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## They want atomic energy to dominate electricity output by the year 2000

The mind boggles at the thought: There, where the rivers Volga and Don pinch together like the neck of an hourglass, Soviet workers strung along a serpentine assembly line nearly 6 mi. long crank out nuclear reactors like so many Model T Fords. Huge cranes plop the factory-assembled units onto barges. Tugs then pull them up the Volga system to sites all over the European Soviet Union, or down the Don and through the Azov, Black, and Mediterranean Seas on their way to the world's markets.

However improbable it may seem, a plan to build just such an assembly plant—the Soviets have dubbed it "Atomash," which is a synthesis of the Russian words for "atomic machines"—has been certified by the Kremlin. And Atomash is just the beginning. For while atomic power seems to be faltering somewhat in the U.S., the Russians have made a command decision to go nuclear.

Right now Russia has only about 6,000 megawatts of nuclear capacity, almost all of it west of the Ural Mountains, where most of the population lives and works and where conventional fuel supplies are running perilously low. By 1980 the Kremlin hopes to have an additional 15,000 Mw. on line, representing some 20% of all new power plant construction during the next five years. Then, in the 1980s, 1,000-Mw. reactors will start rolling out of the mammoth Atomash plant at a rate of three to four a year. Eventually the plant is even supposed to make fast breeders, the alchemic reactors that create nuclear fuel even as they consume it. If all goes according to plan, mass-produced nuclear power will dominate electricity production in the Soviet Union by the end of the century. **Top priority.** In the past such grandiose Soviet schemes have often gone awry. The giant Kama River truck factory, for example, which is akin to the Atomash plant in both scope and design, is now two years behind in construction. And, in fact, Atomash has already run into some snags. Recently, authorities complained that the builders were being held up by the designers, who have been late in delivering blueprints. But nobody doubts that Atomash will be built, and it will probably be fin-

ished closer to deadline than other such projects because the Kremlin has placed top priority on it. "The 25th Party Congress said we would get first production from Atomash in 1978 and would start building the second stage before 1980," says Mikhail F. Taryelkin, the 47-year-old director-designate of the Atomash plant. "And when they say it in the Congress," he adds, "you'd better do it."

When completed, the complex of three factories and one high-rise office building will cover 1,600 acres. The main assembly plant, ½ mi. long, more than ¼ mi. wide, and 150 ft. high, will house 62 bridge cranes that can lift 12,000 tons each. To handle its output, a special port and dock will be built at Volgodonsk. And a new town is already being laid out to accommodate the Atomash complex, its 16,000 workers, and their families.

The current standard nuclear reactor in the Soviet Union is a 440-Mw. pressurized water reactor, made at the Izhorisk plant just south of Leningrad. When Atomash starts up late in the decade, it will produce 1,000-Mw. units,

### Assembly-line production of 1,000-Mw. reactors is part of the Kremlin's plan

or *millioniki*, as the Russians refer to them. Eventually, claims Taryelkin, the plant may be set up to produce even bigger units, because previous constraints on very large reactors—chiefly the inability of the railroads to ship them—will no longer exist.

The impact that all these nuclear power plants will have on the Soviet energy system will be substantial. With Atomash, the Soviets will not have to transport nearly so much oil and gas from their remote Siberian deposits, which they would rather preserve for chemical feedstocks. Atomash may also enable the Russians to confine coal-burning power stations to locations east of the Urals, where most of their coal lies. The plant will also free more fossil fuels for export.

**Exporting reactors.** The foreign implications of the push for nuclear energy are less apparent, however. Officially, the Soviet Union is opposed to proliferation and was one of the nuclear-powered countries that recently met in London to discuss ways of checking the spread of nuclear technology. But that does not mean that the Soviets, like their Western counterparts, will refuse to sell reactors, or the enriched ura-

nium to fuel them, to other countries. Indeed, in a recent magazine article, Deputy Foreign Trade Minister Vladimir S. Alkhimov singled out the export of uranium enrichment services as "a new big feature" guaranteeing "high hard-currency value return." The Russians have already commissioned Soviet-made reactors in East Germany, Rumania, and Bulgaria and have sold units to other satellite countries as well. Moreover, Finland bought Soviet reactors for its Loviisa station, that nation's first nuclear power plant. Now, from all signs, the Russians seem to be ready to move into the Third World.

Does this make the Soviets potentially serious competitors of General Electric Co., Westinghouse Electric Corp., and other Western reactor makers? "Let's wait and see how long it takes them to develop a market," says an American power equipment salesman in Moscow. Though he is confident that Western manufacturers can retain their dominant position for a long time, he does not discount the inroads that the Russians might eventually make, "especially with Eastern bloc nations cooperating on manufacture," he says.

**Talks.** On the other hand, the Soviet nuclear push is a potentially big market for Western nuclear components, or at least for the equipment to make the components. Westinghouse has been talking with the Soviets for the past two years. So has its partially-owned French affiliate, Framatome. Though neither has accomplished anything concrete, their lack of success has hardly deterred others in the nuclear business. Early this month, at the invitation of the Ministry of Power Machine Building, officials of Babcock & Wilcox Co. toured Soviet facilities and talked with officials about participating in Russian nuclear power stations. They were followed by a delegation from Allis Chalmers Corp. "These were talks, not negotiations," says a spokesman for the ministry, "but this is a good way to get to know each other and to see if we can do business." Last winter a similar group from Combustion Engineering Inc. toured the Soviet Union as well. And a Japanese consortium of seven companies led by Mitsubishi Heavy Industries has held preliminary talks about building reactor components in Japan to Soviet specifications. The Soviets are even hinting that they might want to cooperate with Western suppliers in the Third World market, perhaps supplying Russian reactors out-

fitted with Western controls.

For any such deal to be consummated, however, the companies would have to win approval from their governments, which would be concerned about tipping a strategic balance in favor of the Soviets. Thus the first sales won from the Soviets in their big push to go nuclear are likely to be one step removed: for the equipment needed to perform the technologically demanding tasks that Soviet engineers will require of their frequently less exacting manufacturing colleagues. Taryelkin says Soviet officials are already weighing the superiority, cost, and delivery times of such foreign equipment as

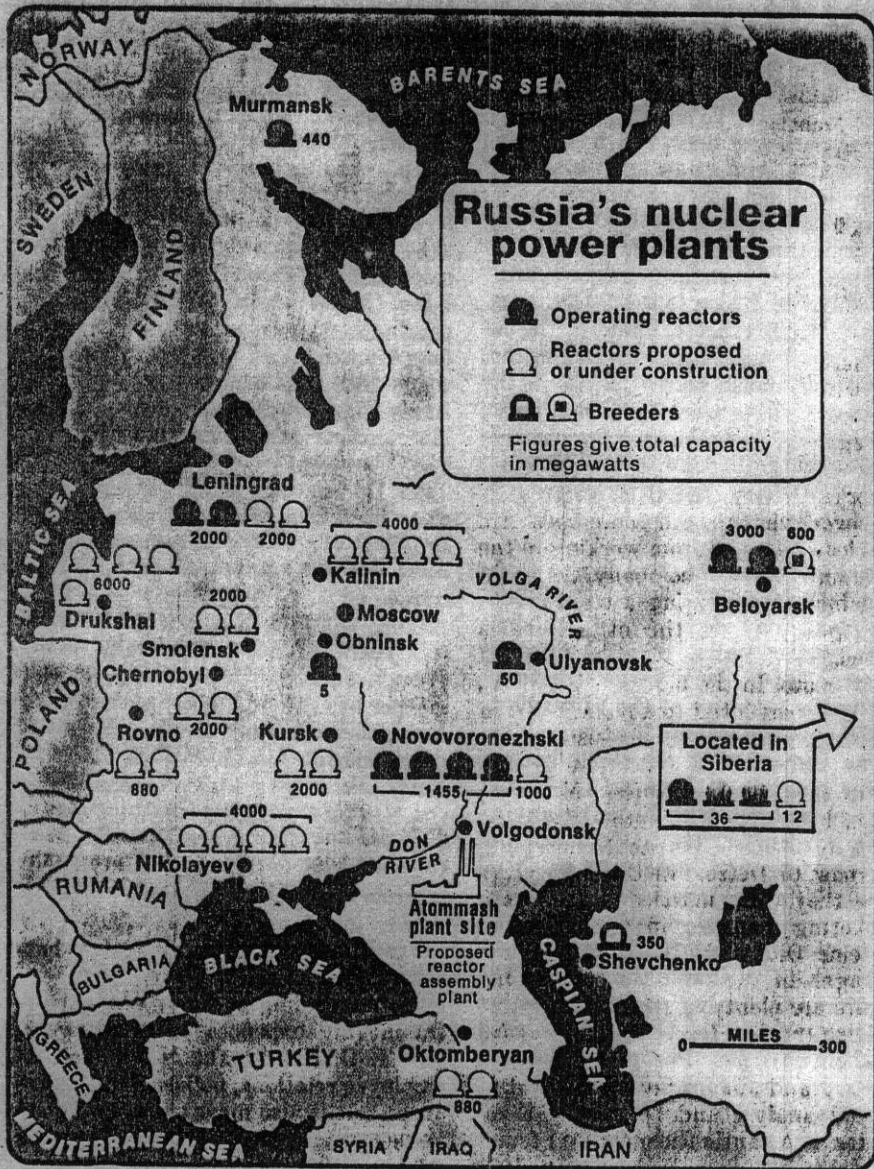
country to start up a nuclear power station (at Obninsk, in 1954), the first to permanently hook a fast breeder into an electrical grid (at Shevchenko, in 1973), and the first to maintain a controlled thermonuclear reaction for as long as 1/10th of a second (with the Tokomak-10 device in Moscow, which achieved the feat in March). And, as with Atomash, the Russian achievements seem to stem more from determination than from superior expertise. Says one American scientist who was involved in a Soviet-U.S. exchange program: "The Soviets rush to hardware, building a little one right away and, if it works, building a bigger one;

iting factors, the Russians started up the 350-Mw. breeder at Shevchenko, on the Caspian Sea, in mid-1973. Almost immediately the reactor broke down when faulty welds in the steam tubing allowed water to react with the surrounding sodium coolant. Last year the crippled reactor operated at one-third of capacity. Scientists who recently visited the installation say it is now operating at two-thirds of capacity, with the intense heat produced from the fission reaction used to desalt water though not necessarily to generate electricity.

The Shevchenko unit is a loop-type breeder, one in which the cooling step takes place in loops off to one side of the reactor itself. The Soviets are also building a tank-type breeder, which has the sodium coolant suspended in a tank around the reactor. A 600-Mw. unit, to be built in Beloyarsk in the Ural Mountains, is supposed to provide a comparison with the smaller Shevchenko unit. But Western scientists have come to believe that the Soviets do not want to wait until the larger reactor starts up in 1979 or 1980 to choose between the two designs. Observers speculate that Russian engineers, in their typical build-now, fret-later fashion, will select the simpler tank-type reactor as the breeder of choice sometime this year or next. "They talk about breeders as a stop-gap until fusion comes along," says one Western expert based in Moscow. "But it looks more and more as if they are going to develop a complete enough breeder program to serve as a backstop if fusion is delayed into the mid-2000s."

Meanwhile, the Kremlin is not at all averse to squelching any critics of nuclear power. When the respected Soviet physicist Pyotr Kapitsa dared to raise his concerns over safety at a big meeting of the Academy of Sciences last fall, he stirred some enthusiasm among his colleagues—as well as repeated public rebuttals from high-ranking party officials. Kapitsa's harangues cloaked their attacks in the guise of responses to Western alarmists, who they claimed were frequently in the pay of the oil companies, but their message was clear enough: Moscow will brook no opposition to nuclear power.

Thus while safety and other concerns may continue to slow the advance of nuclear power in the U.S. and the rest of the industrialized world, they should have little impact in the Soviet Union. "The Soviet Union's own energy problems have given the power minister more power," sums up a European observer. "The result will be a big standard reactor that could become Brand X on the world market while Westerners tinker with improvements and argue over whether they really want nuclear power after all."



automatic welding machines, rolling equipment to bend steel slabs nearly 1 ft. thick, and manipulators to wrestle the huge components about.

The decision to build Atomash, while dramatic, does not shock Western nuclear scientists, who, after all, have seen the Soviet Union achieve most of the world's commercial "firsts" in nuclear power. Russia was the first

while Americans study and iron out design first, then build."

**Ignoring inhibitions.** The Soviets' juggernaut approach can be seen in their efforts to commercialize breeder reactors, which have yet to reach the demonstration stage in the U.S.—and some say never will because of technical, environmental, and economic problems. Ignoring such normally inhib-