What's New in the Atomic Power Industry

Behind the Decisions of the 25th CPSU Congress: LIGHT FROM THE ATOM. (By Special Correspondent V. Shilov. Pravda, Aug. 4, p. 2. 1,400 words. Condensed text:) "To provide for the priority development of atomic power engineering in the European part of the USSR.***

"To accelerate the development of atomic machine building***" — (From the Basic Guidelines for the Development of the USSR National Economy in 1976-1980).*

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Volgodonsk and Moscow. 1. Remember This Date. — ... The era of atomic power engineering had its start on June 27, 1954, in the city of Obninsk, not far from Moscow. It is not yet a quarter-century since that time, but already more than 130 atomic power stations are in operation in the world. The unit capacity of reactors has grown from 5,000 to 1 million kw. Their total potential is approximately 83 million kw. Ordinary power stations took almost 100 years to reach that level.

The Soviet Union, although it possesses adequate natural resources of petroleum and coal, is developing atomic power engineering at priority rates. Whereas the production of electric power as a whole increased by 40% during the Ninth Five-Year Plan, the growth figure for atomic power stations was 600%. In the 10th Five-Year Plan, the flow of atomic light will grow by another 400%.

Today about 80% of all electric power is consumed in the European part of the country. Fuel resources there are only one-fourth of all-Union reserves. We have to go farther and farther to the east and the north for petroleum, gas and coal. ... Over 350 million tons of fuel a year is hauled from eastern to western regions. This costs a great deal, of course. Transport outlays alone run into several billion rubles. Moreover, the energy requirements of our European industry are continuing to grow rapidly. A whole complex of national-economic problems is arising. What is the sword that will cut this unique "Gordian knot"? Atomic power engineering!

Let's make some calculations. An atomic power station with a capacity of 1 million kw. consumes 30 tons of slightly enriched uranium a year. About 2.5 million tons of coal is needed to operate a thermal station of this size. By putting into full operation the reactors commissioned during the current five-year plan, we will save approximately 45 million tons of fuel a year by 1980. The economic effect will be billions of rubles and hundreds of thousands of railroad cars freed for other use. The atom will, as it were, emancipate power engineering from the weaknesses of transport. Reactor units can be sited without regard to roads and resources, wherever it is most advisable for the national economy. A convincing example is the Bilibino Atomic Power Station on Chukotka. A remote, cold region with no natural fuel is now reliably supplied with electricity and heat.

Let us turn our attention to another extremely important aspect of the matter. In the structure of the country's fuel balance today, petroleum products make up more than 60%. ...

Twenty-three years have gone by since the atom donned its working clothes. It gives electricity to the sea, moves icebreakers, freshens water, and is learning how to perform many other useful jobs. But people have not forgotten its first, sinister profession — they keep its latent aggressiveness under intermitting control and are constantly improving protective systems to insure themselves against any surprises. And it must be said that, with rigid observance of the established rules of operation, this is working out rather well. For example, at the Novovoronezh nuclear station's power-generating unit No. 5, now under construction, the safety system takes into account even instances the probability of which ranges from once every 10,000 to once every million years.

Modern atomic power stations also have substantial advantages from the ecological standpoint. A thermal station with a potential of 1 million kw. discharges hundreds of tons of combustion products into the atmosphere every day and builds up mountains of slag. In order to create normal sanitary-hygienic conditions, tall smokestacks must be erected. At the same time, many years of testing have shown that discharges from atomic power-generating units are only 1% of the permissible normatives and have no effect whatever on the environment. ...

The program for the 10th Five-Year Plan envisages the commissioning of 13 to 15 million kw. of atomic power-generating capacity. What has been done in the last one and a half years?

The Kursk Atomic Power Station — the power-engineering heart of the [Kursk] Magnetic Anomaly — has generated over 1 billion kwh. since it was started up several months ago. Installation work on another reactor is in full swing there, and the construction of a second section began recently. The Chernobyl Atomic Power Station will produce current by the 60th anniversary of October. A significant increase in potential is expected next year. In particular, it is proposed to turn over a 1 million-kw. power-generating unit at the Novovoronezh Atomic Power Station. The development of the Leningrad, Rovno, Smolensk, South Ukraine and other stations is continuing.

Obtaining electricity is only the first, and the easiest, step in nuclear power engineering. What comes next? ... First of all, it is intended to use reactor capacity to supply heat to cities and industrial enterprises. At present, 25% to 30% of all fuel resources is used for this purpose — as much as is used to generate electric power. It is not difficult to imagine the economic and ecological importance of replacing boiler houses operating on coal and fuel oil with atomic power.

The introduction of nuclear power into metallurgy and the chemical industry can provide enormous advantages to the national economy. The road is being opened to qualitatively new and highly efficient technological processes. There are still a good many complicated scientific and technical problems here. The main problem is that we must create reliable reactors with coolants whose temperature level will be over 1,000 degrees [Celsius]. The realization of this task still lies ahead of us. ...

The possibilities of first-generation reactors are still far from exhausted, and science is helping practice to move forward. The second stage is aggregates of a fundamentally new type, using fast-neutron chain reactions. These units have enormous advantages over earlier types. The degree of utilization of nuclear fuel is dozens of times greater. Resources that do not now have industrial significance will become accessible — for example, uranium dissolved in sea water. Fast-breeder reactors combine two opposite processes: They burn fuel and simultaneously form new stocks of it.

A power-generating unit of this type is in stable operation in the Soviet Union — in the city of Shevchenko, on the shore of the Caspian Sea. Besides electricity, it produces heat, and it also freshens water. A larger aggregate is under construction at the Beloyarsky Atomic Power Station. The carrying out of basic preparatory work toward start-up on the production of a 1.6 million-kw. fast-breeder reactor is scheduled for the next few years. Thus, atomic power engineering is finding its second wind, as it were.

For 23 years atomic power engineering has been accumulating a vast scientific potential. Scientists and designers can offer detailed recommendations on many long-range questions. Are practitioners ready to implement proposed design developments on a wide scale?

"We're not sufficiently ready, unfortunately," A. Grigoryants, member of the collegium of the USSR Ministry of Power and Electrification and Director of Glavatomenergo [Chief Administration for the Use of Atomic Power] thinks. "... The branch is doubling the scale of work, but it is experiencing difficulties with equipment for atomic power stations. We have even had to make several postponements in

CDSP, Vol. XXVIII, No. 16, pp. 14, 16.

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the schedules for commissioning new power-generating units at certain stations. Let me remind you that in the near future it will be necessary to deliver for installation reactor equipment with a total capacity of at least 10 million kw. a year — more than was commissioned during the entire Ninth Five-Year Plan. So, an increase in the capacities of atomic power engineering is directly dependent on the power machinery industry."

V. Krotov, USSR Minister of Power Machinery, says:

"... During the 10th Five-Year Plan, capital investments are to increase by over 200%. This is already starting to bring tangible results. Especially great hopes are pinned on the Atomic Power Machinery [Atommash] Complex in Volgodonsk. It will be the flagship of the branch."

How is the construction of facilities for the flagship coming along? Has everything been done to put it into operation as quickly as possible? The concluding article will discuss this topic.

Behind the Decisions of the 25th CPSU Congress: LIGHT FROM THE ATOM. (By Special Correspondent V. Shilov. Pravda, Aug. 6, p. 2. 1,400 words. Excerpts:) Volgodonsk and Moscow. 2. Who Should Be the Conductor? — ... The 60th year of October will be marked by the commissioning of the first shops of a new industrial giant — the Atomic Power Machinery Complex [Atommash]. A technical project daring in its scale is being carried out on the banks of the man-made Tsimlyansk Sea: the creation of a conveyor for the series production of large-capacity atomic power stations. ...

By the beginning of the second year of the five-year plan, the construction of Atommash had entered a decisive phase. Utility lines had been laid, and a heat-and-power station and a machine-shop section were in operation. Now plans were made for turning over the main building's capacities to the operational workers.

"Here, on an area equal to 15 soccer fields, we will place hundreds of modern machine tools," M. Tarelkin, director of the giant under construction, said enthusiastically [in a conversation last spring]. "These are highly complex, up-to-date aggregates: presses that develop a force of up to 15,000 tons; tilters and manipulators that will easily lift assemplies weighing 1,000 tons; bending 'rollers' capable of casting sheet metal with a thickness of 25 cm." ...

Recently I had occasion to revisit Atommash's main building. ... The preparation of reinforced-concrete slabs to be placed under the machine tools was in full swing. A poster at the entrance to the building said: "140 Days Left Till Start-Up." However, the optimism of this visual agitation does not jibe with the actual state of affairs. After all, the installation and adjustment of the equipment takes a year.

In the opinion of Yu. Chechin, manager of the general contractor, Volgodonskenergostroi [Volgodonsk Trust for the Construction of Power Engineering Facilities], the primary blame rests with the client, which was behindhand in issuing working drawings and equipment. The plant's director, M. Tarelkin, points to the design institutes and suppliers. Each of the partners is right, in his own way. Here is what happened.

The construction-and-installation workers already had the finish line in their sights. The operational workers, preparing to pick up the relay baton, began to tick off the remaining prestart days. But then it was discovered that many of the technical processes were based on outmoded practices and did not take into account recent achievements in reactor construction. ... It was necessary to take immediate steps to correct these mistakes.

The design changes involved a ramified network of economic ties. The USSR State Planning Committee was instructed — with the assistance of the interested departments — to draw up a directive document that would encompass the whole complex of questions and define precisely who should do the various jobs and on what time schedules. The drafting of this document went on for many months. This gave rise to poor coordination in the activity of the main construction partners: the Ministry of Power Machinery, the USSR Ministry of Power and Electrification and the USSR Ministry of Installation and Specialized Construction Work. One would think that now, when the atomic machinery industry is developing so rapidly, it would be advisable for the USSR State Planning Committee and the USSR State Construction Committee to have an apparatus able to efficiently and competently program tasks for the new branch, dovetailing them with nationwide plans.

It was not so long ago that the power machinery industry was set up as an independent department. The new ministry correctly determined the main element in its work, initiated a speed-up in the construction of Atommash, and invested the lion's share of its funds and material and technical resources in the complex. However, the power machinery builders are experiencing serious difficulties.

Can a rapidly growing branch get along without a solid design base? Experience in economic management says No. Nevertheless, the State Committee for Science and Technology has long shied away from considering this question. Corrections in the design for the Volgodonsk plant had to be farmed out to several institutes of related ministries on a contract basis. But they have enough troubles of their own. Therefore, the documentation issued to Atommash was sometimes disorganized and incomplete. Orders for materials and equipment were placed belatedly. The technological continuity of the construction-and-installation conveyor was disrupted. ...

More than 30 specialized subdivisions are concentrated at Atommash. Almost all of them overfulfilled their six-month plans, if one assesses their work in terms of rubles spent, but taken together they failed to meet their target assignments for facilities scheduled for early start-up. What was the trouble?

In this construction orchestra, the conductor's place has always been empty. Theoretically, this job should be assigned to the general contractor. But more than half of the total volume of work done by Volgodonskenergostroi falls under its "own" program. It has to perform coordinating functions while simultaneously carrying out other tasks. ...

More and more often, leadership of the largest construction projects is being entrusted to agents equal in rank to a deputy minister. The experience of the Volga and Kama Automotive Plants, the Baikal-Amur Main Line and a number of other national-economic complexes confirms that this form raises the level of management and increases its efficiency. But it would seem that an exception to the rules should not be turned into the norm, especially because major construction projects are getting bigger and bigger. Therefore, we need a permanent centralized system — we need a conductor capable of directing an "orchestra" like the construction of Atommash. ...

It was known several years ago that the creation of Atommash would increase the population of Volgodonsk by 400% to 500%. In essence, a completely new city was to be built. However, when the designs and estimates were confirmed, a large-panel housing construction combine was struck from the list of top-priority projects. Now this "saving" has proved very costly. The failure to put housing and cultural and service buildings into operation on time is jeopardizing the start-up schedule for the entire industrial complex. ...