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SWITZERLAND'S ELECTRICITY SUPPLY

Although deprived of raw materials, Switzerland nevertheless possesses two natural sources of wealth. One — her Alpine scenery — has made possible the development of tourism in the country. The other — her waterways — makes Switzerland one of the countries the most richly endowed with hydraulic resources for her size. The mountainous nature of the country makes it ideally suited to the building of hydro-electric dams, which are found in great numbers throughout the Alps. Some of them are even located at altitudes of over 6,500 feet, but some are also situated on the Plateau.

From electricity for a hotel . . .

The "white coal or water power rush" started in 1875 at St. Moritz, one of the best known tourist resorts in the world, with the building of the first electrical power station in Switzerland developing a total of 10 HP. It was built, *noblesse oblige,* for the lighting of a hotel, Since those pioneering days, the total output of electricity in Switzerland has increased by leaps and bounds, production for the hydrological year 1968/69 totalling some 32 billion kWh. 95% of this power is supplied by hydro-electric power stations and 5% by conventional heavy oil power stations. Switzerland's electricity production enables her to cover about a quarter of the country's power requirements (as opposed to 75% in 1950): the rest is provided by the 9·2 million tons of petroleum products imported each year. This is an important fact, since it raises the problem of Switzerland's dependence on outside sources of supply.

. . . to electricity for the whole of Switzerland

Most of Switzerland's waterways rise in the Alps; they are therefore glacial in origin, which means that they are characterized by two very distinct periods: an abundant summer flow, caused by the melting of the snow and the glaciers, followed by a long period of low flow in winter, precipitations being mainly in the form of snow. Now, unfortunately, the country's electricity consumption is naturally much higher in winter than in summer. In order to remedy the situation, many reservoirs have had to be built so as to be able to make use in winter of part of the surplus supply of water available in summer. In 1968. the total capacity of reservoirs of this kind was 3,237 billion cu.m. This comparative water shortage obliges Switzerland to import electricity in order to meet certain peak demands. However, Switzerland's exports of electricity exceed her imports by several billion kWh (4 billion kWh today, an expected 7 billion in 1972, and 3,5 billion in 1976.) The country's electricity requirements are thus covered until 1975/76, by existing production plants or plants in the course of construction. After that, it will become necessary gradually to put new power stations — probably nuclear — into service. At present, three atomic power stations, with a total output of 1 million kW, are in the process of construction.

The era of nuclear power stations has begun

By 1972/1973 Switzerland's total electricity production is expected to amount to 39 billion kWh. However, the share contributed by hydraulic power stations will have fallen to 79%; i.e. 16 % less than today, in spite of an increase in output of 2·2 billion kWh. That of conventional steam plants will have dropped to 4%, representing a decrease of 1%. The remaining 17% will be supplied by the nuclear power stations Beznau I and Beznau II, in the canton of Aargau, and Mühleberg, in the canton of Berne. By 1972, these three power stations will have a total installed capacity of about 1 million kW; they will generate 6·5 billion kWh per year, working 6,500 hours. With an installed power capacity representing 10·6 kW per 100 inhabitants, Switzerland will then be the third biggest nuclear power producer in the world. Only Great Britain (14·6 kW per 100 inhabitants) and the United States (12·4 kW) will come before her.

The end of an epic

But after 1972? The question remains unanswered; one thing is certain however and that is that Switzerland is witnessing the end of a veritable Alpine epic. One only has to think for example of the building of a dam like the Grande-Dixence, in the Valaisan Alps: some 930 feet high (making it the highest in the world), it holds back some 400 million cu.m. of water, ensuring a mean annual production in the neighbourhood of 1·6 billion kWh.

In spite of this uncertainty regarding the future, there are a number of plans for nuclear power stations: the one at Verbois, not far from the town of Geneva, should be operational by 1975/76. The construction of a nuclear power station is also under consideration at Corcelettes near Yverdon (canton of Vaud) and another at Kaiseraugst (canton of Aargau), on the banks of the Rhine; but no firm decision has yet been reached. However, the financial aspect is likely to bear considerable weight. In fact, it has been estimated that the cost of building a nuclear power station is about 330 million Swiss francs, compared with approximately 480 million for a power station at water level and 720 million for a power station supplied by a dam. Only heavy oil thermal power stations are financially competitive (225 million) but probably — for reasons of supply and national independence — have very little future in Switzerland.

From waterways to the machinery industry

Up till now, electricity production has been almost exclusively hydraulic in origin. This state of affairs has given makers of electrical machinery, in particular those specializing in hydro-alternators, great scope for development. As a result of the experience gained in electricity production and distribution, the Swiss machinery and apparatus industry at present exports complete plants all over the world: generators, transformers and hydraulic turbines, as well as steam and gas turbines. Several firms have specialized most successfully in the construction of turbo-machines for power stations.

Having had to cope for several decades with the problems facing the electrical economy, the Swiss machinery industry has now turned with success to the use of electronics and nuclear power for peaceful purposes. *(OSEC)*

TECHNICAL ITEMS

Surface 69—Rendezvous for surface treatment experts

Surface 69, the international exhibition to be held in Basle from November 19th to 25th this year, will be a centre of attraction for this specialized field. Five halls covering a total area of 130,000 square feet will house over 130 exhibitors displaying the products and processes of some 200 manufacturers. The special display "Galvanorama", a production line on which a number of parts will be given various treatments in accordance with the actual processes used in practice, will certainly capture the attention of visitors. The presentation of new methods and the most modern plant equipped with means for recuperating and eliminating poisonous substances will provide experts with invaluable information and suggestions.

An original invention, the outer "shell" for ski boots

The ski-boot of the future is already here! Everyone interested in skiing is well aware that racers generally get through one or several pairs of boots in a season. As a matter of fact, the great strain they undergo leads to deterioration of the boots, which lose their rigidity and no longer give the foot the support it needs. The chemist and engineers of a well-known Swiss firm at Kreuzlingen (canton of Thurgau) turned boot-makers and came up with an original solution to the problem. Although simple in appearance, the principle of the new FIBER-JET boot is quite revolutionary. It consists in fact of an outer fibreglass shell which fits exactly, in two or three movements, over the inner boot which is as soft as