

the lower end of the scale

Prospects for the development of small and medium power reactors were reviewed at a symposium attended by more than 150 participants from 35 countries and five international organizations, held in Oslo in mid-October.

Discussion centred on the current technical and economic status of reactors having an output of more than about 500 MWe, which might find application in the comparatively small electricity supply grids which are generally associated with areas where industrialization is not very far advanced.

At the opening of the symposium Mr. Compton Rennie, Director of the IAEA Division of Nuclear Power and Reactors, drew attention to the fact that this was the first international symposium which the Agency had organized in Norway; as such it had a special significance. "We are all well aware of the pioneering role which Norway has played in fostering international collaboration in the peaceful uses of atomic energy since the early 1950s," he said, "and the important contributions which the scientists from many countries working together at the Kjeller Institut have made. The Agency, since its inception, has received a great measure of cooperation from Norway in a number of activities."

Mr. Rennie repeated what is well-known: that nuclear power has already become competitive in several countries, and was expected to make increasing contributions to the generation of electric power. There were now 92 nuclear power reactors with a total output of 17 000 MWe in operation, in 14 Member States of the Agency. By the end of 1975 it was expected that there would be in operation more than 250 power reactors, producing 115 000 MWe. The current forecast for 1980 indicated that installed nuclear capacity in the world would then exceed 320 000 MWe, and account for about 16 per cent of the total electrical capacity of the world. If present trends continued, within three decades more than a half of all electricity generated would have nuclear origin.

"While nuclear power is progressing rapidly in advanced countries," Mr. Rennie continued, "its rate of introduction in the less industrialized or developing countries is rather slow. According to the estimates prepared by the Agency, developing countries — which account for more than two-thirds of the world population — will have not more than a tenth of the world nuclear capacity at the end of this decade. This implies that the early expectations of harnessing cheap nuclear power for accelerating the industrial development of the developing countries in the world may not become a reality as quickly as was foreseen."

A noteworthy feature in the recent development of nuclear power, he said, was the sharp rise in the so-called economic size. In the last two years the average size of unit ordered had reached 800 MWe, and the trend was still upward.

"There are a large number of less industrialized or developing countries and, I may add, regions in certain advanced countries, where the conventional fuel costs are high but the electric power grids are still small and cannot assimilate such large units," Mr. Rennie noted. "Unless we can find a way to develop more economic, smaller units, these countries may have to wait for a considerable time before their grids can accept the currently-offered standard sized large nuclear reactors."

The Agency, he said, was keenly interested in promoting the widespread application of nuclear power among its Member States, and as a part of its activity it had been reviewing the status of small and medium power reactors which could find application in smaller grids. It had made a number of studies, and had organized meetings including a panel discussion of the subject in 1968. It had also initiated a coordinated programme of research on technical and cost assessment factors relating to intermediate-sized nuclear power reactors, in which several advanced countries were taking part.

"It is our impression that a sizeable potential market exists for intermediate-sized power reactors in the high fuel cost areas of the world, which could be exploited if the manufacturers were able to develop and offer suitable standard plants at more attractive capital costs," he said. "This is indeed a challenging task, but given the extensive experience which has already been gained in building a large number of nuclear power stations and the state of advancement of nuclear technology, it does not seem to be beyond our reach."

A general view, expressed not only at the Oslo symposium but at other meetings arranged by the Agency to consider the economic integration of nuclear power stations in electric power systems and the like, is that before any country or electricity authority decides to embark on

nuclear power production. it should make a thorough, specific analysis of its own, actual needs, both immediately and in relation to the likely growth in demand for electricity in years to come. As a US participant in the symposium put it, "the process of evaluating the relative merits of nuclear power compared to fossil-fuelled units, deciding on the type of nuclear unit desired, soliciting and evaluating bids, developing an understanding of the special requirements for a nuclear station (licensing, the need for special legislation, etc.) will probably be the most ambitious undertaking ever made by a power company purchasing its first nuclear unit. The benefits derived will be worth it. When a power company has made the decision to 'go nuclear,' it has decided in favour of the energy source which is modern, clean, reliable and easy to operate."

But as delegates to the Fourteenth Session of the General Conference of the IAEA pointed out, the benefits cannot be derived if available nuclear power station designs are too large for a country's specific needs. The continuing work done by the Agency in relation to small and medium sized reactors, and this symposium in particular, could thus help to meet an immediate need for power at the lower end of the scale.

The programme of the symposium, which lasted for five days, included 35 papers presented at eight working sessions. The topics included the status of light-water, heavy-water and gas-cooled reactors, improved designs and analytical concepts, multi-purpose systems and special applications, cost experience and projections, fuel cycle evaluations, and discussion on the broad subject area, the outlook for nuclear power in developing countries. Participants had the opportunity during two free afternoons to visit the Kjeller Institut and the Halden experimental power reactor — a boiling heavy-water cooled and moderated tank-type reactor which first went critical in June, 1959.

Papers were presented by participants from Austria, Belgium, Brazil, Canada, Chile, the Federal Republic of Germany, India, Italy, Japan, Korea, Mexico, Norway, Pakistan, Spain, Sweden, Switzerland, Turkey, the USSR, the United Kingdom and the United States. The proceedings of the symposium will be published in 1971.