

Research Programme "Electricity"



Concept 1996 - 1999
Research Programme „Electricity“
of the
Swiss Federal Office of Energy
(Summary)

by

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On behalf of the

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The "Electricity" research programme deals with the optimised utilisation of electrical energy from its production and distribution through to its efficient application. As before, the fundamental objectives of the programme encompass an increase in production, the optimisation / improvement of the degree of efficiency in the field of storage and transmission and a more efficient utilisation in the various fields of application.

Throughout Switzerland, the industry is investing around 600 to 700 million Swiss francs in research and development in the field of electricity each year. The greater portion of the government's contribution of around 18 million Swiss francs consists of funds from the Federal Institute of Technology Council, and is mainly used for fundamental research tasks. The budgeted sum of approximately 1.25 million Swiss francs by the Federal Office of Energy represents a modest contribution, especially when compared to the contribution made by the industry. Nonetheless, a considerable control effect is achieved by means of carefully directed financial support in the form of subsidies. In addition, the Federal Office of Energy's budgeted funds for application-related research tasks have a complementary effect to the contributions of the Federal Institute of Technology Council.

Since the field concerned is very extensive, clear **priorities** also need to be set for the 1996 - 1999 research period in the sense of a concentration of efforts.

The principal goals of the research efforts carried out in the "**transmission and distribution**" sub-sector are to bring about a high degree of network availability coupled with maximum network quality, and to *minimise transmission losses*. Since practically the entire quantity of electricity consumption is transmitted via the distribution network to the end user, a reduction of losses results in significant savings even in the per mille range. It is therefore hardly surprising that the private economy has been active in this field for a considerable time already. Now and then the relevant Federal Institutes of Technology (Zurich and Lausanne) are also called upon here. Within the scope of the 1996 - 1999 research programme, efforts in this connection are to be continued, though these are not to be further intensified. On the basis of a national and international research and development study, and with the assistance of the Swiss electricity industry, the strategic goal is being pursued of preparing and accompanying energy-relevant projects in the field of administration of the distribution networks with reasonable expenditure. Funds equivalent to around 20% of the Federal Office of Energy budget are to be applied for this purpose.

There is still a considerable savings potential to be exploited through **efficient energy use**. Since electricity plays a dominant role in an extremely broad range of areas, the field of research in this connection is correspondingly multivarious. The **following priorities** have been set, with funds of up to 50% of the Federal Office of Energy



budget, in a differentiated manner and in harmony with the various other research efforts:

- Promotion and support of national *Demand Side Management* projects, and active participation in the international IEA programme in the same field.
- Promotion of research and development of an *integral motor in the mid-capacity range*. In addition, support of basic development of a non-manufacturer-related *design tool for electrical drives*. Finally, concrete optimisation projects in the field of electrical drive systems are to be co-financed.
- Following the successful launching of the programme aimed at minimising losses in electronic office and entertainment equipment, attention is to be focused on the subject of *energy optimisation in the field of networks and in data processing centres*.

Following the completion of the initial NFP 30 national research programme at the end of 1995, efforts are now to be made to ensure the continuation of energy-relevant research tasks in the field of **high-temperature superconductors**. The focus of attention here is the study of high-temperature applications such as the *superconductor transformer* or the *energy cable*, as well as the *manufacture of wires and tapes*. The contribution to costs here is expected to be somewhere in the region of 20% of the Federal Office of Energy budget.

In addition to the priorities mentioned above, specific support is also foreseen in the remaining sub-sectors from case to case.

The “**production**” **sub-sector** is to support the *use of renewable hydropower*. This has already been perceived as a priority in the “Small-scale Hydropower Plants” DIANE programme in the past few years. But projects with a research character, especially in the field of small-scale hydropower plants, also certainly require support to a limited extent in the future as a complement to the now concluded DIANE programme. In all, around 5-10% of the budget is to be reserved for the “production” sub-sector.

In the current research concept, the main focus in the field of **electricity storage** is to be on *mechanical and electromagnetic storage technology*. This primarily encompasses flywheel, compressed air and water storage technology, plus superconductor magnetic storage. Promising results achieved at universities and in the industry are leading to an increased focus on flywheel technology. Various applications (network stabilisers, USV systems, etc.) are indicating notable potential as high-capacity storage systems. A concluded project regarding the potential application of a *superconductor magnetic storage* system has demonstrated that neither the viability nor the demand have been



established in Switzerland, either at present or in the near future. Consequently, this technology is not to be given support for the time being.

A great deal of importance is being attached to the *implementation of new research findings*. On the one hand, already available results that have not yet been effectively implemented need to be dealt with, whilst on the other hand steps have to be taken to implement new findings. During the 1990 - 1995 planning period, the establishment of an office at the Federal Institute of Technology in Zurich, specialising in “stand-by questions”, and which was entrusted with the task of implementing the corresponding research results, can be cited as an exemplary move. Approximately 10% of the project funds has been reserved for implementation purposes.