 2021), Lesotho, Togo, Benin, Botswana, Gabon, Liberia, Rwanda (till 2021), Morocco, Algeria
  - In the last 5 years: Ghana, Mauritania, Madagascar, Angola, Burundi, Mauritius, Malawi, Niger, Senegal, Seychelles, Tanzania, Zimbabwe
- Regional AFRA projects
  - Developing, Expanding and Reinforcing Energy Planning Capabilities including Nuclear Power (continuation of previous projects)
  - 34 countries participate in the projects
  - Sub-regional power pool modelling and analysis
  - Three African conferences on Energy and Nuclear Power since 2011

Development of sub-regional electricity market models



Illustrative map

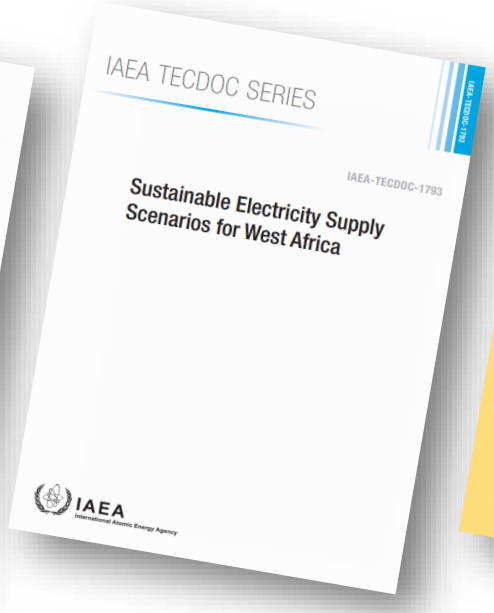
Information provided on the map is informative and does not constitute recognition of international borders or regions.

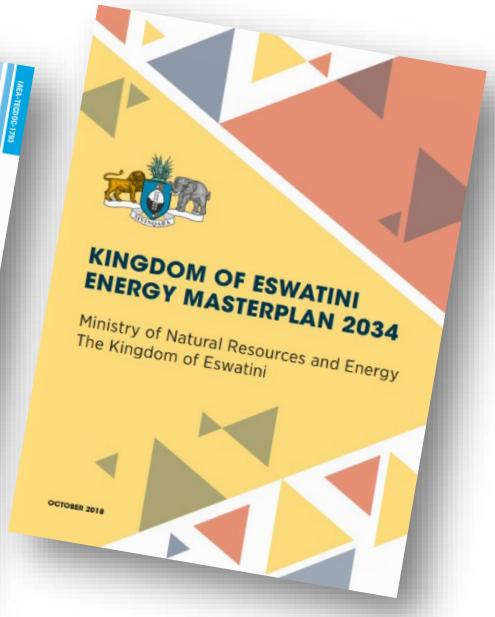
Support to Africa in Numbers

- On average, during two years of the national project…
  - … 6-10 national experts are trained (national team)
  - … 4 national trainings are organized (distance learning and in-country training)
  - … 4 expert missions are conducted
  - … 3 fellowships are hosted
  - … 2 national WS are supported
- Pool of National experts was develop so that local experts support capacity building programs in other African countries

Examples of Support to African Countries

- National and regional reports on energy demand and supply options and energy sector master plan development





International Collaborations

- UN DESA & UN Statistics Division (UNSD)
- IRENA cooperation for capacity building
- AFREC collaboration on energy statistics
- ECOWAS regional policies for RES and EE
- ECREEE Capacity building
- IEA & NEA / OECD
- UNECA / IDEP

Conclusions

- **Energy is important**
- **Energy planning is needed**
- **Sound energy planning needs sound energy statistics**

- Growing demand for energy, considering limited resources, increases the need for reliable and detailed statistics
- Availability of good, reliable and timely energy statistics is fundamental for policy and decision making
- Development of energy statistics according to international standards is a basis for consistency among statistics collected by different agencies within a country and for international comparison
- Importance of energy statistics requires clear link to economic and other statistics terminology, definitions, concepts and procedures

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Thank you!

BONUS SLIDES

Planning and Economic Studies Section

- Planning and Capacity Building
  - Assists Member States capacity building, through training, technical assistance and information exchange in energy systems analysis and planning to identify the role of different technologies, including nuclear, in meeting their future energy needs.
  - Elaboration of sustainable energy strategies and conducting studies for energy system and electricity sector development and management, energy investment planning and energy environment policy formulation
- Energy-Economy-Environment – 3E analysis
  - Assists Member States' understanding of nuclear technology's compatibility with national sustainable development objectives and its possible contributions to socio-economic development, climate protection and energy security
  - Conducts analysis of nuclear technologies, along with both fossil and renewable energy technologies, focusing on competitive energy markets, environmental impacts and sustainable energy development. It also maintains information references of energy and economic data

Level of Data Details

- Any sound energy policy relies on detailed, reliable and up-to-date statistics
  - ***… collecting any data/statistics has a cost,***
  - ***… not having appropriate data could lead to even higher costs***
- Limit data collection to what is necessary
  - Necessity depends on needs
- **Absolut minimum in energy data collection and statistics** – regular compilation of an Energy balance (annual review of energy flows in a country/area)

Difficulties in Collecting Statistics

- Level of details of energy statistics is not sufficient for some reporting, certain analysis and modeling - increased level of details needed
  - Disaggregation by fuels, sub-sectorial and energy end-use
- Increased data needs, require larger resources and legal bases for the collection and compilation of energy statistics
- Legal obligations in relation to energy statistics, dependent regulations and international agreements/protocols
- Energy market liberalization
  - Growing reluctance on behalf of the data suppliers to supply detailed data as it is now being classified as commercially sensitive

Coordination of Activities

- Actors involved in two processes (i.e. energy data collection/statistics and planning) are not necessarily the same or are not coordinated
  - Responsibilities and focuses of two processes can be different or "detached"
- Cooperation and integration between systems/institutions for energy statistics/balances and energy planning is needed

Statistics and … Statistics

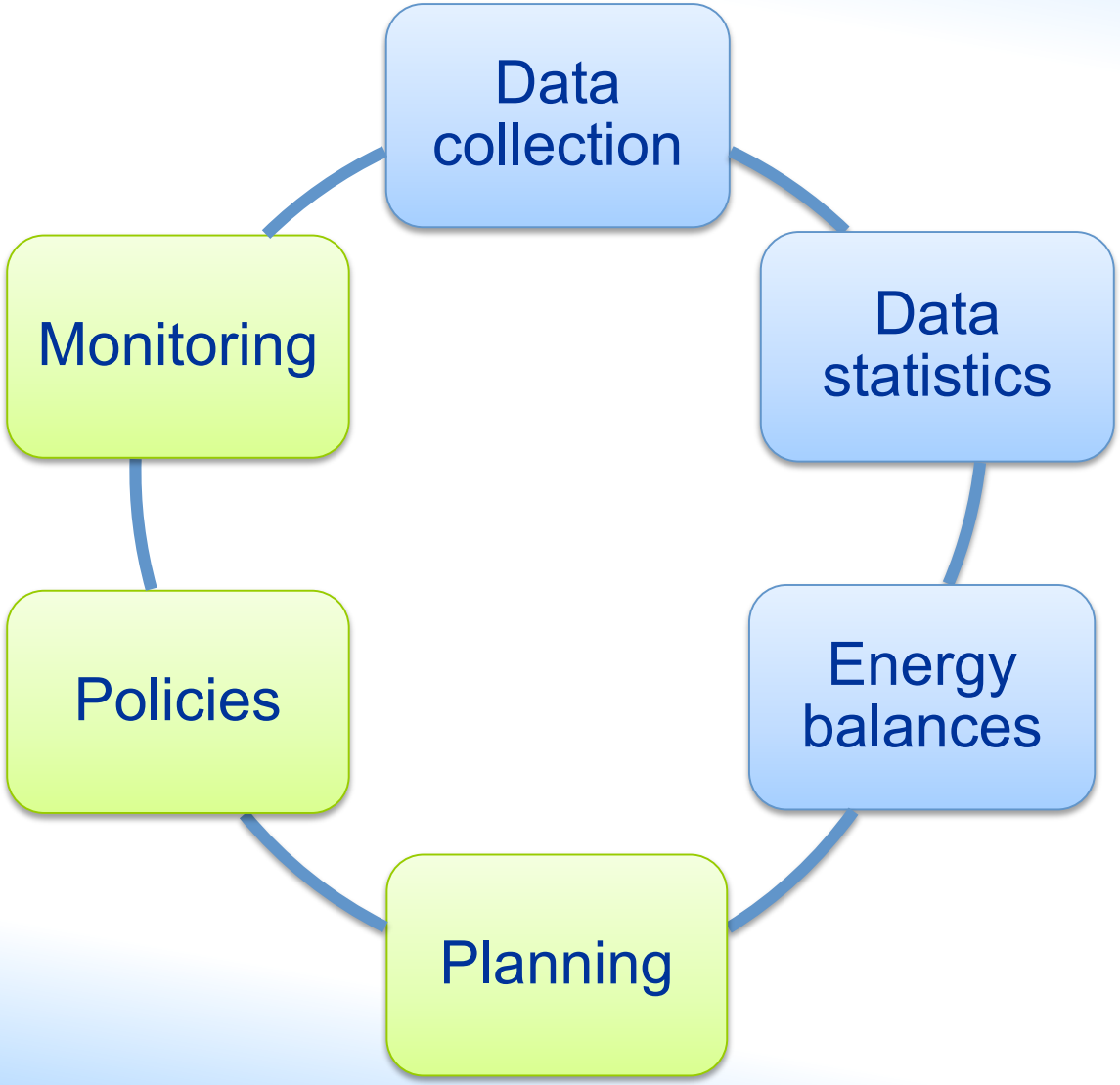
- Some reasons for differences between statistics
  - Primary energy equivalent – physical energy content vs. substitution?
  - Categorization of fuels/energy forms – e.g. some consider peat to be RES?
  - Supply – includes bunkers or no?
  - Conversion factors – standard vs. specific?
  - Calorific values – net vs. gross?
  - Units
  - Reporting period – calendar of fiscal year
- Use of statistics to define obligations can also be a problem
  - E.g. CO_2 emission – selection of the base year (what was climate in that year)?

- **To avoid confusion, misjudgments and facilitate/simplify usage of energy statistics there is a need for harmonization across the countries**

Harmonisation of Energy Statistics and Energy Balances

- Helps policy and decision making process
- Reduces administrative workload when collecting and supplying data
- Reduces efforts of organizations in explaining differences between different datasets
- Helps general public to understand energy situation in their own country as well as in other countries
- Detailed, complete, timely and reliable statistics are essential to monitor the energy situation at the country level as well as at the regional level

Integral Approach



Challenges in Project Implementation

- Organisational
  - Project management and visibility in country
  - Project relevance in policy and decision making
- Operational
  - Data availability, quality, access and collection
  - Staff turnover (changes in national team composition)
  - Financing local project activities and trainings
- Long-term
  - Sustaining capacity building beyond project lifetime (inclusion of academia/universities)