4. The Rise of Electrification, 1914–1917

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CHAPTER 4

The Rise of Electrification,
1914–1917

World War I was the single most important factor in the transition from electrification in Russia to Russian electrification. The war drastically worsened the environment for utilities, which lost their technology, financing, and fuel just as military requirements sharply increased demand for electricity. This inability to satisfy wartime needs brought electric power to the attention of state officials and industrialists more effectively than a score of prewar petitions. The war forced the government to recognize the economic importance of electro-technology, but the state’s response was too little, too late, and too disorganized to forge an accommodation with the private sector and electrical engineers.

The rise in the economic importance of electric power stimulated a parallel political rise of Russian electrical engineers. The war hastened the respectability and seeming inevitability of planning Russia’s economic future among government officials, industrialists, and engineers. The leaders of the electrical engineering profession, such as Piotr S. Osadchii, proved no exception. Their postwar expectations, framed within the existing political and economic system, laid the groundwork for far-reaching proposals to transform radically the Russian economy by electrification. By war’s end, the regional station had started to acquire political as well as economic significance.
Government and Quasi-Government Responses

World War I marked a watershed in government–society relations by forcing greater and more intrusive state control of the economy. This increasing role began from necessity as a war expected to last a few months stretched into years, but increasingly it derived from an ideological construct that equated state planning and control with a country’s basic interests.

The initial tsarist actions were a response to shortages and not the product of an activist policy. The government’s first attempt to improve the industrial contribution to the war was the establishment of the Special Council for the Reinforcement of the Artillery Supply for the Army in May 1915. Four months later, the government created the Special Council for State Defense, with participation by the duma, the state council, ministries, and the private Central War Industries Committee. Direct state control of the economy further increased with the creation of special councils for transport, fuel, and food supply in 1916. Each council signaled the failure of normal procedures to meet the war’s unprecedented demands.

As initial enthusiasm subsided into a realization that the war would not end quickly, the scientific and technical communities tried to contribute more than sanitation and food units for the front. As a summer 1915 Imperial Academy of Sciences article enthusiastically proclaimed, “All for war! Victory—a matter for each and every one! Eleven months’ knowledge of war has shown that the present war is in significant measure a war of technology and science, a war of the creative forces of the country.” Even in the early days of the war, engineers contemplated their potential contributions for the war and postwar period. In October 1914, the prescient mechanical engineer Vasilii I. Grinevetskii, rector of the Moscow Higher Technical School, declared that the two main tasks for engineers were to assist the wartime conversion of industry and to prepare for the postwar period. Grinevetskii accurately predicted the wartime goals of the electrical

4 Spravochnoe byuro Akademii nauk, *Mobilizatsiia tekhnicheskikh sil*, no. 1: 6, no date but probably printed in August 1915 and published with *Elektrichestvo* and other technical journals. The Library of Congress 1915 volume of *Elektrichestvo* contains three issues.
engineering leadership. For the war effort, scientific and technical societies needed to collect information on the German role in Russia’s economy, compare domestic industry with its foreign competitors, and propose economic policy. The main postwar task would be to overcome dependence on German technology, which would demand a unified technical profession, better technical education, and rationalization of Russian industry.5

The first attempt to mobilize the country’s scientific and technological forces came from the Imperial Russian Technical Society. In late 1914, the society created an information bureau for industry and state and local governments. Inquiries peaked in July 1915 at fifty a month, then decreased as new organizations and more published information fulfilled these needs.6 By late 1915, newly created organizations had assumed the task of harnessing science and technology for the war. These organizations ranged from small, institutional committees to the nation-spanning war industries committees. An example of the former was the Committee for Military Technical Assistance, established in July 1915 by the Society of Electrical Engineers. The committee produced artillery shells in the St. Petersburg Electrotechnical Institute, repaired instruments, and trained students.7 The best known example of scientific mobilization was the Committee for the Study of Natural Productive Forces of Russia (KEPS) of the Imperial Academy of Sciences, which functioned through the early years of Bolshevik rule.8 These attempts to aid the war effort despite state opposition contributed to the technical intelligentsia’s growing desire to become involved in postwar policy.9

The engineers’ enthusiasm to employ their skills paralleled the business support manifested in the war industries committees. Pushed on a reluctant, at times hostile, national government by Mos-

5 V. I. Grinevetskii, Tekhniko-obshchestvennye zadachi v sfere promyshlennosti i tekhniki v sviazi s voinoi (Moscow: Biulleten Politekhnicheskogo obschestva, 1914), 1, 9–15.
cow industrialists and the Association of Industry and Trade, "the principal representative and defender of large-scale industrial interests,"10 these committees sought to incorporate small- and medium-scale enterprises into the war effort, rationalize industrial policy, and act as clearinghouses for military orders and allocations of resources. The Central War Industries Committee (TsVPK, Tsentralnyi voenno-promyshlennyi komitet), created in May 1915, oversaw regional and local branches. By January 1916, thirty regional and two hundred local committees had formed. Many—fifty-nine in 1917—managed factories.11 Hostile to finance capital and big business, to government and bureaucracy, the war industries committees were the pinnacle of middle-class business organization. Politically, they marked an extension of the struggle between the government and the business community and an attempt, according to Lewis Siegelbaum, "to project onto an all-Russian scale a plan for victory in the war and through it the future industrial development of the country."12 Like many organizations formed in troubled times, the promise and vision of these committees exceeded their accomplishments.

The TsVPK established an electrotechnical section in September 1915.13 A bureau composed of a president, Petrograd physics professor Aleksandr A. Voronov, and three members (including Bolshevik Leonid B. Krasin14) coordinated the section's efforts to supply the military with equipment and to secure power, electrical equipment, and materials for private and governmental enterprises.15 The section represented the electrical engineering elite of Russia in industry, academia, and the VI Section.16 It worked closely and amicably with industry, government, and the VI Section to discuss common concerns, collect and disseminate information, and attempt solutions. In 1915, for example, a TsVPK survey found 53 MW of surplus power

12 Siegelbaum, Politics of Industrial Mobilization, 48.
13 Mobilizatsiia tekhnicheskikh sil, no. 1: 3.
14 The other two were engineer Evgenii Ia. Shulgin and professor Vladimir F. Mitkevich.
16 The VI Section elected eight of the thirty members; “Deiatel’nost VI,” Elektrichestvo, 1915, no. 20: 171; see also “Deiatel’nost VI,” Elektrichestvo, 1916, nos. 7–8: 136.
at provincial power stations theoretically available. The TsVPK sent this information to evacuated factories and firms interested in building defense factories.

Overall, the war industries committees brought more disorganization than organization to the chaos of Russian economic reality. Compared with other parts of the TsVPK and the regional and local branches, the electrotechnical section rates rather favorably. It contributed toward maintaining the Russian electrotechnical industry under increasingly demanding circumstances. The section's relative success stemmed from not operating factories directly and from the community of interests it represented. More important, it represented the first time the electrical engineering community organized to solve national needs. This would be but the first of several efforts.

Imports

The immediate problem facing utilities was their severe dependence on foreign equipment. Although domestic firms manufactured half of Russia's electrotechnical needs, some equipment, such as instruments, was not manufactured domestically and other equipment was not produced in sufficient quantities to meet demand. The most advanced equipment, such as the large turbogenerators powering first-tier utilities, was all foreign.

Utilities used three approaches to overcome these deficiencies: covert imports from enemy countries, imports from friendly and neutral countries, and domestic production. The first approach was initially most popular. Importers used Switzerland and Stockholm as transfer points, but the tsarist government's insistence on knowing the nation of manufacture eventually blocked these paths, although the MTP decree of 22 September 1915 prohibiting enemy imports exempted electrical and other equipment. Several factors limited imports from

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18 See Siegelbaum, Politics of Industrial Mobilization, 158.
20 "Obshchii ocherk zadach," 34; S. A. Gusev, Razvitie sovetskoi elektrotekhnicheskoi promyshlennosti (Moscow: Energiia, 1964), 12.
21 "Otdela TsVPK," Izvestiia Tsentralnogo voenna-promyshlennogo komiteta, 15 September
friendly and neutral counties. Gaining government authorization to purchase foreign goods was difficult. The menace of German submarines further limited imports. Only two ports, Vladivostok and northern Archangel, remained open during the war. Only the trans-Siberian railroad linked the former with European Russia, and the latter lacked a good railroad. Increasing domestic production ultimately received the most attention, but it also failed to meet demand. The TsVPK electrotechnical section encouraged domestic production of key materials, such as sheet iron for transformers, and equipment, such as measuring instruments, but the Russian electrotechnical industry could neither meet this demand nor manufacture the high-technology equipment.22

Nationalization

The large cities—Petrograd, Moscow, and Kiev—fulfilled their long-standing goals of directly controlling their utilities under the aegis of a broader popular movement to sequester enemy-owned enterprises.23 Cities, aided by public hostility against Germany and Germans,24 justified their efforts as the "quick liberation of the population . . . from subjugation by German enterprises."25 A self-nationalization had already occurred when Russians replaced German and Austro-Hungarians as workers, foremen, and directors of the 1886 Company and Elektroperedacha. Since Russian engineers had been moving up the management hierarchy, this takeover proved more one of degree than of kind, save for the new, direct role of the tsarist and local governments.26

The tsarist government moved fairly quickly against the economic

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1915, 3; M. O. Kamenetskii, Robert Eduardovich Klasson (Moscow: Gosenergoizdat, 1963), 118; Boris E. Nolde, Russia in the Economic War (New Haven: Yale University Press, 1928), 32–42.

22 "Obshchii ocherk zadach," 34.

23 Elsewhere, Dvinsk and Omsk sequestered electric stations, while Baku’s efforts to seize Elektricheskaia Sila failed; "Po russkim gorodam," Elektrichestvo, 1914, nos. 17–18: 412; 1916, nos. 19–20: 297.

24 A Moscow newspaper called on consumers to protest against the 1886 Company by not paying their rates; by May 1915, the company had lost 5.4 million rubles; see Kamenetskii, Klasson, 113.


26 TsGANKh f. 9508, op. 1, ed. kh. 14, 3.
activity of enemy citizens. A law of 22 September 1914 prohibited the purchase of property by enemy nationals. Further laws in 1915–16 confiscated or closed enemy-owned enterprises. City actions against electric utilities paralleled these state laws. As early as November 1914, the Moscow duma discussed seizing the 1886 Company and Elektroperedacha, and in March 1915 it formally asked the state to liquidate them. The Kiev duma moved along the same lines against the Kiev Electric Company in early 1915. Petrograd pursued the most aggressive route to acquire and unify its three foreign-owned utilities. The city had established a commission in April 1914 to plan the buyout of its three concessions under the terms of the model agreement. Despite financially based arguments to buy only the 1886 Company and opposition from the firms, the duma voted by a two-to-one margin in April 1915 to purchase all three concessions in 1917–18.

The state moved slower than the cities against the utilities. In July and October 1915, the Council of Ministers approved special governing boards for the 1886 Company, Elektroperedacha, and the Company for Electric Regional Stations, the offshoot of the 1886 Company in Petrograd. The Imatra Company had earlier purchased the Company for Electric Regional Stations in an unsuccessful effort to avoid sequestration. The boards consisted of representatives of ministries and the appropriate city government without any industrial or TsVPK participation, despite a request by the Moscow Society of Factory and

27 Before this law, the military council of the Caucasus command rejected the application of a German citizen, Emílio Tsart, for a power plant concession on grounds of awkwardness; “Po russkim gorodam,” Elektrichessto, 1914, no. 16: 395.
28 Nolde, Russia in the Economic War, 74–100.
29 “Po russkim gorodam,” Elektrichessto, 1914, no. 20: 444.
31 “Po russkim gorodam,” Elektrichessto, 1915, no. 4: 84.
34 TsGIAL f. 23, op. 27, d. 841, 74; f. 23, op. 28, d. 1913, 1–2; f. 23, op. 28, d. 2562, 100–104, 128–38; “Po russkim gorodam,” Elektrichessto, 1915, no. 4: 83–84; 1915, no. 17–18: 342; 1916, no. 10: 186. The 1886 Company case served as the basis for the two laws empowering the Council of Ministers to appoint receivers; see Nolde, Russia in the Economic War, 91.
35 TsGIAL f. 23, op. 28, d. 2562, 8.
Mill Owners for representation. By February 1917, the state Special Committee on the Struggle with German Dominance completed a plan to sell the stock of the five largest foreign electrical and electro-technical companies, including the 1886 Company and Elektroperedacha, on 1 June 1917. Old firms would dissolve and new companies form. Russian, neutral, and friendly nationals could have their stock converted, a diplomatic concession to Belgium and France. Private investors, the Moscow and Petrograd governments, and the treasury would each hold approximately one-third of the stock, which would add 30 million rubles of new capital to the utilities. Here, as elsewhere, the tsarist government moved too slowly.

War and the Utilities

The war placed the utilities in a "scissors crisis," trapped between greatly increased demand for electric energy and decreased availability of fuel, equipment, and skilled personnel. These problems worsened over time. The sharp reduction in imported equipment halted expansion and adversely affected existing operations. Although the increase in industrial demand affected the first tier worst, utilities everywhere suffered from shortages and restrictions. By mid-1916, the major problems were the loss of trained staff to conscription, stations with too few defense industries to receive official priority for fuel and materials, and the increasing disarray of the economy. Nonetheless, utility output increased through 1916 in response to the war's vast industrial demands. These immediate needs were satisfied at the expense of the health of the physical plant and the nondefense industrialist, businessman, and private individual.

The first shortages, carbon rods for arc lamps, occurred in late 1914. Three factories had supplied the prewar market. German forces occupied one; serious supply problems plagued the second, located in the war zone; and the third had depended on the first for its soot supply.
Cities responded by replacing arc lamps with incandescent bulbs and reducing usage. By late 1916, lighting restrictions overshadowed the shortage of rods.

Fuel shortages dominated utility needs by late 1916 because of the greatly increased industrial demand, a railroad system strained by military demands, and a cessation of coal imports to Petrograd. From 1913 to 1915, Petrograd's coal imports dropped more than 90 percent, from 8.7 to 0.6 million tons, necessitating urgent attempts to deliver Donets coal and Black Sea oil to supply the city's vital defense industry. The city government immediately understood its vulnerability. On 21 August 1914, the uprava established a special commission on fuel, the first of many state and local government efforts.

In March 1915, a coal squeeze prompted more systematic procedures to save electricity. Only the transfer of coal stocks from the hospital and Nikolaevsk railroad averted a shutdown of the tram system. By mid-1915, an MTP committee worked on regulations to reduce electricity use, while the naval ministry proposed urgent measures to minimize all nonproductive electrical uses in the capital. Finally, the governor of the region announced restrictions aimed at preserving fuel and electric energy for defense-related factories and workshops. The regulations banned electric lighting for advertisements and building exteriors near street lighting, limited lighting for doorways, and substituted incandescent for arc lights. The more drastic MTP measures limited hours of operations for commercial establishments and greatly curtailed street lighting.

These measures proved insufficient. On 28 October 1915, the city duma authorized its head, D. I. Demkin, to take the necessary measures to ward off a shutdown by the 1886 Company threatened for 30 October. With this threat in the background, Demkin negotiated with the MVD, MTP, and Ministry of Communications for guaranteed monthly allotments of Donets coal.

41 E. g., Rostov-on-Don and Tiflis; "Po russkim gorodam," Elektrichesvo, 1914, no. 16: 395.
43 Osobaia komissiia po toplivu, Otchet po operatsiiam s donetskym i angliiskim (poluchen­nym cherez Arkhangelsk) uglem i drovamu (St. Petersburg: Petrogradskaiia gorodskaiia up­rava, 1915).
In 1916, the capital had 105 stations with 193 MW. One hundred one of these were industrial and had an average capacity of 1 MW, small by the standards of the 1886 Company but still larger than most Russian utilities. The city’s four utility stations accounted for nearly half of the 193 MW and 60 percent of the 478 MkWh generated. Until the 1886 Company warned its subscribers of power cuts, Petrograd contained twenty-six idle factory plants with 2 MW. Fear of electricity cuts prompted many factory operators to reopen their closed stations, which operated less efficiently than utilities. The consequent demand for electrical equipment and fuel triggered efforts by the city and the TsVPK electrotechnical section to coax guarantees from the 1886 Company to supply these factories. Overloading worsened. By October 1916, the MTP had a list of 1,500 industrial and private users to cut when the industrial load had to be reduced. Despite the disruptions to the city’s industrial life, cuts occurred. In February 1917, the 1886 Company had only a week’s supply of coal, while the two other concessions literally operated on a shipment-to-shipment basis.

Severe fuel shortages spared Moscow in 1915 because of its closeness to southern fuel supplies and the peat-fired Elektroperedacha. The standoff between the city duma and Elektroperedacha ended in late 1915 when the duma, under MTP pressure, allowed the 1886 Company to receive power from Elektroperedacha. The Moscow uprava proved equally unwilling to enact MTP conservation measures, prompting the commander of the Moscow military district to order their implementation in autumn 1915.

As early as 1915, shortages prompted other cities to mandate cutbacks during peak periods. Utilities justly feared operating at full capacity without reserves, backup equipment, needed maintenance, and a fully trained staff. Despite these problems, surprisingly few blackouts occurred. A major exception was Baku, where the great

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49 TsGIAL f. 23, op. 27, d. 123, 6–7.
51 “Iz gazet,” Elektrotekhnicheskoe delo, 1915, no. 10: 19; Kamenetskii, Klasson, 105–8; Gleb V. Lipenskii, Moskovskaya Energeticheskaia (Moscow: Moskovskii rabochii, 1976), 20–23.
53 E. g., Kiev and Odessa; ibid., 1916, no. 1: 31; no. 4: 92; nos. 19–20: 297.
54 E. g., Rostov-on-Don; ibid., 1916, nos. 19–20: 297.
pressure to increase oil output caused a three-day blackout in summer 1915. The investigation by professor Mikhail A. Shatelen for the Special Council on Fuel blamed the problems on severe overloading and not the suspected sabotage.55

By late 1915, the state and private organizations had formed several groups to mitigate fuel shortages. The Special Council on Fuel established a heating commission in June 1916 to decrease consumption, increase fuel availability, and explore alternative fuels.56 Two of its six sections dealt with regional electric stations, local fuels, and water power.

In December 1915, the Bureau of the Unified Technical Organizations in Moscow founded a heat committee to work with the Special Council on Fuel. Under the guidance of three professors at the Higher Technical School—Karl V. Kirsh, Vasilii I. Grinevetskii, and Karl A. Krug—the heat committee worked to ease fuel shortages and lay the groundwork for postwar development.57 The committee became a major center of technocratic thinking and alternative fuels research.58 Its peat section, for example, worked to increase use of the low-quality fuel in the Central Industrial Region to free higher-quality coal and oil for other industrial centers.59 Peat and oil partially supplanted Donets coal as primary fuels in the Central Industrial Region.60 For the Petrograd region, wood became the fuel of choice, but as the fuel situation deteriorated the city even considered coal wastes—as a substitute for wood.61

The absence of new equipment to replace existing plants or expand capacity aggravated the utilities' problems. MVD authorization for foreign or domestic generators did not guarantee delivery.62 The rare

55 TsGIAL f. 23, op. 27, d. 841, 69–70. For the full report and the company's response, see ibid., d. 2554, 55–73.
59 Kirsh, “Teplovoi komitet.”
61 For coal, see “Kronika Ts.v.-pr. komiteta,” Izvestiia TsVPK, 9 September 1915, 3, and 24 October 1915, 2; for coal wastes, see ibid., 1 January 1917, 3, and “Iz gazet,” Elektroteknicheskie delo, 1917, no. 2: 15.
utility selling old equipment did quite well. Concern quickly shifted from expansion to maintenance of existing equipment. By 1916, many utilities simply refused to connect new consumers because of a lack of cables and other equipment. For support they could point to resolutions issued by the Special Council on Fuel in December 1915 and June 1916. Tariffs rose in response to higher costs as early as 1914. By early 1916, more than twenty cities had raised rates and restricted nondefense consumption.

Despite these problems, electricity generation grew (see graph 4.1). In the Central Industrial Region, output by eighteen utilities rose by a third from 1915 to 1916. The transfers of a 5-MW turbine from Moscow and a 10-MW turbine to the 1886 Company from the unfinished Utkina Zavod project of the Company for Electric Regional Stations gave Petrograd greater capacity in 1917 than in 1913. The first-tier utilities registered the biggest gains, increasing their output from 1913 to 1916 by 180-185 percent. Petrograd utilities increased their output from 158 to 289 MkWh, Moscow output grew from 131 to 244 MkWh, and Baku output rose from 110 to 191 MkWh. This output would not be surpassed for a decade.

Regional Stations

If the diffusion of mass production was the war’s most significant industrial innovation, the utility equivalent was the promotion of large electric stations and interconnections to the exclusion of alternative lines of development, a trend that continued after the war. In the United States, government restrictions on coal purchases and the expanded demand for electricity nearly doubled industrial reliance on coal.
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Graph 4.1. Electricity generation, 1913–16


central stations from 1914 to 1919. In Germany, the government financed the construction of a 128-MW plant fueled by brown coal (lignite) to supply the electricity needed for munitions manufacture.

In Russia, the prewar interest in regional stations gathered wartime momentum from fuel shortages, increasing prices, and rapidly growing demand. The concentration of defense industries in Petrograd and Moscow, a reversal of prewar trends toward a more geograph-


ically dispersed industrialization, further contributed to this drive. By 1917, regional stations were planned for Petrograd, Moscow, and the Donets basin. Most significant, the circle of prospective operators had expanded from utilities to industrialists and the War Ministry. The seizure of Moscow and Petrograd utilities and the wartime industrial demands had passed the political initiative to this new set of economically and politically powerful actors, who proposed building Russia's largest stations. Electrical engineers now had the ear of industry and parts of government.

As fuel shortages grew, interest in hydropower for Petrograd increased. Governmental bodies, semigovernmental bodies, the city government, and private firms launched separate efforts in 1916 to build hydrostations, efforts that ultimately fell victim to bureaucratic confusion and the worsening economy. The Moscow-based heat committee called for a permanent body to develop a national plan for "white coal." The fuel commission of the Special Council on Fuel created a section to substitute hydropower for coal. A Petrograd duma commission proposed a gigantic 200-MW station near Vyborg, Finland, a hydrostation on the Volkhov River, and reconstruction and unification of the city utilities to meet the expected 1917-20 demand.

By February 1917, two ambitious proposals promised hydroelectric operations in 1918. The War Ministry planned to harness the Imatra Falls exclusively for the city's defense industries. The ministry intended to manage the project by a special committee with powers such as those observed in England and the United States. This proposal marked the first government plan to operate a large hydrostation. If implemented, the project would have reintroduced the military as a key factor in electric power. The second scheme, by the Finnish firm Fors, intended to use the Vallinkosk Falls to supply both Petrograd and the Finnish state railroad. A third effort, by Vodopad (Waterfall), a joint venture by the Petrograd Company for Electric Transmission and Fors, unsuccessfully sought a concession for the Imatra and Volkhov rivers.

74 "Khronika," Izvestiia TsVPK, 16 February 1917, 3.
77 TsGIAL f. 634, op. 1, ed. kh. 261, 3-8; “Iz gazet,” Elektricheskoe delo, 1915, no. 10: 17.
Farther south, large-scale power meant peat and mine-mouth coal plants. The Moscow Society of Factory and Workshop Owners again tried to build a regional station to alleviate a serious situation of inadequate and expensive fuel. The society’s peat-burning 25–30-MW plant would provide power at half the prewar cost of Donets coal. The site of the proposed plant later housed the Soviet Shatura station. As in Petrograd, the lack of legal authorization for transmission lines stymied these ambitious plans.  

The Donets basin was another emerging area of consumption as coal mining converted from steam to electric power. Generation of electricity had grown tenfold in the decade before 1914, and wartime demand accelerated that trend. In 1916, two companies thought the aggregate demand large enough for regional stations to serve the mines and surrounding cities such as Ekaterinoslav. Ugletok (Coal Current) proposed coal slag, a mining byproduct, to fuel a 20-MW station with potential to expand to 60 MW. The company intended to build two additional stations to free high-quality coal for use elsewhere. The initial plant would be the fifth largest in Russia. The company planned to start operations in January 1918 and received recognition as an enterprise serving the state defense. The Electric Company for the Donets Basin also intended to serve the area’s extractive industries and had enlisted some of Russia’s leading electrical engineers, including Semen D. Gefter, Aleksandr G. Kogan, and professor Mikhail K. Polivanov.

Despite these industrial efforts, continuing disagreements between the MVD and MTP prevented passage of a law regulating hydro-power and transmission lines. The ministries produced conflicting proposals in 1915–16 for transmission lines, and the MTP also developed a broader proposal for an MTP monopoly on long-distance transmission. The MVD criticized this proposal as favoring state over municipal governments and monopoly concessions over municipal operations, as well as for creating undue centralization. Even the

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82 TsGIAL f. 23, op. 27, d. 841, 57–61, 89.
demands of war could not force the MVD and MTP to work together. Military demands focused attention sufficiently for the Council of Ministers in 1916 to create a special conciliation committee to determine MTP–MVD responsibilities for hydropower and long-distance transmission. Only after the February revolution did the committee accomplish its task. In the interrum, Petrograd, Moscow, and other cities suffered.

New Needs, New Dreams

DURING THE WAR, the electrical engineering leadership embraced the idea of widespread electrification and proposed far-reaching state plans for economic and social transformation. The evolution of the electrical engineering leadership into electrification advocates paralleled the growing conviction among industrialists, government officials, and engineers that state planning offered a favorable, directed environment for industry to grow, prosper, and enrich the nation.

In a major shift from prewar MTP interest in economic regularity and predictability, wartime thinking focused on industrial growth in an internationally competitive economy. Competing visions of the future of Russian industry quickly surfaced. Some, such as Vladimir I. Kovalevskii, director of the Department of Trade and Industry from 1892 to 1900 and president of the Imperial Russian Technical Society from 1906 to 1916, almost welcomed the war as an opportunity to throw off the shackles of German economic oppression and develop into an economic power capable of standing up to foreign capitalism. Kovalevskii proposed an immediate state policy to defend and promote all industry, not just large companies. An independent economy demanded the development of Russia’s abundant natural resources and the accompanying processing industries. Kovalevskii proposed fourteen measures, including vastly increased credit, easier formation of companies, more technical education, a modernized legal framework, and “quickly harnessing the energy of falling water” to

85 V. I. Kovalevskii, “Osnovnye nuzhdy russkoi promyshlennosti,” Trudy Komissii po promyshlennosti v soiazi s voinoi, 1915, no. 5: 7–8. The opportunity to replace German industry also attracted attention abroad; see, e. g., Ludwig W. Schmidt, “Electrical Development in Russia,” Electrical World, 26 June 1915, 1720–21.
meet urban and industrial needs. Kovalevskii assumed the continuance of the existing political structure, but he evoked a vision of a radically reformed, rationalized, and supportive political economy to benefit imperial Russia. The Association of Industry and Trade explicitly linked economic growth with national power in its 1915 report on industrial development.

In a 1916 book published by his employer, the Ministry of Finance, Mikhail I. Bogolepov, an economist and chairman of the Committee for the Study of Natural Productive Forces' industrial geography department, publicized the inevitability of large-scale postwar economic reform and thus the need to begin planned development of the country's productive forces. "Economic policy for newly arising processes in the national economy," wrote Bogolepov, "will play the role of midwife and for developed [processes] it will play the role of a smart gardener" to increase and distribute the national wealth more equally. Bogolepov also advocated a decisive revamping of industrial laws, including those hindering hydropower, and decried the change-resistant nature of the Russian polity.

These examples show the growing interest in extending state control over the postwar national economy. The schemes shared common assumptions: that major restructuring of society was needed for Russia to modernize; that the appropriate unit of analysis was not a ministry's purview or an industry but the entire national economy. An unexpressed assumption was that groups currently outside the government—small industrialists, businessmen, engineers, educators, and others—would play a major role in these postwar activities. This goal of greater participation in a more representative government was one reason for the popularity of the war industries committees. These expectations, framed within the existing political and economic system, lay the groundwork for far-reaching, specialized proposals, as in the field of electrification.

A major impetus for this wave of planning came from technical specialists, whose interest lay not in overt political power but in the

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86 Kovalevskii, "Osnovnye nuzhdy russkoi promyshlennosti," 9–12.
rational organization of the economy by experts. The engineer P. Gurevich spoke for many when he declared, "Two years of real war have shown the full necessity of reconstructing the entire Russian national economy on new rational beginnings. Organization and construction are the slogans of our time, and by them we will possess the future." 

The electrical engineers proved as rational as any. Their wartime proposals shared a common base with their prewar counterparts: regional stations, powered by local fuels and hydropower, would power newly electrified factories and transform Russian industry. Politically, these proposals assumed a transfer of prestige and resources from railroads and heavy industries to electrotechnology and other modern industries. What distinguished the wartime proposals was their greater scale and scope, support from the electrical engineering establishment, and greater promotion. Instead of focusing on increasing capacity, some electrical engineers applied a broader, more systematic and comprehensive approach that envisioned electrification as the foundation of a new, modern Russian economy. For example, the TsVPK electrotechnical section concluded that the rational siting of industry demanded future factories be built not in Petrograd or Moscow but closer to their sources of fuel and materials. This concept had gained interest since the 1910–11 iron shortage. The tsarist railroad plan for 1917–22, discussed below, also advocated establishing industries closer to their raw materials.

The regional station remained the heart of this new thinking, but the rationale and need had expanded. E. O. Bukhgeim revised his electrification proposal in 1915. This extremely significant proposal popularized the economic and "general state significance for all Russia of the organization of electric stations directed to the wide electrification of each given region." The use of local fuels would free the country from dependence on foreign fuels and help the balance of trade. At a conference on Moscow brown coal and peat sponsored by the Special Council on Fuel in November 1915, Gleb M. Krzhizhanovskii, the commercial director of Elektroperedacha, described

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89 Ribber, Merchants and Entrepreneurs, 398–99.
90 P. Gurevich, "Osnovnye voprosy elektricheskoi politiki v poslevoennuiu epokhu v Rossii (okonchanie)," Elektrichestvo, 1917, nos. 2–3: 36.
91 "Otdely TsVPK, Izvestiia TsVPK, 1915, no. 6: 2.
92 TsGANKh f. 3429, op. 1, ed. kh. 1953, 51–51b.
93 According to G. M. Krzhizhanovskii, Myslitel i revolutsioner (Moscow: Gospolitizdat, 1971), 9.
94 E. O. Bukhgeim, K ekonomicheskому osvobozhdeniu Rossii putem elektrifikatsii ikh territorii (Moscow: S. P. Iakovlev, 1915), iv, 10, 17, 27.
how, using contemporary American criteria, eight peat-fired stations could supply the entire Central Industrial Region. 95

The most comprehensive view of a postwar electrified future was offered by Gurevich in Elektrichestvo in early 1917. Drawing heavily on Western data, the Swiss-based engineer declared that electricity would replace gas and kerosene for lighting because electric energy demanded “the least expenditure of time, money, and power.” As long as a chronic coal shortage hindered the metallurgy industry, he claimed, burning coal for electricity “is completely intolerable from the point of view of the national economy.” Consequently, “the Russian electrical industry in the most inflexible development of events will be compelled within ten years and possibly earlier to transfer to a system of large connected regional stations which work on water power or low-quality brown and sulfuric coal and that will be universally accepted as the only rational and advantageous way for generating electric energy.” 96

Using Western activities as examples and for legitimation, Gurevich advocated that state regional stations decrease operating costs for low tariffs and thus high usage. Existing concessions and municipal operations would voluntarily sell the state-produced power since it would be significantly less expensive than generating their own. Gurevich rejected the more radical possibility of state control of production and distribution because of the enormous capital needed to buy out existing utilities and doubts that the central government could market electricity efficiently. To further use of electricity outside the big cities, local and regional governing bodies would handle marketing. 97

Individuals proposed these early ideas, but in 1916 the VI Section advanced its own postwar scheme. This proposal began with a pro forma request from the IRTO VIII (railroad) Section to review the government’s five-year railroad plan for 1917–22, which called for a significant allocation of state resources to expand existing lines and connect new economic regions to the rest of the country. 98 Transporting coal would consume much of the increased capacity. 99 The VI Section offered a technical critique and then proposed the alternate path of

95 G. M. Krzhizhanovskii, “Oblastnye elektricheskie stantsii na torfe i ikh znachenie dla tsentralnogo promyshlennogo raiona,” in Izbrannoe (Moscow: Gospolitizdat, 1957), 16.
98 TsGANKh f. 5208, op. 1, ed. kh. 1, 79–79b/109–110.
electrification to achieve the "comprehensive and most rational development of all the productive forces of the country." The foundation of this development was the "creation of powerful central electric stations in regions with rich reserves of fuel or sources of water power to change fundamentally the manner of Russian industry."\(^{100}\)

The railroad plan assumed the continued transfer of southern coal for northern energy needs, an assumption that the electrical engineers considered inefficient and irrational. At a VI Section meeting on the railroad plan, Evgenii Ia. Shulgin, a longtime proponent of increasing the societal role of the VI Section and electric power,\(^{101}\) declared that the section's prime consideration was "the use of all natural resources of the country and the creation, by the construction of large electric transmission networks, of conditions for industry to use the most direct and economical sources of fuel. . . . This issue, undoubtedly, is no less important than strengthening the output and transportation of fuel."\(^{102}\)

In conclusion, Piotr S. Osadchii, president of the VI Section and a professor at St. Petersburg Polytechnic Institute, stated that the railroad plan should develop into a larger plan integrating all energy resources and the railroads to meet national needs. According to a paraphrasing of his October 1916 speech, Osadchii said,

> Bearing in mind that one of the decisive factors of this hypothetical plan of railroad construction is the concern about the security of transport of mineral fuel to industrial regions and separate cultural [kulturnye] centers as sources of power . . . the correct decision to this question conceivably will be found only after the full study of the possibility of the wide use of electrical transport of mechanical energy from the places where their sources are found—deposits of coal, peat and the so-called "white coal" (water sources)—to the place of consumption.\(^{103}\)

Instead of railroads hauling coal vast distances for industrial consumption, large mine-mouth electric stations and long-distance transmission would provide secure, reliable energy to users. The new fuels, peat and "white coal," would link with a nation-spanning transmission network as the high technology of electricity replaced the low technology of railroads to power Russia's industries. The VI

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\(^{103}\) Ibid., 274.
Section sent Osadchii's proposal to the VIII Section for incorporation into the IRTO report. The country's leading electrical engineering society had just endorsed large-scale electrification as the goal not just for electrotechnology but for the country's economic future.

In a telling demonstration of the importance it now gave electrification, the tsarist government by 1917 effectively controlled the major utilities directly by sequestration and other utilities indirectly by fuel allotments, supply priorities, and consumption restrictions. If the tsarist government had lasted, its control would have increased even more: in early February, the Council of Ministers approved an MTP proposal to regulate the generation and distribution of electrical energy and to sequester enterprises. This measure would have given the government direct operational control over the utilities, a drastic increase of interest and authority since 1914.

The environment for electrification in 1917 differed greatly from that of 1914. Industry and government were more aware of the importance of electric energy and more concerned to remedy its deficiencies. Regional electrification had evolved from the ideas of a few engineers to proposals by the VI Section and industrialists in Moscow and other industrial regions. For the first time, Russian engineers ran the largest utilities and, through the VI Section and new semiofficial groups, promoted electrification as an answer to national problems.

These changes resulted from the war and its ramifications: the expulsion of German managers, greatly increased demand, chronic shortages of oil and coal, the growing unreliability of the train network, and the realization that the existing networks of power were woefully inadequate. Forerunners to these problems existed by 1914, but the war focused attention and pushed the change in the conception of utilities from separate, independent firms to vital elements in the national economy.

The forcing factors were negative, demanding substitution for resources no longer available. Russian utilities met the immediate challenges: electrical generation reached record levels in 1916 despite increasingly adverse conditions. The hidden costs included poorly trained workers, overworked equipment, and growing shortages of materials, parts, and fuels. Equally important, the existing structure of utilities was crumbling under its burden. The cities with the largest industrial loads felt the most pressure, but all utilities suffered.

104 Ibid., 275.
Before the war, the city was the unit of analysis for electrification. The geographic unit expanded slowly with the construction of Elekstroperedacha and proposals for full-fledged regional utilities. During the war, these regional plans expanded, as did the proposed postwar role of electricity. The large size of the planned stations, based on assumptions of wide-scale industrial modernization, broke dramatically from the small stations that constituted the overwhelming majority of Russian utilities. This was an elite vision propagated by electrical engineers to move beyond the reality of electrification in Russia to Western dreams.

In 1916, the VI Section formally accepted and promoted the concept of regional stations fueled by low-quality fuels to transform industry and relieve the transportation system. Thus the electrical engineering leadership in Russia had already enunciated and promoted the basic themes of Soviet electrification four years earlier. Although revolutionary compared with prewar thoughts and tsarist postwar plans, these grand visions of an electricity-based future were accompanied by a confident sense of inevitability. In 1917, Gurevich thought state electrification inevitable within a decade and possibly earlier.106 The fall of the tsarist government and two revolutions made him seem a pessimist. Electrification was the official policy of the state only three years after he wrote.