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ECONOMIC INTELLIGENCE MEMORANDUM

CURRENT PROBLEMS AND PLANNING IN THE ELECTRIFICATION PROGRAM OF THE USSR

CIA/RR EM 60-7

24 June 1960

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CENTRAL INTELLIGENCE AGENCY

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CURRENT PROBLEMS AND PLANNING IN THE ELECTRIFICATION PROGRAM OF THE USSR*

Summary

In November 1959, at the All-Union Conference on Electric Power Construction, Premier Khrushchev expressed dissatisfaction with the rate at which capacity for production of electric power was being expanded in the USSR. Construction of new powerplants in 1958 and 1959 had fallen behind schedule, threatening to impede both the electrification program and the economic development of the USSR. The prospect of shortages of electric power had prompted the Central Committee of the Communist Party to launch a countrywide campaign to conserve electricity.

In his speech, Khrushchev defined the problem areas in the program for constructing powerplants. Under the Seven Year Plan (1959-65) the rate at which new capacity is installed must increase by more than 1 million kilowatts (kw) annually if the goal for electrification is to be achieved. Because construction of thermal electric powerplants is the most expedient means of making such large additions to capacity, priority is now being given to these plants rather than to the hydroelectric powerplants emphasized during earlier plans. Achievement of the goal for construction of thermal electric powerplants, however, will entail the installation of turbogenerators larger than those now in operation in the USSR, and the electrotechnical industry has fallen behind schedule in bringing these large units into serial production. Khrushchev also was displeased with the rate at which modern powerplant equipment and methods of construction were being developed and put into use.

Even though the Seven Year Plan for installation of new capacity may be underfulfilled by 5 million to 10 million kw, the goal for production of electric power in 1965 probably can be met by increasing utilization of existing powerplants and rearranging work schedules in industry. On the basis of the current level of industrial production and a trend toward an upward revision in plans, it is possible that the 1965 goal for consumption of electric power by industry will be met or in some cases exceeded. It is estimated, therefore, that production of electric power in 1965 will be close to the goal of 520 billion kilowatt-hours (kwh).

* The estimates and conclusions in this memorandum represent the best judgment of this Office as of 1 May 1960.

At the conference, Khrushchev also announced new goals for production of electric power in 1975 and 1980 that would require continuing high rates of increase in production of electric power and construction of powerplants. Khrushchev has set his sights on complete electrification in the USSR to support the development of the national economy and to surpass the US in production and industrial consumption of electric power. If the Soviet goals for production of electric power are achieved, the USSR could overtake the US in total production of electric power in the late 1980's, and industrial consumption of electric power in the USSR could surpass that in the US before 1975.

I. Poor Performance in 1959

The 7-year program for construction of electric powerplants in the USSR started badly. In 1959, the first year of the Seven Year Plan (1959-65), the goal for installation of new generating capacity was not met. As a result, Soviet leaders fear that there will be inadequate electric power for industrial consumers in the next year or so. Concern was apparent at the All-Union Conference on Electric Power Construction, which was held in Moscow in November 1959 for the purpose of discussing measures necessary for fulfillment of the goals for electrification under the Seven Year Plan. The speeches at this conference, including an exhortation by Premier Khrushchev and an apology by the Minister of Construction of Electric Powerplants, I.T. Novikov, reflected several major current problems and proposed goals for the electrification program of the USSR.

The accomplishments of the electric power industry during 1959 were unsatisfactory to the Soviet leaders. The goal for production of electric power in 1959 was 258 billion kwh. Actual production was 264 billion kwh, or slightly more than the goal, but this level of production was achieved only through more intensive utilization of capacity. The installation of new capacity, however, fell below the goal. About 5.5 million kw of new capacity was placed in operation, compared with a plan of 5.7 million kw, an underfulfillment of about 4 percent. The underfulfillment of the plan would have been much greater had it not been for the installation of four units more than planned at the Stalingrad hydroelectric powerplant and two units more than planned at the Kremenchug hydroelectric powerplant, for a total of 600,000 kw above plan at these two hydroelectric powerplants. The goal for installation of thermal electric capacity, therefore, was underfulfilled

by 800,000 kw, or 20 percent. Installation of the 200,000-kw aggregate* at the South Urals thermal electric powerplant, the first unit of its size in the country, was not completed by the end of 1959, and work was said to be progressing unsatisfactorily at the Tom'-Usinsk, Troitsk, and other large thermal electric powerplants, especially in important economic regions, including the Urals. The plan for 1958 also was underfulfilled by more than 600,000 kw, but the lag was again in construction of thermal electric powerplants, which fell 800,000 kw short of the goal. The practice of installing most of the capacity in the last quarter of the year may have been partly responsible for the unsatisfactory results. Of the capacity installed during the year, 68 percent in 1958 and 65 percent in 1959 were placed in operation during the last quarter.

Novikov blamed other organizations for the lag in construction of electric power facilities. The manufacturers of equipment were charged with falling behind schedule in deliveries, with failing to reduce the cost of their equipment, and with failing to design and produce necessary new models of equipment. Novikov also stated that the supply of cable for new transmission lines was inadequate and that the projects for the promised construction bases of the Ministry of Construction of Electric Powerplants were behind schedule.

II. Problems of Powerplant Construction

A. Construction Program, 1959-65

The major speech at the Soviet All-Union Conference on Electric Power Construction in November 1959 was given by Premier Khrushchev on the last day of the conference. He expressed concern over the rate of development of electrification, which threatens achievement of the industrial goals for 1965, emphatically reasserted the priority of construction of thermal electric powerplants, and urged the most rapid adoption of new designs and methods of construction that would speed up construction of powerplants.

The current Seven Year Plan (1959-65) envisions the addition of 58 million to 60 million kw of generating capacity and about 200,000 kilometers (km) of transmission lines by the Soviet electric power industry, which is more than twice the 27 million kw of generating capacity and 65,000 km of transmission lines added in the 7-year period 1952-58. The plan to install 6 million kw in 1960 leaves about 48 million kw for the remaining 5 years of the plan, or an average of almost 10 million kw a year, compared with 5 million kw commissioned in 1958 and 5.5 million kw installed in 1959. It is planned that, in 1964, new capacity will

* An aggregate is a unit composed of a turbine and a generator.

be installed at the rate of 10 million to 12 million kw a year and transmission lines at the rate of 40,000 km a year. After 1960, fulfillment of the plan will depend on Soviet ability to produce and install new generating equipment at a rate of increase of more than 1 million kw annually, a significantly higher rate than has been maintained previously. The year 1960 is to be the decisive period for speeding up construction of power facilities. In order to install the rapidly increasing amounts of new capacity that will be required in 1961-65, the preparatory work must be accomplished in 1960.

B. Emphasis on Thermal Electric Powerplants

In his speech to the Soviet power construction workers, Khrushchev strongly reiterated his preference for the construction of thermal electric powerplants, summarizing his views as follows: "Hydroelectric powerplants would be better if they could be built more quickly, but at the present stage thermal electric powerplants are better because they become operational more quickly."

The debate over construction of thermal electric powerplants as opposed to hydroelectric powerplants arose from the obvious inadequacy of the capital allocations, not only in volume but also in composition, for meeting the industrial goals of the original Sixth Five Year Plan (1956-60). It was apparent by 1957 that it would be impossible to achieve the goals for 1960 with the capital allocations that had been planned. Along with the industrial reorganization of mid-1957, it was decided to prepare a Seven Year Plan that would make allocations of investment more nearly commensurate with goals for production. Because the electric power industry is one of the most capital-intensive industries, investment in electric power became a subject of controversy between two major groups. There were those who argued for a continuing emphasis on hydroelectric powerplants, in which lower costs of production would more than compensate for the higher initial investment. There were others who argued that an investment maturing earlier is to be preferred to one which "sterilizes" capital resources for a longer period, in spite of the later higher costs of production for thermal electric powerplants.

Later discussion of the Seven Year Plan for construction of powerplants shows how the Soviet planners viewed their choices and indicated the thinking behind the decision to support the emphasis on thermal electric powerplants. It was reported (1) that the reduction in emphasis on hydroelectric installations during the Seven Year Plan and the attendant reduction of investments in hydroelectric powerplants would permit the commissioning of new capacity for production of electric power during the period to be increased by 10 million kw and (2) that the retention during the Seven Year Plan of the previous ratio

of hydroelectric to thermal electric power capacity, if applied to the total electric power capacity planned for installation during the period, would require additional capital investment totaling 23 billion rubles.*

There were three possible solutions to the question of investment priorities, as follows: (1) to retain the previously existing ratio of hydroelectric and thermal electric capacity and the plan for commissioning 58 million to 60 million kw of new capacity, which would require an investment program 23 billion rubles larger than the 125 billion to 129 billion rubles allocated; (2) to retain the previously existing ratio of hydroelectric and thermal electric capacity within the limits of the total investment program of 125 billion to 129 billion rubles, which would limit the construction of new electric power capacity to 10 million kw less than that presently required in the Seven Year Plan; or (3) to retain both the commissioning plan and the total investment program as provided under the Seven Year Plan, which would then require a substantial change in the ratio of hydroelectric and thermal electric generating capacity in favor of thermal electric power and a drastic reduction in the costs of the hydroelectric powerplants to be built.

On 10 August 1958, at the dedication of the Kuybyshev hydroelectric powerplant, Khrushchev put his weight behind the third alternative, thus supporting the proponents of thermal electric powerplants. The victory was not clear cut, however, and disaffection still existed beneath the surface. In his speech at the November conference, Khrushchev made several references to continued grumbling over the merits of the thermal electric power program, and he presented the case for thermal electric power with fervor and persistence.

According to earlier plans, hydroelectric power was to represent 24 percent of the total production of electric power in 1965, compared with about 19 percent in 1958 and 14 percent in 1955. According to the Seven Year Plan, as adopted, hydroelectric powerplants will account for only 15 percent of production of electric power by 1965. Of the new capacity to be installed by the electric power industry during the Seven Year Plan, 17 to 18 percent will be installed in hydroelectric powerplants, and 82 to 83 percent in thermal electric powerplants, compared with a percentage breakdown of 24 percent in hydroelectric and 76 percent in thermal electric powerplants installed during the 7-year period 1952-58.

The shift in emphasis is even more apparent in the proportional allocation of investments within the electric power industry, as shown below .

* Ruble values in this memorandum are expressed in current rubles and may be converted to US dollars at the official rate of exchange of 4 rubles to US $1. This rate of exchange, however, does not necessarily reflect the dollar value. Ten rubles to US $1 appears to be good working ratio as applied to electric power.

	1952-58		1959-65	
	Percent	Billion Rubles	Percent	Billion Rubles
Hydroelectric powerplants	48	36.0	16	20 to 21
Thermal electric powerplants	42	31.6	59	74 to 76
Transmission lines	10	7.5	25	31 to 32
Total investments	100	75.1	100	125 to 129

Much of the shift in allocation of investment is a result of changes within the program for constructing hydroelectric powerplants rather than of a shift from construction of hydroelectric powerplants to construction of thermal electric powerplants.

Capital expenditures per kilowatt of installed hydroelectric capacity were reduced from 4,740 rubles in 1952-58 to 1,900 to 2,000 rubles in 1959-65, primarily because many of the new hydroelectric powerplants are at favorable natural sites in Siberia that will require smaller amounts of earth and concrete work per kilowatt of installed capacity than did earlier construction in the European plains. For example, the hydroelectric powerplant at Bratsk on the Angara River is expected to cost little more than one-half as much as the plant on the Volga near Kuybyshev, but it will produce twice as much power. Part of the reduction in the average cost also is a bookkeeping reduction, for much of the investment for the high-cost hydroelectric powerplant at Stalingrad was made before 1958 and the capacity is being added after 1958. Aside from the very large plants, the average hydroelectric powerplants to be built in 1959-65 will be larger than those built in 1952-58, and this greater size will permit a lower cost per kilowatt of capacity. Most of the powerplants to be built during the Seven Year Plan have been completely redesigned. The Saratov hydroelectric powerplant on the Volga will now be built by prefabricated methods, and concrete work on the Bratsk hydroelectric powerplant on the Angara River is to be cut in half as a result of redesigning.

C. New Designs and Methods

Khrushchev was not content merely to endorse thermal electric powerplants. He went on to press for the more rapid installation of new generating capacity, which would come as a result of the redesigning of powerplants and the development and use of new powerplant equipment and methods of construction. His exhortation showed a rather

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naive optimism about what technically could be accomplished but left no doubt in the minds of his listeners that he was serious in his desire that they concentrate on adoption of powerplant designs already long in use in Western countries. He also urged that they add a few more Socialist techniques of construction based on extensive standardization, prefabrication, and large regional construction bases. Most of his proposals already had been widely discussed in the technical press and already were partly carried out. Khrushchev urged greater rapidity in the adoption of his proposals and promised adequate funds for research and development where necessary.

One of the areas in which the USSR is far behind the US and in which it can make the most rapid gains is in the size and efficiency of thermal electric powerplants. By increasing the size of both the powerplant and the equipment installed in it, construction time and capital expenditure per kilowatt of installed capacity, as well as production costs, may be radically reduced. Under the Seven Year Plan, 36 percent of the new thermal electric power capacity is to be in units of 200,000, 300,000, and 600,000 kw, mostly in plants with capacities of 1.2 million to 2.4 million kw.

No units of this size are in operation in the USSR at the present time. The degree to which the new equipment can be placed in operation depends on the capabilities of the electrotechnical industry to produce the units. The first 200,000-kw turbogenerator originally was scheduled for operation in 1957 but was not yet ready at the end of 1959. Designs for the 300,000-kw turbogenerator only recently have been completed, and the first unit probably will not be produced before 1961 and will not be in operation until at least a year later. The 600,000-kw unit is not expected to be ready before 1965, if that soon. In spite of the ambitious targets of the Seven Year Plan, there has been no provision for adding to the number of plants producing turbines and generators. The scheduled increases in production are to be achieved mainly by the expansion of existing plants and by increased efficiency in methods of production.

There is no technical reason why the USSR cannot achieve its goals for production of larger units, but the past Soviet history of bringing new units into serial production suggests that their program may be overly optimistic. Seven years elapsed between the designing of the 150,000-kw unit and serial production. The 200,000-kw unit was designed in 1956 and probably will not be in serial production until 1961. The 300,000-kw unit may not be in serial production until 1964. Any slippage in these production schedules will force an underfulfillment of plans for additions to capacity.

Khrushchev also urged speed in the application of new design techniques, mostly copied from the West, which simplify, speed up, and reduce the cost of construction of powerplants. In warmer latitudes, there will be constructed more open-air plants in which the equipment is installed without the cover of buildings. Increased use of natural gas is expected to cut costs further by eliminating storage, conveying, and grinding equipment used in coal-burning plants. The block principle, whereby a boiler, turbogenerator, and transformer will be installed as one unit with no cross-connections, will speed up construction time, lower the costs of installation, and permit increased labor productivity. In addition, greater use will be made of prefabricated components, a Soviet innovation comprising up to 95 percent of total plant structures in thermal electric powerplants and 70 to 80 percent in hydroelectric powerplants.

In support of Khrushchev's demand for a more rapid rate of construction of powerplants, the Ministry of Construction of Electric Powerplants has inaugurated its 3.7-billion-ruble program for a major expansion of its vast empire of regional construction bases. These bases will be located in the center of power development areas and will manufacture prefabricated components of buildings, boilers, and other structures away from the actual site of the powerplant, thereby lowering the costs of construction, speeding building time, and providing more room at the construction sites. Personnel of the construction bases will supervise construction of powerplants in their areas and provide an equipment park.

III. Threat of Power Shortages

The entire All-Union Conference on Electric Power Construction in the USSR was haunted by the threat of possible power shortages arising from the poor showing in the installation of new electric power facilities in the past several years. In 1957, after a decade of constantly increasing additions to capacity, new additions to capacity for the first time dropped below additions of the previous year. In that year, because of the poor performance of the economy in general, installations continued to increase faster than requirements for power. In 1958 and 1959 the consumption of electric power increased more rapidly than did capacity. Demand will continue to increase more rapidly than will capacity in 1960.

The seriousness of the threat of an inadequate supply of electric power was emphasized by the launching, by the Central Committee of the Communist Party, of a campaign for the conservation of electric power. Coincident with the opening of the conference, an open letter was issued to political and administrative organizations at all levels, criticizing wasteful practices and issuing instructions

to launch a "stubborn struggle" for the thrifty use of electricity. In order to supply adequately the increasing demands of industry, transportation, and other consumers, an all-out effort was ordered to utilize properly every kilowatt-hour of electricity produced.

Excessive losses of power by industry and transportation reportedly were amounting to 11 billion kwh a year. Of this total, 7 billion kwh were attributed to improper lighting practices. The total power used in lighting in the USSR is 25 billion kwh. To replace old, worn, and inefficient lighting fixtures and systems would take much time and cannot be accomplished immediately. Thus the "losses" are not, as might appear at first glance, easily retrievable.

The urgency of the letter ordering the conservation of electric power and the mere fact that the matter is serious enough to warrant a general letter from the Central Committee of the Communist Party are indications that a shortage of power in the next year or two is anticipated. It was reported that one of the speakers at the first session of the conference stated that if waste of electric power was not controlled, the goals of the Seven Year Plan for production of electric power could not be reached. This statement was, perhaps, an exaggeration, but it does emphasize the intimate relation of the achievement of the plan for electrification of the economy to the achievement of the goals for industrial production.

IV. Prospects for 1965

The fulfillment of the goal for production of electric power in 1965 depends on two limiting factors -- the amount of generating capacity in Soviet electric powerplants in 1965 and the ability of the consumers to use the amount of electric power that is planned for production in the USSR. It should be noted that the Seven Year Plan for the installation of electric power capacity can be met, even if the turbine and generator industries fail to meet their 1965 goals for production by as much as 40 percent. Furthermore, goals for production of electric power can be reached, even if the installation of capacity is underfulfilled by 5 million to 10 million kw (10 to 15 percent), by not retiring old equipment, which is costly to operate, and by increasing the utilization of the powerplants to the level that prevailed in 1953. This solution, however, might entail rearrangement of work schedules in industry. On the basis of capacity to be available in 1965, there is a sufficient reserve included in the plans so that the upper limit of the plan for production of electric power (520 billion kwh) probably can be attained. The poor showing in the installation of new generating capacity in the last few years and the problems facing the turbogenerator industry suggest, however, that the plan for production of electric power could not be substantially exceeded.

The ability of the consumers to use the amount of electric power that is planned for production depends on the success of the economy in general and of industry in particular in fulfilling the goals for 1965. On the basis of the current level by which the plan is being exceeded and a general upward revision in plans, it is probable that the 1965 plan for consumption of electric power by industry will be attained and may even be exceeded. This conclusion is based on the assumption that there will be no great change in the pattern of consumption of electric power such as that which would result from a general disarmament agreement and a consequent reduction in consumption of electric power for production of nuclear materials. In view of the uncertainty of assumptions on disarmament and the fact that consumption of electric power by other sectors of the economy may not meet the plan, consumption of electric power and therefore production in 1965 probably will be close to the goal of 520 billion kwh.

V. Relation of Electrification to the Development of Industry

In the past 10 years the growth of the gross value of industrial production in the USSR (as indicated by official Soviet indexes based on constant prices) and of consumption of electric power by Soviet industry has progressed at the same rate. By definition, increases in labor productivity and consumption of electric power per worker have progressed at the same rate. The Seven Year Plan, however, provides for an 80-percent increase in the gross value of industrial production and a 120-percent increase in the consumption of electric power by industry. The USSR plans, therefore, that increases in consumption of electric power per worker will be 1.5 times as great as increases in labor productivity over the 7-year period, a noticeable change from the pattern of the last 10 years. The percentage increases for 1952-58 and those planned for 1959-65 are shown in Table 1.*

The planned rapid increase in consumption of electric power per unit of industrial production in 1959-65 may be accounted for by at least three interdependent considerations. (1) Approximately one-third of the additional increase in consumption of electric power can be attributed to a planned rapid growth of power-intensive electrothermal and electrochemical processes, which are expected to use 35 percent of all industrial power in 1965 compared with 28 percent in 1958. (2) It is possible that an indeterminate amount of the planned increase in consumption of electric power per unit of industrial output may be accounted for by a deliberate understatement of the expected rate of industrial growth. In the Fifth Five Year Plan (1951-55), consumption of electric power by industry was to increase about 10 percent faster than industrial production. In fact, however, industrial production grew 20 percent faster than planned during 1951-55, but

* Table 1 follows on p. 11.

Table 1

Percentage Increases in Industrial Production, Productivity, Labor Force, and Consumption of Electric Power in the USSR 1952-58 and 1959-65

	Percentage Increases	
	1952-58	Planned 1959-65
Industrial production	110	80
Labor productivity a/	58	45 to 50
Industrial labor force b/	33	20 to 24
Consumption of electric power per production worker c/	64	77 to 83
Consumption of electric power by industry	118	120

a. The figures on labor productivity for 1959-65 refer to all persons engaged in industrial production, those for 1952-58 only to industrial production workers. Historically the relation of production workers to total production personnel has remained fairly constant. For present purposes, therefore, the indexes would be comparable.
b. Obtained by dividing the index of industrial production by the index of labor productivity.
c. Obtained by dividing the index of consumption of electric power by industry by the index of the industrial labor force.

consumption of electric power grew only 10 percent faster. As a result, consumption of electric power and industrial production grew at approximately the same rate. (3) Up to two-thirds of the increase in consumption of electric power per unit of industrial output must be attributed to an increase in the electric motive power available to each worker. Thus the increases in labor productivity planned for 1959-65, which are necessary to offset the slower rate of increments to the industrial labor force, probably will have to be bought by means of an even more rapid rate of increase in consumption of electric power per worker. If a faster rate of increase in consumption of electric power per worker cannot be achieved, then increments to the industrial labor force must be increased, or the industrial goals for 1965 may not be reached.

VI. Relation of Electrification to the Development of Communism

A. Long-Range Goals for Electrification, 1975-80

The concern expressed by Khrushchev over the present rate of development in electrification in the USSR also is to be examined in the light of long-range goals for the complete electrification of the Soviet economy. He presented these goals to the conference as the foundation of a new program to be considered at the Twenty-second Congress of the Communist Party in 1961. This new long-range plan for electrification calls for the continuation through 1975 of the present rapid rate of growth of electric power, for the establishment of the "economic basis of Communism" through the electrification of the USSR, and for a level of industrial production that would surpass that of the US.

According to the plan, production of electric power will amount to 900 billion kwh in 1970, 1,500 billion kwh in 1975, and 2,300 billion kwh in 1980. Capacity of powerplants is to increase 7 to 8 times in 15 to 20 years. The contemplated growth in production of electric power is shown in the chart.*

These goals represent a reversal of the policy adopted 2 years ago, when the Sixth Five Year Plan was abandoned. In October 1957 the goal for production of electric power in 1975 was reported to be 1,500 billion kwh. In November 1957, Khrushchev announced that 800 billion to 900 billion kwh would be produced in 1972, indicating a lowering of the goals to a more realistic level. He now has returned to the earlier goal of 1,500 billion kwh in 1975 in his eagerness to overtake and surpass the US. The average annual rate of increase in production of electric power, instead of declining to about 7 percent between 1965 and 1972, is to continue during 1965-70 at about the same rate as in the previous 5 years, 1960-65, or approximately 12 percent per year. From 1970 to 1975 the indicated average annual rate of increase is only slightly lower, approximately 11 percent, with a drop to about 9 percent per year between 1975 and 1980.

The proposed increase in capacity is to bring total capacity up to 480 million kw in 1980, which would be adequate to produce the planned 2.3 trillion kwh in 1980 with an average utilization factor of about 5,000 hours a year. According to the Seven Year Plan, total capacity at the end of 1965 should be 110 million to 113 million kw. To attain a total of 480 million kw by the end of 1980, it would be necessary to install an average of about 24.5 million kw a year during 1965-80. The goal for 1964 requires installation of 10 million to 12 million kw of additional capacity. The annual construction programs

* Following p. 12.

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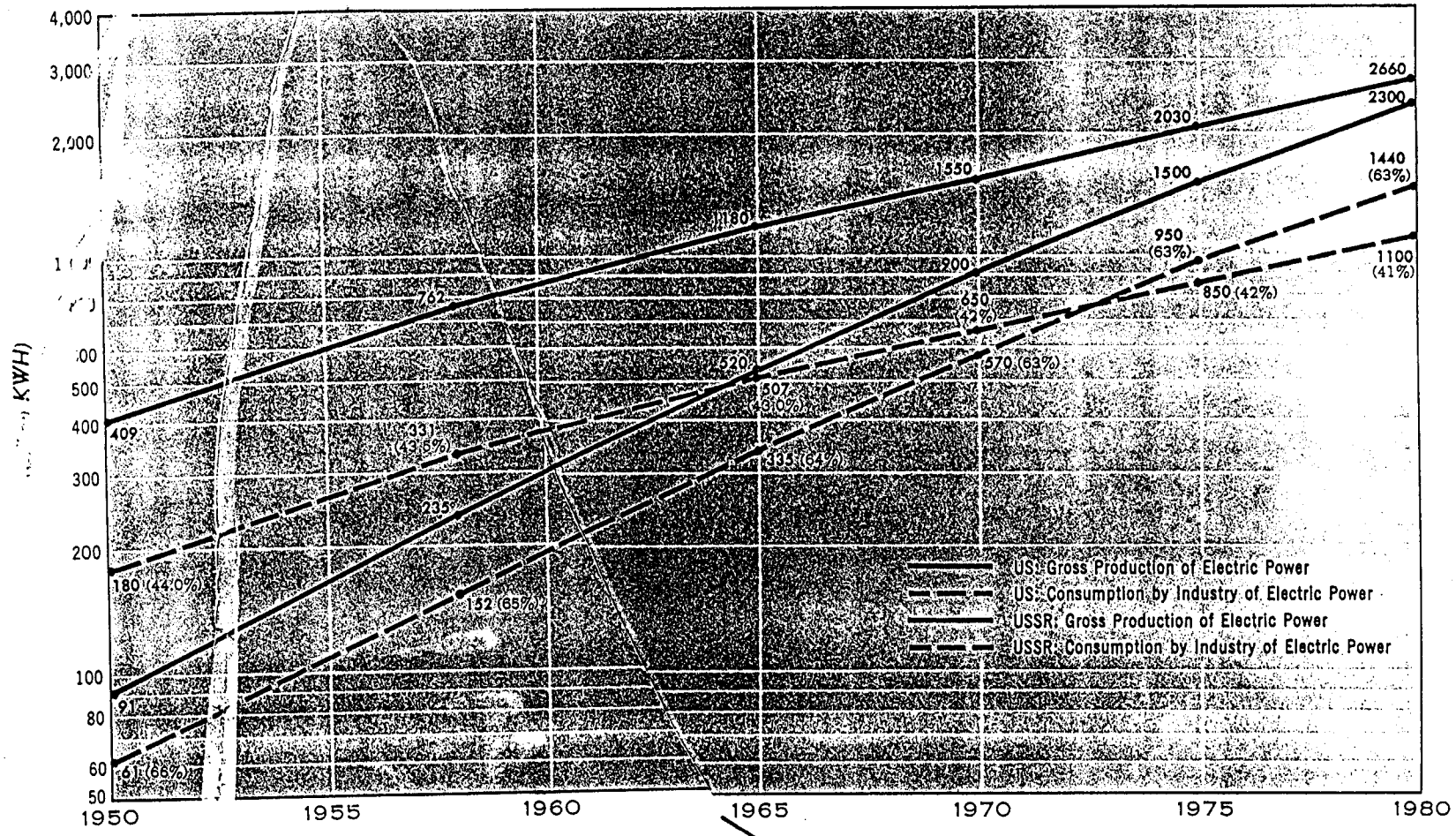
US and USSR: Production of Electric Power and Consumption by Industry of Electric Power, 1950-80



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thus would have to increase at a very rapid rate in order to keep up with the long-range goals for production of electric power.

B. Electrification as the Economic Basis of Communism

In presenting his long-range goals, Khrushchev cited Lenin's dictum that "Communism is the Soviet power plus the electrification of the whole country" and presented this formula as a "concrete and live idea concerning the tasks of the construction of Communism." He said that the political basis of Communism, the establishment of Soviet power, has been accomplished and that the economic basis of Communism, the electrification of all of the USSR, is now acquiring decisive importance. The stage of development must be reached in which all workers, industrial and agricultural, produce by means of machinery rather than with muscular force. According to Communist doctrine, this mechanization is what makes one free and capable of entering into the Communist society. This stage, according to Lenin and Khrushchev, can be achieved only when the entire country is electrified, thereby furnishing the motive power to the machinery. It is reasoned that the long-term plan for the complete electrification of the country must become the basis of the program for the construction of Communism.

The electrification of the whole country means, in Soviet terms, the electrification of agriculture, inasmuch as industry is already 95 percent electrified.* Starting from practically nothing in 1945, rural electrification is growing rapidly. In 1958, Soviet agriculture used 62 kwh per rural inhabitant, compared with 47 kwh in France and 831 kwh in the US. By 1958, 93 percent of all state farms were electrified to some extent, but only 49 percent of collective farms were even partly electrified. On the basis of present plans, Soviet agriculture should be using about 82 billion kwh by 1975, or approximately 1,000 kwh per rural inhabitant, which is about two-thirds of the anticipated US level for the same period.

C. Soviet Growth in Comparison with US Growth

The figures presented by Khrushchev are impressive when compared with probable US production of electric power in 1975, and if his goals are attainable, there may be some basis for his hope of overtaking US industrial production in the 15-year period. Three recent estimates of production of electric power in the US in 1975 _' (the lowest by the Federal Power Commission, the highest by a private utility

* Residential and commercial use of electric power is not considered to be important in the Soviet concept of electrification of the whole country.

spokesman, and the intermediate estimate by an independent research organization), when adjusted to total gross production to make them comparable to Soviet figures, average 2,030 billion kwh. If a level of 2,030 billion kwh is to be achieved in 1975, the average annual rate of increase in production of electric power would indicate that production would be 1,180 billion kwh in 1965 and 1,550 billion kwh in 1970. This rate of increase in production of electric power could support an average annual increase of 3.75 percent in gross national product.

The USSR is gaining every year in the percentage of US production of electric power that it produces. In 1958 the USSR produced about 31 percent as much electric power as the US. By 1965 it is estimated that this percentage will have risen to 44 percent, by 1970 to 58 percent, and by 1975 to 74 percent. Because the US has a much larger base, its lead over the USSR in actual production of electric power will continue to increase through 1970, after which time this lead will begin to decrease, on the assumption that production will be approximately as indicated above.* If production continued to increase in the US at the rate indicated for 1956-75 and in the USSR at the rate planned for 1975-80, Soviet production of electric power would equal that of the US by the late 1980's.

Because the use patterns differ in the US and the USSR, consumption of electric power by Soviet industry could overtake that in the US before 1975, as shown in the chart.** Electric power consumed by industry in the USSR represented 66 percent of the total available in 1950 and 65 percent in 1958 ; is planned to be 64 percent in 1965 ; and may be about 63 percent in 1975, or a total of 950 billion kwh in that year. In the US, industry consumed 44 percent of the total electric power available in 1950 and 43.5 percent in 1958. It is estimated that this amount will decline to 43 percent by 1965 and to 42 percent by 1975, when 850 billion kwh are expected to be consumed by industry.*** Thus consumption of electric power by industry in the USSR could surpass that in the US in another 15 years. The anticipation that this accelerated program of electrification will be successful and the implication that the USSR would overtake the US in industrial production by 1975 both bolster Khrushchev's hope of going down in history as the leader who gave the Communist Bloc a decisive weight and influence in the world.

* See Table 2, which follows on p. 15.

** Following p. 12, above.

*** These estimates are based on the sum of electric power used in manufacturing, mining, and governmental industries, as appearing in various publications of the Federal Power Commission and the Department of Commerce. The total ranges from 90 to 100 percent of large light and power sales plus industrial self-generation, which are the figures often used as an approximation of industrial consumption. Percentages are of gross production, as in the USSR.

Table 2

Estimated Production and Industrial Consumption of Electric Power and Capacity of Electric Powerplants in the US and the USSR 1958 and Selected Years, 1965-80

	Production (Billion Kilowatt-Hours)	Industrial Consumption (Billion Kilowatt-Hours)	Capacity of Powerplants		
			Total (Million Kilowatts)	Thermal (Million Kilowatts)	Hydroelectric (Million Kilowatts)
			1958		
US	762 a/	331 b/	160.2 c/	130.1 c/	30.1 c/
USSR	235 d/	152 b/	53.3 e/	42.5	10.8 e/
Percent of US	30.8	45.9	33.3		
US lead	527	179	107		
			1965		
US	1,180 f/	507 f/	245 g/	202 to 205	40 to 43 h/
USSR	520 i/	335 i/	112 g/	90.2	21.8 j/
Percent of US	44.1	66.1	45.7		
US lead	660	172	133		
			1970		
US	1,550 f/	650 f/	310 k/	256 to 261	49 to 54 h/
USSR	900 i/	570 f/	180 k/		
Percent of US	58.1	87.7	58.1		
US lead	650	80	130		
			1975		
US	2,030 m/	850 m/	406 k/	336 to 346	60 to 70 n/
USSR	1,500 i/	950 m/	300 k/		
Percent of US	73.9	111.8	73.9		
US lead	530	-100	106		
			1980		
US	2,660 f/	1,100 f/	532 k/		
USSR	2,300 i/	1,440 f/	480 o/	380 o/	100 o/
Percent of US	86.5	130.9	90.2		
US lead	360	-340	52		

a. Net production, adjusted to gross production.
b. See p. 14, above.
c.
d.
e.
f. See the chart, following p. 12, above.
g.
h. Calculated at a growth rate of 4.1 percent per year for the lower range and 5.1 percent per year for the upper range from 1958 to 1975.
i.
j.
k. Estimated on the basis of 5,000 hours of utilization per year.
l.
m. See p. 14, above.
n.
o. —

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APPENDIX

SOURCE REFERENCES

Evaluations, following the classification entry and designated "Eval.," have the following significance:

Source of Information	Information
Doc. - Documentary	1 - Confirmed by other sources
A - Completely reliable	2 - Probably true
B - Usually reliable	3 - Possibly true
C - Fairly reliable	4 - Doubtful
D - Not usually reliable	5 - Probably false
E - Not reliable	6 - Cannot be judged
F - Cannot be judged	

Evaluations not otherwise designated are those appearing on the cited document; those designated "RR" are by the author of this memorandum. No "RR" evaluation is given when the author agrees with the evaluation on the cited document.

Except for publications of the US Government, all sources used in this memorandum are evaluated RR 2.

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