The "Electricity 2000 – 2003" concept: a summary

Electricity plays an essential role in every sphere of daily life, both at the workplace and in the home. The "Electricity" programme of the Swiss Federal Office of Energy (SFOE) supports efforts to achieve optimum efficiency in the use of electricity in specific fields -- from generation through to distribution and end use. The programme was launched in 1990 and has already completed two stages, 1990-1995 and 1996-1999, each with its own guiding concept. The Swiss "Electricity" programme, which covers both research and related pilot and demonstration (P+D) activities, is now about to enter its third stage (2000-2003) with an updated concept that sets clear objectives in ***four key areas:*** *energy efficiency in drives/motors, energy efficiency in information/communications technology including automated systems*, *high temperature supraconductivity in energy technology,* and *electricity distribution grids.*

The increasing concentration on short-term results and profit maximisation in industry makes it more and more difficult to obtain the necessary financing for research based on more long-term objectives and for P+D projects in the private sector. Moreover the trend to market liberalisation is creating an increasingly hostile atmosphere in which electricity trading increasingly relies on sophisticated and aggressive marketing methods, and both consumers and suppliers are losing interest in energy efficiency questions.

A look at the SFOE budget for 2000 and the allocation of funds for implementation of the concept provides the following breakdown over the next three years of the "Electricity" programme: SFr 0.85 million for research plus SFr0.2m for P+D projects. The latter does not include in-house federal P+D projects, or any additional funds that may be made available through a tax on non-renewables (*Förderabgabe*). These funds will be allocated in the priority areas briefly outlined below.

Switzerland has no reason to fear international comparison in the field of ***high temperature superconductivity (HTSC)*** research***,*** and indeed is a pioneer in areas such as materials science and the development of components including transformers and current limiters. In the past the government has joined with industry to support a number of high-cost component research projects *(transformers, power cables)*. In view of the fact that financial resources are increasingly scarce however, future activities will concentrate on comprehensive *information sharing in the HTSC field*. In this context we shall continue to support and make use of the available communication and information channels, such as the IEA Assessing Programme, the Swiss HTSC status seminar, etc. To help ensure the maximum applicability of HTSC technology in the energy field, financial support will also be provided for complementary *HTSC-relevant system studies and inspection,* in collaboration with the private sector and in particular with the electricity supply industry (ESI), in very specific areas. On the other hand it will no longer be possible to continue to subsidise *components research*, due to the limited resources available. About 15 per cent of the total budget is earmarked for HTSC activities. No funding is foreseen in the corresponding P+D area.

The increasing reliance on *decentralised electricity generation* (photovoltaic, biomass, fuel cells, etc.) is creating new problems for the operators of ***distribution grids***, since the flow of current is no longer unidirectional, i.e. from a supraregional to a regional distribution company and on to the end-user. The problems addressed in this activity area include the following: the interface between a large number of decentralised supply sources and the distribution grid, island building, preparation of the system services, grid stability, protective gear and control systems. *Liberalisation of the electricity market* will also affect the operation of the distribution grid and is certain to have an impact on its availability, due to the pressure on prices that will

result. It is necessary therefore to conduct research into the practical effects and technical measures that may be needed to ensure grid quality and the security of supplies. In budget terms research in the field of distribution grids will account for 15 per cent of the total, with no corresponding investments planned in the area of P+D projects.

The potential savings from making more ***efficient use of energy*** is as great as ever, and this objective is indeed at the heart of the concept in terms of both the number of projects and the funding made available. After assessing the potential and the general extent of research efforts in relevant areas, it was decided to focus on two main areas: ***electric drives/motors*** and ***information/communication technology and automated systems***.

It had already been decided in the context of the 1996–1999 concept not to concentrate our main energy-related activities in the area of ***electric drives/motors*** on motor optimisation, but rather to broaden the approach so as to take the whole propulsion system into consideration. Studies have indicated that this approach would make it possible to reduce the power consumption of electric drives by about 20 per cent. The emphasis is therefore on *optimisation of the drive systems (compressed air systems, pumps, lift, etc.)* and support activities in so-called "*cross-section" technologies (promotion of frequency converters/integral drives, layout and dimensioning tools, establishment of a neutral test centre, etc.)*. The budget allocates about 40 per cent of the total research funding to this area, while 50 per cent of the available P+D funds will also be spent on related activities.

In the area of ***information/communication technology and automated systems*** extra efforts are needed to speed up progress in the reduction/avoidance of standby losses as well as the reduction of energy consumption in the "on" mode, either with the help of new technology, or through regulatory or other measures. In this context various complementary paths are being explored in close co-operation with various international bodies. As well as the gathering, processing and dissemination of all relevant information in this fast-moving field in a continuous and institutionalised manner, the work necessary for the appropriate labelling/target values is also being carried out. And finally efforts are being made to find new solutions and procedural methods in the energy efficiency field. Some 20 per cent of the research budget and 40 per cent of the P+D budget are earmarked for the activities in these areas.

Apart from the two energy efficiency priorities mentioned above, subsidies are also provided on a case-by-case basis, particularly for heat-related work in the area of household appliances. Here the budget allocates 10 per cent of the available funds for research, and the same ratio for P+D projects.

Great importance is given to the application of the knowledge that comes to light in all the areas mentioned above. Indeed roughly 10 per cent of project funds are reserved for the purpose of implementing the new know-how. As for the "trend-watching/companion groups" created in recent years for each priority area, these have certainly proven their worth. And they are an excellent channel for the exchange of experiences, knowledge transfer and the establishment of contacts between industry, academics and researchers.