

Planning & Economic Studies Section (PESS): Analysis for Sustainable Energy Development

IAEA Energy Planning Tools

Computer-supported modelling forms
the core of the IAEA's approach to
energy planning...



Capacity Building for
Sustainable Energy Development

Distance Learning

Planning and Economics Studies Section

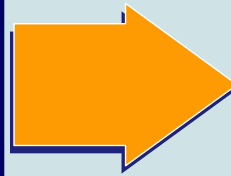
IAEA Department of Nuclear Energy

MAED

Model for the Analysis of Energy Demand

INPUT

- Energy sector data (energy balance)
- Scenario assumptions
 - Socio-economic
 - Technological
- Substitutable energy uses
- Process efficiencies
- Hourly load characteristics



OUTPUT

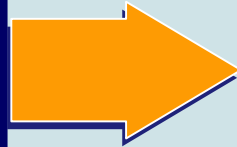
- Useful or final energy demand by sector/fuel
- Electricity demand
- Degree of electrification
- Hourly electric load
- Load duration curves

MESSAGE

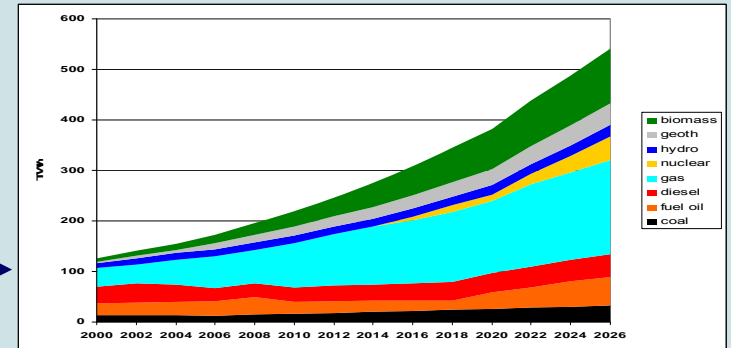
Model for Energy Supply System Alternatives and their General Environmental Impacts

INPUT

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

WASP

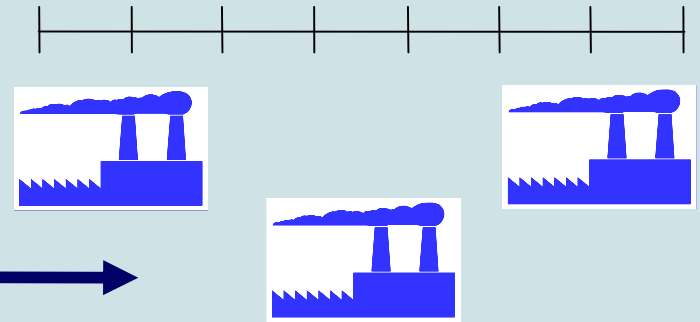
Wien Automatic System Planning Package

INPUT

- Load forecast
- Existing system
- Candidates
- Constraints:
 - Reliability
 - Implementation
 - Fuel
 - Generation
 - Emissions



OUTPUT



- Build schedule
- Generation
- Costs
- Fuel consumption
- Emissions

FINPLAN

Financial Analysis of Electric Sector Expansion Plans

INPUT

- Investment programme (= capacity additions) & operating expenses
- Economic and fiscal parameters (inflation, escalation, exchange rates, taxes)
- Financial parameters (credits, bonds...)



OUTPUT

For each year:

- Cash flows
- Balance Sheet, Statement of Sources, Applications of Funds
- Financial Ratios:
 - Working Capital Ratio
 - Leverage ratio
 - Debt Repayment Ratio
 - ...
 - Global Ratio

SIMPACTS

Simplified Approach for Estimating Impacts of Electricity Generation

INPUT

Case 1 (minimum data requirements):

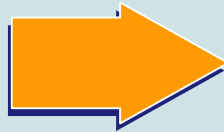
- pollutant emission rates
- regional population density (< 1000 km)
- source location (urban/rural)

Case 2 (some more data):

- stack characteristics
- local population (<50 km)

Case 3 (even more data):

- local meteorological data (wind directions & speed)
- population around the source (10x10 km)



Estimate 1



Estimate 2



Estimate 3



OUTPUT

Case 1 (minimal results):

- uniform world model (UWM) estimate for total exposure
- quantification of health impacts
- monetisation of impacts

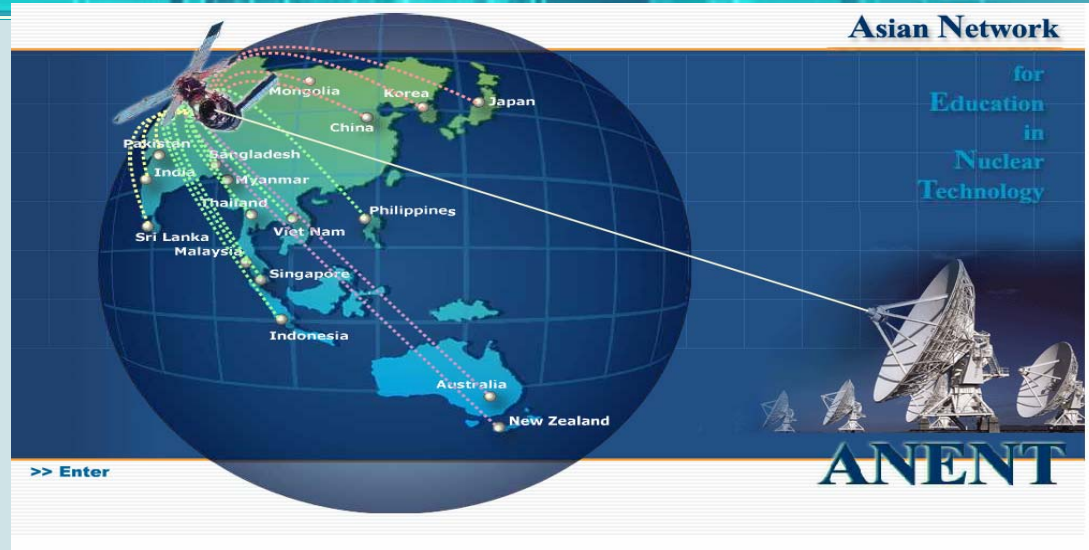
Case 2 (more output):

- estimates 1 adjusted for effective stack height (including $H+V_{\text{exit}}+T_{\text{exit}}$)

Case 3 (even more output):

- Gaussian plume used for local exposure and impact estimate
- estimates 2 adjusted for more accurate pollutant & receptor distribution

Distance Learning



Video Conferences



On-Line Tutor

