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## SUB-COMMITTEE ON SOVIET ECONOMIC POLICY

## PROGRESS MADE IN THE USSR, UNDER THE SEVEN-YEAR PLAN, WITH THE CONSTRUCTION OF POWER PLANTS AND THE PRODUCTION OF ELECTRIC POWER(1)

Note by the German Delegation

SUMMARY

The electric power industry is one of the few branches of industry in the USSR which have achieved the principal aims of the Seven-year Plan, so that there is reason to believe that the final goals for 1965 will probably be attained. Although the electric power production plan for the 1959 to 1964 period was 102% fulfilled, there was no improvement in the supply system for Soviet industry. In this field, a serious bottleneck still exists.

2. As regards the construction of power plants, the plans give priority to the building of steam generating stations; on the other hand, the programme for their transfer to the Eastern regions of the USSR has so far fallen behind schedule.

3. As regards the construction of machinery for power plants, the very high rates of increase recorded from 1959 to 1962 declined sharply after that period. Difficulties were encountered and delays occurred in the development and launching of quantity production of new models of steam turbines; the construction of steam boilers is still unsatisfactory, while most of the targets set for the production of water turbines and generators have been met.

4. Marked progress has been recorded in the extension of the high-voltage network. As regards steam generating stations, the importance of coal and peat as fuel has decreased in the same, or practically the same, proportion as the importance of oil and gas has increased. In order to promote the further expansion of the electric power supply system, it is of the utmost importance to reduce the time required for construction projects.

OTAN/NATO,
Paris, (16e).

(1) Position in April 1965.

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# PROGRESS MADE IN THE USSR, UNDER THE SEVEN-YEAR PLAN, WITH THE CONSTRUCTION OF POWER PLANTS AND THE PRODUCTION OF ELECTRIC POWER

The electric power production industry is one of the few branches of industry which have achieved the principal aims of the Seven-year Plan within the scheduled time-limits, so that the goals set for 1965 will probably be attained.

## I. Production of electric power

| Year | Production in milliards of kW/h | | Increase as compared with previous year | |
|---|---|---|---|---|
| | Forecasts | Actual figures | In milliards of kW/h | as % |
| 1958 | | 235.35 | | |
| 1959 | 264 | 265.11 | 29.76 | 13.7 |
| 1960 | 291 | 292.27 | 27.16 | 9.2 |
| 1961 | 327 | 327.61 | 35.34 | 12.0 |
| 1962 | 366 | 369.28 | 41.67 | 12.8 |
| 1963 | 411 | 412.06 | 42.78 | 11.1 |
| 1964 | 452 | 459.00(1) | 47.00 | 11.4 |
| 1965 Plan | 510 | | | |
| 7-yr. Plan | 500 - 520 | | | |

2. The electric power production plan was about 102% fulfilled from 1959 to 1964. In 1964, production rose to a new level, representing about 2,000 kW/h per capita.(2) Despite this relatively good progress the supply system for the Soviet economy, and more particularly for industry, is still a serious bottleneck. On 1st January, 1965, it was necessary to lay down severe penalties for consumers of excessively large quantities of electric current.

(1) This figure may be compared with the consumption of electric power in the EEC member countries, which amounted in 1964 to 365 milliard kW/h.

(2) This figure may be compared with the figure for the United States in 1963, which stood at 5,317 kW/h.

3. Industry's share of the total consumption in 1958 was 71.5% and in 1964, 70.3%. For 1965, the Seven-year Plan provided for a rate of 73.3%. On the other hand, consumption in the transport sector, which has gone up steeply owing to the high-pressure effort to electrify the railways(1), has practically trebled, for its share of total consumption rose from 4.9% (in 1958) to 6.6% (in 1964). As from 1965, agriculture, which has so far consumed 4%, and domestic consumers are expected to account for an increasingly larger share of total consumption.

4. The share of the Eastern regions(2) in total consumption rose from 39.6% (1958) to 41.4% (1963). However, the figure of 46% forecast in this connection for 1965, and which has no solid foundation, is not likely to be attained.

5. By 1970, electric power production is to be increased to 900 or 1,000 milliard kW/h, while per capita production will be increased to 3,700 kW/h. However, even these figures would not represent more than 70% of the present power production of the United States.

## II. Construction of power plants

### A. Development of the production capacity of power plants

| Year | Capacity of power plants in millions of kW | | Increase over the previous year | |
|---|---|---|---|---|
| | Forecasts | Actual figures | in millions of kW | as% |
| 1958 | | 53.64 | | |
| 1959 | 59.3 | 59.27 | 5.63 | 10.5 |
| 1960 | 65.8 | 66.72 | 7.45(3) | 12.6 |
| 1961 | 73.6 | 74.10 | 7.38(3) | 11.0 |
| 1962 | 82.5 | 82.46 | 8.36(3) | 11.0 |
| 1963 | 92.1 | 93.00 | 10.54 | 12.7 |
| 1964 | 102.1 | 103.00 | 10.00 | 10.7 |
| 1965 Plan | 113.1 | | | |

(1) Length of electrified railways: in 1958, 9,500 km.; at the end of 1965, probably about 25,000 km.

(2) The Urals, Siberia, the Far East, the Central Asia Republic and Kazahkstan.

(3) To be compared with the United States figure (millions of kW): 11.4 (1960); 12.1 (1961); 11 (1962).

6. Under the Seven-year Plan there was to be a power plant production capacity of 111 to 113 million kW and an increase of about 60 million kW by the end of 1965. This aim will be approximately achieved, four-fifths of the capacity being provided by the construction of steam generating stations and one-fifth by the construction of hydraulic generating stations. The only case where a certain slippage in the execution of the Plan is apparent concerns atomic energy generating stations. This gap is filled, however, by an increase in the production capacity of the hydraulic generating stations which exceeds the goals set by the Plan. The priority construction programme for steam generating stations included in the Seven-year Plan has been fully carried out.

B. Production of the engineering industry for power plants

7. The engineering industry turning out major equipment for power plants (turbines, boilers, generators and transformers) was able to start on the execution of the Seven-year Plan under relatively favourable conditions. In the post-war period, the following types were developed and put into production:

1952: condensation turbines with a capacity of 15,000 kW, the live steam conditions being an effective pressure of 90 kg. per sq.cm., and a temperature of 535°C;

1953: hydraulic turbines with a capacity of 115,000 kW for the power plants near Kuibychev and Volgograd;

1957: condensation turbines with a capacity of 200,000 kW (effective pressure 130 kg. per sq.cm., 565°C);

1958: high pressure condensation turbines with a capacity of 150,000 kW, the steam conditions being an effective pressure of 130 kg. per sq.cm. and a temperature of 565°C.

Quantity production of 150,000 kW unit slices of the power plant programme was started in 1958, and quantity production of 200,000 kW unit slices was started in 1959 to 1960.

8. The following table shows the trend in the production of the engineering industry for power plants under the Seven-year Plan.

| Production in | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 Seven-year Plan |
|---|---|---|---|---|---|---|---|
| Turbines Millions of kW | 7.60 | 9.20 | 10.7 | 11.9 | 11.87 | 13.2 | 18.7-20.4 |
| Increase over the previous year, as a % | 14.0 | 21 | 16 | 11 | -0.2 | 11 | |
| Boilers thousand tons per hour | 41.7 | 50.3 | 57.8 | 66.4 | 71.4 | | |
| Increase over the previous year, as a % | 4 | 21 | 15 | 15 | 7 | | |
| Generators Millions of kW | 6.5 | 7.9 | 9.45 | 11.0 | 11.8 | 12.8 | 17.5 - 18.4(1) |
| Increase over the previous year, as a % | 25 | 21 | 20 | 16 | 7 | 8 | |
| Transformers Millions of KVA | 40.5 | 49.4 | 64.1 | 75.7 | 83.9 | | |
| Increase over the previous year as a % | 31 | 22 | 29 | 18 | 10 | | |

9. During the first four years, production made good progress. The mean annual increase rates rose in 1959 to 1962 to 15.5% for generators and 25% for turbines, 13.7% for steam boilers and 20.5% for transformers. In 1963 and 1964, a marked slowing-down became apparent owing to the difficulties encountered in launching the production of new types of steam turbines and to the problems raised by the poor quality of the boilers.

(1) Revised figure in the new 1965 plan: 14.2 million kW (+11%)

1. Production of steam turbines

10. As regards the development of new types of turbines, there was often a time lag of several years between the manufacture of the first prototype and the inception of quantity production. No account had been taken of these difficulties at the planning stage; after the delivery of the first batch, the order was immediately placed for the production of further batches before the prototypes had been sufficiently tested.

(+) for the generators and at 25%.

11. For example, the first prototypes of condensation turbines with a capacity of 150,000 kW had come off the production line as far back as 1952, but at the end of 1958 only four of these were in service. It is clear that quantity production did not start until 1957/1958. The years 1959 and 1960 saw the installation of ten further turbines, which made a substantial contribution to the increase in capacity recorded in those years.

12. As regards the batches of 200,000 kW steam turbines (the first models of which were produced in 1957), only seven were in service at the end of 1961.

13. The two new condensation turbines of the 300,000 kW type (effective pressure 240 kg. per sq.cm.; 580°C) had already been completed by the end of 1960, but they were not in 100% operation until 1964. Of the eight batches planned, only two were in service.

14. The new models also include the first condensation turbine with a capacity of 800,000 kW, whose construction was completed at the end of 1964 in the Leningrad Engineering Works. It is a turbine with two shafts of 500,000 and 300,000 kW respectively.

15. The turbine works at Charkov are due to complete construction of a single-shaft 500,000 kW turbine in 1965. Quantity production of this turbine, like that of a mixed (heating and power production) turbine with a capacity of 100,000 kW, the live steam conditions being an effective pressure of 130 kg. per sq.cm., and a temperature of 565°C, and whose first prototypes had already been turned out in 1963, can hardly be started up until 1967/1968.

16. The main contribution to the increase in the capacity of power plants during the next five or six years will be made by the batches of 200,000 and 300,000 kW steam turbines(1) which are already in quantity production. According to the 1965 Plan,

(1) In 1963, construction was completed of fourteen 200,000 kW steam turbines and of three 300,000 kW steam turbines.

these two types will alone account for 47% of the total capacity of the new power plants to be brought into service, and for over 50% of the capacity of steam generating stations. The figures for the total capacity which it is planned to bring into service in 1965 are as follows:

| | | |
|---|---|---|
| Increase of total capacity of power plants, | | 11,026,000 kW |
| including the capacity of steam generating stations, | | 10,224,000 kW |
| which is broken down as follows: | | |
| 8 batches of 300,000 kW | = | 2,400,000 kW(1) |
| 14 batches of 200,000 kW | = | 2,800,000 kW(2) |
| 8 batches of 150,000 kW | = | 1,200,000 kW(3) |
| 10 batches of 100,000 kW | = | 1,000,000 kW |
| 37 batches of 50,000 kW | = | 1,850,000 kW |
| 19 batches of 25,000 kW | = | 475,000 kW |
| 20 batches of 12,000 kW | = | 240,000 kW |
| 35 batches of 6,000 kW | = | 210,000 kW |
| capacity of under 6,000 kW | = | 49,000 kW |

17. At the end of 1965, the total capacity which is expected to be available consists of 113 slices of 150,000, 200,000 or 300,000 kW, representing 25% of the installed capacity of steam turbine generating stations.

2. Production of steam boilers

18. The greatest difficulty encountered in the production of equipment for steam turbine generating stations is connected with the delivery of boilers. Owing to the delay which has occurred in the planning and production of large capacity boilers, the principle of complete unit assemblies (one boiler for each turbine) which, for the construction of power plants, is of prime importance, cannot be applied to the first units of the new types of turbines.

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(1) Power plants at Kachira, Konakova (2), Krivoi Rog, Pridneprovsk, Novotcherkassk, Tashkent, Troisk (see Annex).

(2) Power plants at Bielojarsk, Belovo, Bourchtyn, Koutchourgan, Pribaltisk (2), Sainsk (2), Chtchiokino (2), Smijevo, Staro Bechevo (2) (see Annex).

(3) Power plants at Ali Bairamli, Jaiva (2), Jerevan (2), Nasarovo, Tbilissi, Vievis (see Annex).

Each turbine will have to be operated by two boilers with a small steam output.

19. For large turbines with a minimum capacity of 150,000 kW, in practically every case, only forced circulation boilers are installed.

20. The capacity and steam conditions of the standard production high pressure boilers are as follows:

| Steam output t per h | Steam conditions eff. pressure kg. per sq.cm. | °C | Individual steam turbines, operated by unit slices |
|---|---|---|---|
| 220 | 100 | 540 | |
| 210 | 140 | 570 | |
| 320 | 140 | 570 | 100 |
| 480 | 140 | 570/570 | 150 |
| 500 | 140 | 570 | |
| 640 | 140 | 570/570 | 200 |
| 950 | 255 | 565/570 | 300 |
| 1,600 (under construction) | 255 | 565/570 | 500 |
| 2,500 (under construction) | 255 | 565/570 | 800 |
| 200 | 255 | 585/570 | |
| 8 (trial boilers) | 400 | 700 | |
| 35 (trial boilers) | 400 | 700 | |
| 710 (trial boilers) | 315 | 655 | |
| 12 (trial boilers) | 300 | 650 | |

## 3. Production of hydraulic turbines

21. The development of new types of large capacity hydraulic turbines, unlike that of steam turbines, did not encounter any difficulties as regards their entry into service and the inception of quantity production. Deliveries were made on time, so that the major hydraulic generating stations could start to operate

according to schedule. For example, the Leningrad turbine works turned out, within about two years, sixteen 225,000 kW turbines for the Bratsk hydraulic generating station. At the end of 1964, the first 508,000 kW turbine was delivered to the hydraulic generating station of Krassnojarsk on the Jenissei. This turbine had been put into production in 1962.

4. Production of gas turbines

22. Gas turbine plants make an insignificant contribution to the production of electric power in the USSR. Quantity production only exists for small plants with maximum capacities up to about 7,000 kW, which are primarily designed as the direct source of power for the gas compressors of the long distance supply pipes and of the blowers in metallurgical works. A batch of gas turbines with a capacity of 4,000 kW has been developed. Gas turbines with medium capacities (9,000, 10,000 and 12,000 kW) for gas compressors and for the production of electric power are being tried out, as in the case of the two batches of 25,000 and 50,000 kW completed in 1960, which were installed and brought into service in the steam generation stations. It is already planned to install 100,000 kW gas turbines for electric power production purposes.

5. Production of generators

23. Generally speaking, the production of generators designed to be driven by steam or gas turbines or by hydraulic turbines progressed at the same rate as the production of turbines. The new types of equipment have not created any difficulties. At the end of 1964, the Leningrad generator works completed, at about the same time, the construction of a 508,000 kW hydraulic generator (the second of its kind) and the construction of the first turbo-generator produced in the USSR, which has a capacity of 500,000 kW. The factory had started to construct this turbo-generator at the end of 1963. For the steam generating stations which it is planned to set up in Siberia in the 1970 - 1980 period and which are to have a capacity of up to 5 million kW, it is proposed to install turbo-generators with individual capacities of one million kW.

24. The large capacity generators are equipped with a water-cooling system for the winding of the stator, and with a hydrogen cooling system for the winding of the rotor. The water-cooling system is about to be adopted for the winding both of the stator and of the rotor in the case of generators with a capacity of 200,000 kW and over. The very out-of-date system of compound insulation is still used for generators whereas, in Western countries, it has been the general practice for many years to use the heat-reaction insulation system (employing a plastic material) which enables a higher production capacity to be attained.

25. In spite of all this, the plans of the last few years for the production of the major equipment items for power plants have not been 100% fulfilled. In 1964, the production of turbines and generators still fell short of the 1965 goals of the Seven-year Plan by 40%. However, the execution of the programme for the construction of new power plants and for the extension of existing power plants has not been adversely affected. It must be inferred that the programme for the replacement of the out-of-date equipment power plants has not been fully carried out.

26. The long-term 1966-70 plan provides for an increase of about 90 million kW in the production capacity of power plants, including 23 million kW for hydraulic generating stations. If this project is to be carried out, the production of turbines should be increased so as to raise the capacity from 13.2 million kW in 1964 to about 26 or 28 million kW in 1970, and this would imply an annual increase of about 14% which would be difficult to achieve, in view of the situation prevailing in recent years, without resorting to special measures.

27. One of the top priority problems arising in connection with the construction of machinery for power plants is how to install highly dependable equipment. The difficulty is not only that the sub-contracting factories produce poor equipment, such as pumps, engine fittings, etc., but that the major factories turning out turbines, boilers, generators and transformers also deliver equipments with serious defects, and this applies not only to prototypes but also to quantity production equipment.

28. As regards the major production batches recently delivered, breakdowns resulting in a total stoppage are attributable in the proportions of 63% to the boilers, 11.5% to the turbines, 17.5% to the electricity distribution system and 8% to other defects; 40% of the breakdowns are caused by sub-contracting factories, 36% by faulty assembling and 16% by errors committed by operating personnel. As regards the boilers, the weakest parts are the furnaces, the heat exchangers, the welding seams and the tubing.

29. Special measures are under consideration for improving the quality of boiler tubes, of the steel transformers and of the electrical insulation; efforts are being made to develop without delay a completely satisfactory synthetic material for electrical insulation.

C. Construction of power plants

30. From 1959 to 1964, power plant production capacity was increased mainly by extending the existing installations and by constructing new plants. An improvement in the methods of operating the existing equipment can only result in an annual increase of from 0.3 to 0.5 million kw. The fact that a slightly higher level of electric power production has been attained than that set as a goal in the plans must be attributed to an increase in the average number of power plant operating hours.

31. The main effort has been directed to the creation of steam generating stations operating on a basis of cheap coal, natural gas and fuel oil. To this end, three types of steam-generating stations have been developed:

Capacities: 0.6 million kw (4 turbines with individual capacities of 150,000 kw)

1.2 million kw (6 turbines with individual capacities of 200,000 kw)

2.4 million kw (8 turbines with individual capacities of 300,000 kw)

32. The following are the main projects which progressed during the 1959-64 period, as far as the operational stage or up to completion:

Steam-generated stations:

- coal operated: the power plants of Dobrotvor, Lougansk Pridneprovsk, Smijevo, Staro Bechevo in the Ukraine, Beresa in Bielo-Ruthenia, Nasarovo in Eastern Siberia and Tom Usa in Western Siberia, Troisk and Verchne Tagil in the Urals, as well as Tcherepet which depends on the economic region of Oka;

- gas-operated: the power plant of Ali Bajramli in Azerbaidjan;

- oil-shale operated: the power plant of Pribaltijsk in Estonia;

- fuel-oil operated: the power plant of Sainsk situated in the economic region of the Volga;

Hydraulic generating stations:

Those of Bratsk in Eastern Siberia, Votkinsk in the Urals and Volgograd.

33. Other efforts have been directed at the development of the power system of the chemical industry, which it was planned to extend in 1964 by setting up 64 new generating sets with a total capacity of 2 million kw. In the future, this industrial sector will consume over 100 milliard kw per year.

34. Between now and 1980, it is planned to construct 180 hydraulic generating stations, 200 mixed (heating and power) regional generating stations and 260 other mixed generating stations. This plan can only be carried through if the time required for the construction work is cut down to 2 or $2\frac{1}{2}$ years for steam generating stations and to 3 to 5 years for hydraulic generating stations with a capacity of from 1.2 to 2.4 million kw.

35. In addition to steam and hydraulic generating stations, several atomic energy generating stations have been constructed. Turning to good account the experience gained with the first atomic energy station of Obninsk (capacity: 0.1 million kw) inaugurated in 1954, the atomic energy stations of Novo-Voronech (current capacity: 0.21 million kw) and of Belojarsk (current capacity: 0.1 million kw) have been brought into operation. A further atomic energy station is being constructed at Melekess near Ouljanovsk (planned capacity: 0.07 million kw). Moreover, several types of mobile atomic energy stations with an installed capacity of 500, 1,000 and 1,500 kw have been developed. The target set for the end of 1964, namely a total capacity of 0.9 million kw, has not been attained and there is no prospect of meeting the Plan's requirement of 2 million kw before the end of 1965.

36. The USSR is also developing tidal power generating stations and geothermal generating stations. The first tidal power generating station with a capacity of 1,000 kw is under construction at Kislaja Gouba near Murmansk. It is scheduled to start operating in 1965. The largest of the trial steam generating stations (5,000 kw), which is located at Pauchat, in Southern Kamchatka, will be completed before the end of 1965.

37. Particulars of these projects and of several other important plants are given in the tabular Annex to this note.

III. The electric power distribution network

38. In view of the enormous distances which separate the power plants from the consumer centres in the Soviet Union, the extension of the high-voltage supply network is of prime importance.

39. Under the seven-year Plan, electric power production was to be multiplied by 2.2, while the length of the high-voltage lines was to be trebled. In this way, it was hoped to create integrated interconnection networks in the European part of the USSR and in Western Siberia while at the same time interconnecting the networks of the North-West, the West, Transcaucasia, Kazakstan and Central Asia. For this purpose, it was planned to establish high-voltage lines with a capacity ranging from 35,000 to 800,000 kv and a total length of from 212,000 to 215,000 km.

40. From 1959 to 1962, relatively slow headway was made, for only 40% of the plans were carried out in this field. However, the works made considerable progress in 1963 and 1964 with the completion of 35,000 and 38,500 km. respectively, so that, at the end of 1964, a high-voltage network with a total length of 240,000 km. was in existence. It is planned to extend the network by 52,000 km. in 1965. Even if certain slippages occur, the plan itself will be fulfilled in essential respects.

41. The most important results of the construction of high-voltage lines are as follows:

- creation of an integrated power system in the European part of the USSR so that it is possible to interconnect power plants totalling an installed capacity of over 40 million kw;
- establishment of inter-connection facilities with the power systems of Poland, Hungary, Rumania, Bulgaria and Czechoslovakia;
- extension by about 8,000 km. of a 500,000 kV network by the establishment of the following lines:

  Volgograd hydraulic generating station - Moscow

  Kuibichev hydraulic generating station - Moscow

  Kuibichev hydraulic generating station - the Urals

  Votkinsk hydraulic generating station - Sverdlovsk
  Kousbas - Krasnojarsk - Irkutsk;
- establishment of a 800,000 kV direct current line between Volvograd and Donbass.

## IV. Consumption of fuel by steam-generating stations

42. The electric power industry is the main consumer of fuel at present. The fuel requirements of the Rajon power plants(1) amount this year to a quantity equivalent to a coal consumption of 192 million tons(2), or 20% of total resources. During the seven-year Plan, a reduction of 20% was obtained in fuel consumption for each kilowatt-hour produced; this represents an annual saving of a quantity equivalent to a coal consumption of 43 million tons.

43. From 1959 to 1965, the pattern of fuel consumption by the Rajon power plants changed as follows:

| | 1958 | | 1965 | |
|---|---|---|---|---|
| | Quantities equivalent to millions of tons of coal consumption | % | Quantities equivalent to millions of tons of coal consumption | % |
| Total | 79.1 | 100 | 192.2 | 100 |
| broken down as follows: | | | | |
| Coal | 52.5 | 66.3 | 114.7 | 59.9 |

(1) about 75% of total production capacity

(2) converted into coal consumption terms at 7,000 cal. per kg.

| | 1958 | | 1965 | |
|---|---|---|---|---|
| | Quantities equivalent to millions of tons of coal consumption | % | Quantities equivalent to millions of tons of coal consumption | % |
| Gas | 11.8 | 14.9 | 39.4 | 20.5 |
| POL | 7.4 | 9.4 | 22.6 | 11.7 |
| Peat | 6.5 | 8.3 | 10.3 | 5.3 |
| Oil-shale | 0.8 | 1.0 | 3.4 | 1.7 |
| Other fuels | 0.1 | 0.1 | 1.8 | 0.9 |

44. In 1965, the share of power plants in the total consumption of power-producing coal amounted to over 42%. The quality of the coal delivered to the power plants has appreciably deteriorated in recent years. The power plants account for the gas consumption of Soviet industry as a whole in the proportion of about 26%, or 33.5 milliard cu.m. About 30% of this quantity alone is delivered to the power plants during the summer season, when community and household consumption falls in the same proportion.

## TABLE SHOWING THE MAJOR POWER PLANTS CONSTRUCTED FROM 1959 TO 1965

| Name of power plant | Economic region | Type of power plant | Source of power | Capacity in millions of kw. situation at: End 1958 | End 1964 | End 1965 plan | Final production capacity figure |
|---|---|---|---|---|---|---|---|
| ALI BAJRAMLI | SSR of Azerbaidjan | GRESs(1) | natural gas | - | 0.6 | 0.75 | 1.05 |
| ALMA ATA | SSR of Kazakhstan | GRESs | coal | - | 0.15 | 0.15 | 0.15 |
| ANGARSK | Eastern Siberia | TEZ(2) | fuel-oil | - | 0.3 | 0.3 | |
| ANGREN (im.40-letije WLKSsM) | SSR of Uzbekistan | GRESs | coal | 0.2 | 0.6 | 0.6 | 0.6 |
| ARLAN | Central Volga | TEZ | fuel-oil | - | under construc-tion | - | 2.4 |
| ARTEM | Soviet Far East | GRESs | coal | 0.2 | 0.3 | 0.3 | 0.3 |
| ASCHCHABAD-BESMEIN | SSR of Turkmanistan | GRESs | fuel-oil | 0.024 | 0.136 | 0.186 | |
| BALACHOWO | Central Volga | TEZ | natural gas | - | 0.2 | 0.2 | |
| BARNAUL | Western Siberia | TEZ-2 | coal | 0.15 | 0.2 | 0.2 | |
| BELOJARSK (im. Kurtschtow) | Central Urals | AESs(3) | atomic energy | - | 0.1 | 0.3 | 0.3 |

(1) Gossudarstwennaja Rajonnaja Elektrostanzija - Rajon national power plant.
(2) Teplo Elektrozentral - Mixed (heating and power) generating station.
(3) Atomraja Elektrostanzija - Atomic energy generating station.

| Name of power plant | Economic region | Type of power plant | Source of power | Capacity in millions of kw. situation at: End 1958 | End 1964 | End 1965 plan | Final production capacity figure |
|---|---|---|---|---|---|---|---|
| BELOWA | Kuzbass | GRESs | coal | - | 0.2 | 0.6 | 1.4 |
| BERESA | Bielo-Ruthenia | GRESs | coal | - | 0.6 | 0.6 | 1.4 |
| BRATSK | Eastern Siberia | GESs(1) | water | - | 3.6 | 3.825 | 4.5 |
| BUCHTARMA | SSR of Kazakhstan | GESs | water | - | 0.6 | 0.6 | 0.675 |
| BURSCHTYN | Lvov | GRESs | coal | - | under construction | 0.4 | 0.4 |
| CHARKOW | Kharkov | TEZ-3 | natural gas | 0.5 | 0.15 | 0.2 | |
| CHRAM | SSR of Georgia | GESs-2 | water | - | 0.11 | 0.11 | |
| DNEPRODSERSHINSK | Dnieper | GESs | water | - | 0.35 | 0.35 | 0.35 |
| DNEPROWSK II | Dnieper | GESs | water | - | under construction | - | 0.75 |
| DOBROTWOR | Ljwow | GRESs | coal | - | 0.7 | 0.7 | 0.7 |
| DOROGOBUSH | Moscow | GRESs | coal | 0.1 | 0.15 | 0.2 | |
| DSCHAMBUL | SSR of Kazakhstan | TEZ | gas | - | 0.18 | 0.28 | - |
| DSERSHINSK | Volga-Viatka | TEZ | coal | - | 0.1 | 0.15 | |
| DSHESKASGAN | SSR of Kazakhstan | TEZ | coal | 0.15 | 0.2 | 0.2 | |
| DUSCHANBE | SSR of Tadjikistan | TEZ-2 | natural gas | - | 0.118 | 0.218 | 0.218 |

(1) Gidroelektrostanzija - Hydraulic generating station.


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| Name of power plant | Economic region | Type of power plant | Source of power | Capacity in millions of kw. situation at: End 1958 | End 1964 | End 1965 plan | Final production capacity figure |
|---|---|---|---|---|---|---|---|
| FRUNZE | SSR of Kirghizia | TEZ | coal | - | 0.25 | 0.35 | 0.45 |
| GOLOWNAJA | SSR of Tadjikistan | GESs | water | - | 0.21 | 0.21 | 0.21 |
| INGURI | SSR of Georgia | GESs | water | - | under construc-tion | - | 1.63 |
| JAJWA | Western Urals | GRESs | coal | - | 0.3 | 0.6 | 0.6 |
| JAROSSLAWL | Upper Volga | TEZ-3 | | - | 0.10 | 0.15 | |
| JEREWAN | SSR of Armenia | TEZ | natural gas | - | 0.2 | 0.4 | 0.4 |
| JERMAK | SSR of Kazakhstan | GRESs | coal | - | under construc-tion | - | 2.4 |
| JUSHNO-URALSK | Southern Urals | GRESs | coal | 0.2 | 1.0 | 1.0 | |
| KAMENSK | Western Siberia | GESs | water | - | under construc-tion | - | 0.5 |
| KANEW | Kijew | GESs | water | | under construc-tion | - | 0.42 |
| KRAGANDA | SSR of Kazakhstan | GRESs | natural gas | - | 0.3 | 0.3 | 0.3 |
| KARMANOWO | Central Volga | GRESs | coal | - | under construc-tion | - | 2.4 |



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| Name of power | Economic region | Type of power | Source of power | Capacity in millions of kw. situation at: End 1958 | End 1964 | End 1965 plan | Final production capacity figure |
|---|---|---|---|---|---|---|---|
| KASAN | Central Volga | TEZ-2 | gas | 0.1 | 0.225 | 0.225 | |
| KASCHIRA | Moscow - rural district | GRESs | coal | 0.186 | 0.486 | 0.786 | 1.2 |
| KIJEW | Kijew | GESs | water | - | 0.016 | 0.066 | 0.328 |
| KIJEW-DARNIZA | Kijew | TEZ | | 0.15 | 0.25 | 0.25 | 0.25 |
| KIRISCHI | Leningrad | GRESs | fuel-oil | - | under construction | - | 1.35 |
| KIROW | Volga Viatka | TEZ-4 | coal | - | 0.1 | 0.15 | |
| KONAKOWO | Moscow | GRESs | natural gas | - | 0.3 | 0.9 | 2.4 |
| KOSTROMA | Upper Volga | GRESs | natural gas | - | under construction | - | 2.8 |
| KRASSNODAR | Northern Caucasus | TEZ | gas | - | 0.45 | 0.6 | 0.6 |
| KRASSNOJARSK | Krasnojarsk | GESs | water | - | under construction | - | 5.0 |
| KREMENTSCHUG | Dnieper | GESs | water | - | 0.67 | 0.67 | 0.67 |
| KRIWOJ ROG | Dnieper | GRESs-2 | coal | - | under construction | 0.3 | 2.4 |


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| Name of power plant | Economic region | Type of power plant | Source of power | Capacity in millions of kw. situation at: End 1958 | End 1964 | End 1965 plan | Final production capacity figure |
|---|---|---|---|---|---|---|---|
| KURGAN | Southern Urals | TEZ | | 0.075 | 0.275 | 0.275 | |
| KURSK | Centre of the black earth region | TEZ-1 | | 0.05 | 0.2 | 0.2 | 0.2 |
| KUTSCHURGAN | Moldavia | GRESs | natural gas | - | 0.2 | 0.6 | 1.2 |
| LJUBERZY | Moscow-town | TEZ-22 | coal | - | 0.3 | 0.4 | 0.4 |
| LUGANSK | Donets | GRESs | coal and natural gas | 0.7 | 1.5 | 1.5 | 2.3 |
| MINSK | Bielo-Ruthenia | TEZ-3 | natural gas | 0.15 | 0.4 | 0.4 | |
| MOSKAU | Moscow-town | TEZ-9 | coal | 0.15 | 0.25 | 0.25 | |
| MOSKAU | Moscow-town | TEZ-11 | coal | 0.15 | 0.25 | 0.25 | |
| MOSKAU | Moscow-town | TEZ-12 | coal | 0.15 | 0.25 | 0.25 | |
| MOSKAU | Moscow-town | TEZ-16 | coal | 0.1 | 0.2 | 0.3 | |
| MOSKAU | Moscow-town | TEZ-20 | coal | 0.15 | 0.45 | 0.55 | |
| MOSKAU-CHOWRINO | Moscow | TEZ-21 | coal | - | 0.3 | 0.3 | |
| NASAROWO | Krasnojarsk | GRESs | coal | - | 0.75 | 0.9 | 1.9 |
| NAWOJ | SSR of Uzbekistan | GRESs | natural gas | - | 0.35 | 0.35 | 0.6 |
| NEWINNOMYSSK | Northern Caucasus | GRESs | natural gas | - | 0.3 | 0.45 | 0.45 |
| NISHNEKAMSK | Western Urals | GESs | water | - | under construction | - | 1.0 |



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| Name of power plant | Economic region | Type of power plant | Source of power | Capacity in millions of kw. situation at: End 1958 | End 1964 | End 1965 plan | Final production capacity figure |
|---|---|---|---|---|---|---|---|
| NOWOKUJBYSCHEWSK | Central Volga | TEZ-2 | fuel-oil | - | 0.1 | 0.1 | |
| NOWORJASAN | Moscow - rural district | TEZ | fuel-oil | - | 0.1 | 0.1 | |
| NOWOTROIZK | Southern Urals | TEZ | coal | 0.1 | | 0.2 | |
| NOWOTSCHERKASSK | Northern Caucasus | GRESs | coal | - | - | 0.3 | 2.4 |
| NOWOWORONESCH | Centre of the black earth region | AESs | atomic energy | - | 0.21 | 0.21 | 0,575 |
| NUREK | SSR of Tadjikistan | GESs | water | - | under con-struction | - | 2.7 |
| OMSK | Western Siberia | TEZ-3 | coal | 0.25 | 0.4 | 0.45 | |
| PAWLODAR | SSR of Kazakhstan | TEZ-1 | coal | - | 0.05 | 0.1 | |
| PAWLODAR | SSR of Kazakhstan | TEZ-2 | coal | - | 0.1 | 0.1 | 0.1 |
| PETROPAWLOWSK | SSR of Kazakhstan | TEZ-2 | coal | - | 0.2 | 0.25 | |
| PLJAWINSK | SSR of Latvia | GESs | water | - | under con-struction | 0.33 | 0,825 |
| POLOZK | Bielo-Ruthenia | TEZ-2 | fuel-oil | - | 0.15 | 0.15 | |


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| Name of power plant | Economic region | Type of power plant | Source of power | Capacity in millions of kw. situation at: End 1958 | End 1964 | End 1965 plan | Final production capacity figure |
|---|---|---|---|---|---|---|---|
| PRIBALTIJSK | SSR of Estonia | GRESs | oil-shale | - | 1.2 | 1.6 | 1.6 |
| PRIDNEPROWSK | Dnieper | GRESs | coal | 0.5 | 1.8 | 2.1 | 2.4 |
| RAJTSCHICHINSK | Khabarowsk | TEZ | coal | 0.05 | 0.05 | 0.15 | |
| SAINSK | Central Volga | GRESs | fuel-oil | - | 0.8 | 1.2 | 1.2 |
| SCHTESCHJOKINO | Oka | GRESs | coal | 0.6 | 0.6 | 1.0 | |
| SMIJEWO | Kharkov | GRESs | coal | - | 1.0 | 1.2 | 2.4 |
| SSAJAN | Krasnojarsk | GESs | water | - | under con-struction | - | 6.3 |
| SSARATOW | Volga | GESs | water | - | under con-struction | - | 1.3 |
| SSLAWJANSK | Donets | GRESs | coal | - | under con-struction | - | 0.8 |
| SSREDNE-URALSK | Central Urals | GRESs | coal | 0.25 | 0.25 | 0.35 | |
| STARO BESCHEWO | Donets | GRESs | coal | 0.1 | 1.5 | 1.9 | 2.3 |
| TASHKENT | SSR of Uzbekistan | GRESs | natural gas | - | 0.3 | 0.6 | 1.2 |
| TBILISI | SSR of Georgia | GRESs | natural gas | - | 0.3 | 0.45 | 0.6 |



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| Name of power plant | Economic region | Type of power plant | Source of power | Capacity in millions of kw. situation at: End 1958 | End 1964 | End 1965 plan | Final production capacity figure |
|---|---|---|---|---|---|---|---|
| TICHWIN | Leningrad | GRESs | | 0.4 | 0.4 | 0.6 | 0.8 |
| TJUMEN | Central Urals | TEZ | peat | - | 0.1 | 0.15 | |
| TOKTOGUL | SSR of Kirghizia | GESs | water | - | under con-struction | - | 1.2 |
| TOLJATTI | Central Volga | TEZ | | - | 0.2 | 0.2 | 0.25 |
| TOM USA | Kuzbass | GRESs | coal | 0.1 | 1.1 | 1.1 | 1.1 |
| TROIZK | Southern Urals | GRESs | coal | - | 0.6 | 0.9 | 1.5 |
| TSCHARWAK | SSR of Uzbekistan | GESs | water | - | under con-struction | - | 0.6 |
| TSCHELJABINSK | Southern Urals | TEZ-1 | coal | 0.25 | 0.45 | 0.45 | |
| TSCHELJABINSK | Southern Urals | TEZ-2 | coal | - | 0.1 | 0.1 | |
| TSCHEREPET | Oka | GRESs | coal | 0.6 | 1.2 | 1.2 | 1.2 |
| TSCHEREPOWEZ | Leningrad | TEZ | coal | 0.06 | 0.1 | 0.1 | 0.16 |
| TSCHERNIGOW | Kijew | TEZ | | - | 0.1 | 0.1 | |
| ULAN UDE | Eastern Siberia | TEZ | coal | 0.075 | 0.15 | 0.15 | |
| UST ILIM | Eastern Siberia | GESs | water | - | under con-struction | - | 4.5 |


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| Name of power plant | Economic region | Type of power plant | Source of power | Capacity in millions of kw. situation at: End 1958 | End 1964 | End 1965 plan | Final production capacity figure |
|---|---|---|---|---|---|---|---|
| UTSCH KURGAN | SSR of Kirghizia | GESs | water | - | 0.18 | 0.18 | 0.18 |
| VASSILJEWITSCHI | Bielo-Ruthenia | GESs | peat | 0.05 | 0.20 | 0.20 | |
| VERCHNE TAGIL | Central Urals | GRESs | coal | 0.6 | 1.4 | 1.6 | 1.6 |
| VERCHNE TULOMA | Murman | GESs | water | - | 0.055 | 0.225 | 0.225 |
| VIEWISS | SSR of Lithuania | GRESs | natural gas | - | 0.45 | 0.6 | 1.2 |
| VLADIMIR | Upper Volga | TEZ-2 | natural gas | - | 0.1 | 0.15 | |
| VOLGOGRAD | Lower Volga | GESs | water | 0.345 | 2.53 | 2.53 | 2.53 |
| VOLSHSKIJ | Lower Volga | TEZ | natural gas | - | 0.15 | 0.25 | |
| VORKUTA | ASSR of Komi | TEZ-2 | coal | 0.15 | 0.20 | 0.20 | |
| VOTKINSK | Western Urals | GESs | water | - | 1.0 | 1.0 | 1.0 |