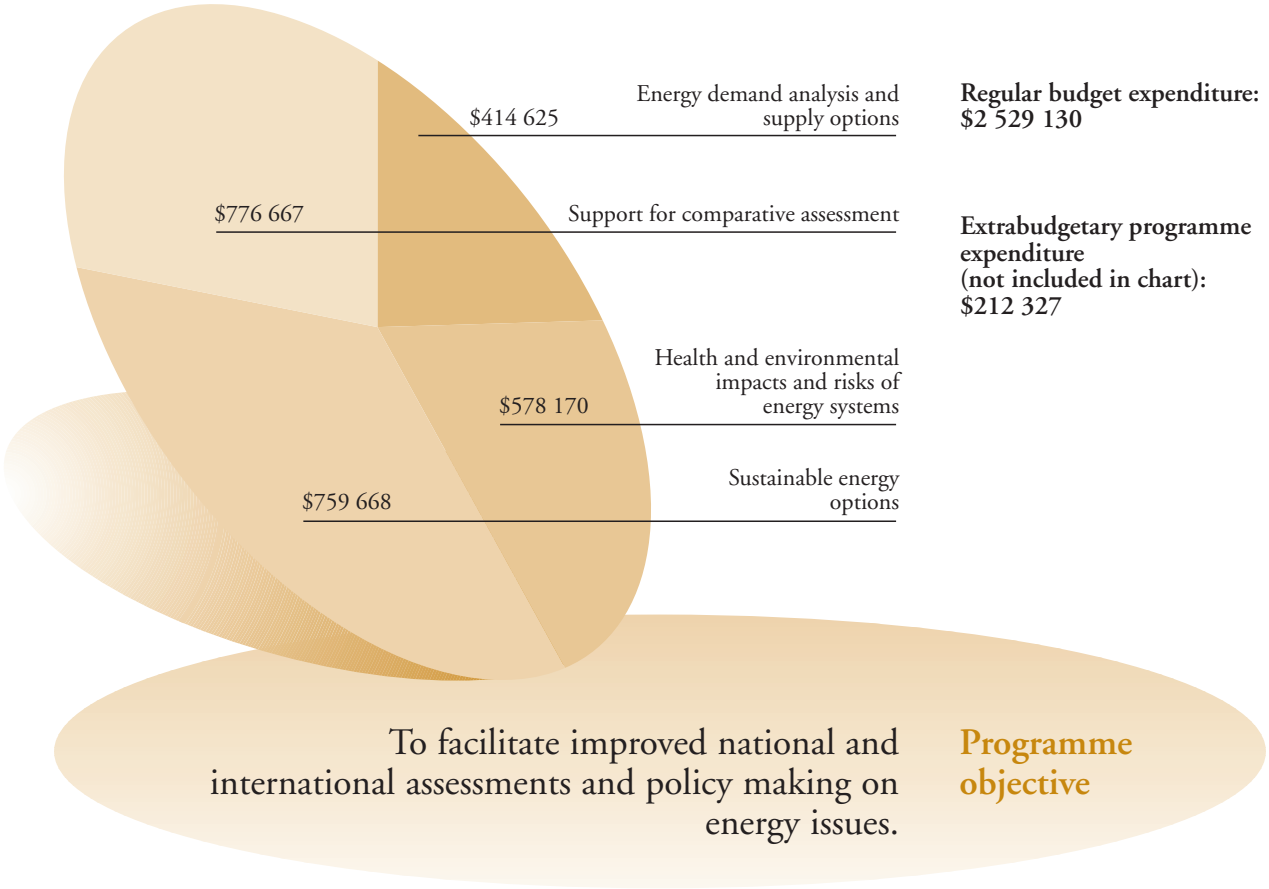
COMPARATIVE ASSESSMENT OF ENERGY SOURCES



Regular budget expenditure:
$2 529 130

Extrabudgetary programme expenditure
(not included in chart):
$212 327

Programme objective

To facilitate improved national and international assessments and policy making on energy issues.

The programme pursued its major objective of developing methodological tools for informed decision and policy making through comprehensive comparative assessments of all energy supply options along their respective full energy source to service chains. These comparative studies aimed at the identification of the potential role of nuclear power for achieving sustainable energy development. Member States, especially developing countries, were assisted in the formulation of national energy policies and strategies and in local analysis capacity building through the dissemination of methodology, and training through the Agency's technical co-operation programme.

Energy demand analysis and supply options

In addition to time horizons appropriate for incremental capacity expansion investment (typically 15–20 years), the Agency extended the analysis time horizon to the year 2100 for tasks related to the role of nuclear power in sustainable energy development and the mitigation of potential climate change. In co-operation with the OECD/NEA, and with national research teams from Japan, the Russian Federation and the USA, the Agency adapted long term projections of energy and electricity demand (originally developed by

IIASA and WEC) at the regional and global levels. On the basis of these regional demand projections, and using the modelling capabilities of the three participating national research teams, an overall comparative assessment of different energy supply systems was carried out and their potential in long term sustainable energy mixes under different sociopolitical conditions was analysed.

A study on fossil fuel resources for the 21st century was completed. This study not only supports the evaluation of energy resource availability and price trends within the Agency's comparative assessment activities (as well as inputs to the Energy and Economic Databank), but also forms an integral part of its contribution to the UNDP/UNDESA/WEC World Energy Assessment that will be part of the input of the United Nations to the ninth meeting of the Commission on Sustainable Development scheduled for 2001.

Health and environmental impacts and risks of energy systems

A CRP on the comparative health and environmental risks of nuclear and other energy systems was completed. The country specific case studies that were prepared will be included in an Agency database on health and environmental impacts. Procedures were also prepared for comparative assessments, including methodological approaches.

Guidance was developed for estimating and comparing accident and health risks from different electricity generation systems. On the basis of a summary of available information, it was recommended that a set of approaches be used that includes the application of cut-off values. Another report describes the methodological and data requirements of comparative assessments for decision making in different areas such as emission control or the choice of technologies.

A proposed set of reference waste disposal practices were identified as part of efforts to formulate an approach to compare the potential health and environmental effects that could result from the disposal of wastes from fuel chains for electricity generation. Transport pathways and exposure scenarios relevant for each reference practice are also being specified to work towards a standardized assessment framework.

Sustainable energy options

Within the framework of the interagency DECADES comparative assessment project, a peer review of the Reference Technology Database, which contains information on technical, economic and environmental aspects of various components of different energy chains, was initiated for nuclear power and fossil fuels. Additional data were collected on renewable energy sources (biomass, solar and wind) and on some advanced and innovative nuclear fuel cycles. In order to increase public accessibility of the database, a DECADES Web site on the Internet was developed and is now being tested.

The Joint Steering Committee of the DECADES project met in November to review achievements and to shape the programme of work for the next period. In this context, strong interest was expressed by the other international organizations participating in the project in using the DECADES tools to carry out some of their comparative assessment studies.

New capabilities added to the DECADES software included a decision aiding module. This module assists the user or decision maker in coping with information on economic and environmental impacts at three levels: the power plant; the full energy chain; and the electricity system. It also permits the analysis of trade-offs between affordability and environmental desirability.

The VALORAGUA software, which provides for a more sophisticated analysis of electricity systems that include hydro power in their generating mix, was fully integrated into DECADES. As a consequence, the structure of the Country Specific Databases was modified to accommodate data from VALORAGUA. An enhanced Control Device Sub-module, used for assessing the cost effectiveness of particulate, sulphur dioxide and nitrogen oxide abatement of fossil fuelled power generation, was also finalized. In addition, a compact disk containing the DECADES tools and the User's Manual for DECADES version 1.0 was prepared.

Attracting investment for electricity capacity in increasingly liberalized electricity and financial markets can be

quite different from the investment strategies pursued by State owned utilities under monopoly conditions. The Agency has a number of system and project planning tools that were adapted to these new trends. For example, the software for investment and financial analysis (FINPLAN) was revised with input from commercial bankers and other experts to permit assessment of energy sector investment options in competitive capital and electricity markets.

Expert group meetings were held on the calculation of greenhouse gas emissions from each of the fuel chains associated with electricity generation. These meetings resulted in several products: a set of estimates for such emissions from a given set of electricity generating options; a methodological approach for making such estimates; and a series of reports on the findings of the individual meetings. One major conclusion was that although the importance of site specific factors cannot be underestimated in greenhouse gas emission calculations, there is a strong and overriding correlation between technology efficiency gains and reductions in such emissions that holds true across the analytical spectrum.

A simplified software package for estimating and valuing the externalities (costs and benefits) associated with electricity generation is under development. This methodology can be used on personal computers with a minimum amount of data and was designed specifically for developing countries that cannot afford data intensive and costly studies. The initial part of this package (relating to the health impacts of fossil fuel based air pollution) was completed and tested at a regional workshop in Asia. This methodology will also be incorporated into the Agency's comparative assessment and energy/electricity planning tools.

Support for comparative assessment

Extending the lifetime of nuclear power plants has become an important issue for the utility industry as many plants approach the end of their licensed operating life. However, despite their age a number of plants are still in good condition and their continued safe and competitive operation is possible through modest investments in lifetime extension. In fact, for economic or sociopolitical reasons, extending plant life may often be the most viable option for the continued use of nuclear power, given the growing attention to mitigating greenhouse gas emissions. A major survey of life extension and decommissioning costs for ageing nuclear reactors in Member States was completed. The results, which were summarized in a technical document, provide a basis for further analysis of the costs of different nuclear power plant retirement options.