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Industry and Forests: alternative raw materials in the Soviet forestry industry from the mid-1950s to the 1960s[1]

The article examines the history of using wood and timber wastes and annual plants as well as in the Soviet Union from the 1950s to the1960s. In the middle of the twentieth century, century Soviet leadership, producers, and scientists expressed their anxiety about the lack of forests near pulp and paper plants, and started looking for alternative raw materials. Modernization during the same period witnessed a number of initiatives to use different sources for pulp production, ranging from wood and timber wastes to reed and annual plants. It included attempts to develop low-waste and non-waste industrial technologies. In most cases, however, this search did not transform the supply of raw materials. Instead, most factories continued manufacturing pulp and pulp-based products using wood, and thus kept cutting and exploring undisturbed forests, in particular those in Siberia. In this article, I investigate the attempted use of alternative resources in industrial operations and examine why employing these materials, was not successful in the Soviet Union in the 1950s-1960s. I am interested in the organizational and technological aspects of how forestry developed and used resources in the Soviet Union. I illustrate how technologies circulated not only within the country, but also between the USSR and Western countries. The article contends that new practices did not change wasteful wood-use practices, in large part because the industry continued to contend with infrastructural and organizational obstacles while attempting to introduce alternative resources.

Keywords: forest, forestry industry, wood wastes, the USSR, modernization, technology transfer

Introduction

Alexader Ryabkov, a member of the secretariat of the Soviet Council of Ministers, remembered how in the early 1960s Nikita Khrushchev and the former Minister of Forestry and current vice-president of the Planning Department (*Gosplan*) Georgy Orlov, were flying over the delta of Volga. Orlov asked Khrushchev to look out the window at vast areas covered by reeds, noting that it might be a good place to construct a large pulp and paper plant. Inspired, Khrushchev immediately gave an order to Alexey Kosygin, the head of Gosplan, to build such a plant near Astrakhan`. Kosygin expressed his hesitation, stating that Gosplan had already approved the list of new plants to construct. He also said that he never heard about manufacturing pulp and paper from reed, but Khrushchev insisted on immediate construction. After a short squabble, Kosygin conceded in an argument.[2] The plant was built soon, but it did not manufacture pulp of good quality: reeds were not suitable raw materials given the state of Soviet technology. In addition, in the first year reed was cut on the Volga Delta, it did not regrow quickly enough to service the plant. As a result, the plant was supplied with wood from distant Northern regions like Arkhangel`sk, Kostroma, and Vologda. Damaging reed growth also had negative environmental impacts on nesting birds and spawning fish.[3]

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[2] Alexey Gvishiani, *Phenomen Kosygina. Zapiski vnuka* (Ekaterinburg: Fond kul`tury "Ekaterina", 2004): 98-99.
[3] While being a destroyer of environment, the Astrakhanskii pulp and paper plant had worked until 1995. It was one of the largest producers of pulp, paper, plywood, cardboard, and yeast.

What was the reason for such a rapid-fire decision on the part of the Soviet leader? One might believe that it was Khrushchev`s explosive character, and that the Soviet system was easily subordinated to the spontaneous decisions of the leader.[4]But it was Khrushchev's desire to stimulate industrial development and increase the production of pulp and paper using alternatives to wood. Since the USSR's beginning, pulp and paper was a marginal sector, and one of the most technologically outdated within the Soviet industry. The Second World War and the Cold War tensions that followed illustrated to the Soviet leadership the need to develop pulp production for manufacturing both civilian products and military applications such as gun powder, military rubber, and other materials.[5]In the immediate post-war period, however, Stalin`s government invested in heavy industry, mostly neglecting pulp and paper. But when Khrushchev launched his technological modernization drive, he also aimed to develop traditionally marginalized industrial branches. In 1955, the Soviet leadership issued a decree on industrial modernization, which stimulated engineers and producers to search for new technologies to solve critical problems in pulp and paper production.[6]

In the mid twentieth century the Soviet leadership, producers, and scientists expressed their anxiety about the lack of forests near pulp and paper plants, and started looking for alternative raw materials. The modernization of 1950s-1960s witnessed a wide variety of initiatives to use different sources for pulp production, ranging from wood and timber wastes to reed and annual plants. It also included initiatives to develop low-waste and non-waste industrial technologies, all together directed to solving inefficiency problems of the forestry industry. These initiatives had several aims and meant tempering a progressively more problematic deforestation, organizing more efficient resource supplies and, as a result, improving the quality of pulp and pulp-based materials. In most cases, however, this search did not transform the supply of raw materials. Instead, most factories continued manufacturing pulp and pulp-based products using wood, and thus kept up the pace of deforestation and exploration of undisturbed forests, in particular in Siberia and the Far East.[7]

This paper investigates the use of alternative resources in industrial operations and examines why employing such materials, like wood and timber waste or annuals, was not successful in the Soviet Union in the 1950s-1960s. It is focused on the organizational and technological aspects of forestry development, which sheds light on the Soviet use of forest resources as well as the functions of industrial system in general. In doing so, it contributes to further discussing of Soviet industrial environmental history. In addition, it illustrates how technologies circulated not only within the country, but also between the USSR and Western countries, in particular Finland.

This topic is quite marginalized in the historiography. There are some works on the use of forests in different periods, most of which emphasize the destructive nature of Soviet industry and the rapid rate of deforestation. Brenton Barr and Kathleen Braden's discussions of forest

[4] More on Nikita Khrushchev see in William Taubman, *Khrushchev: The Man and His Era (*New York: W.W. Norton & Company, Simon & Schuster, 2003).

[5] See more about the use of pulp in the 1950s-1960s in Elena Kochetkova, "A history of failed innovation: continuous cooking and the Soviet pulp industry, 1940s-60s," History and Technology 31 (2015): 108-132. To a large extent, Stalin`s leadership relied its hopes on the pulp and paper plants annexed from Finland, the Baltic states and Japan.

[6] See a decree "On the improvement of studying and implementing the experience and achievements of advanced domestic and foreign techniques to the people`s economy" in "Ob uluchshenii dela izucheniya i vnedreniya v narodnoe khozyaistvo opyta i dostizhenyi peredovoi otechestvennoi i zapubezhnoi tekhniki" in Kommunisticheskaya partiya Sovetskogo Souiza v rezolutsiyakh i resheniyakh s`ezdov, konferentsyi i plenumovTsK. (Moscow, 1985), T. 8. 1946-1955, 506-509.

[7] See among others Veniamin Alekseev et al., Industrial`noe osvoenie Sibiri (Novosibirsk: Nauka, 1989); Natalia Kuksanova, "Ekologicheskaya situatsiya v Sibirskom regione v period aktivnogo promyshlennogo osvoeniya (1950-1980 gg.)," *Voprosy sotsial`no-politicheskoi istorii Sibiri (XVII – XX veka): Bakhrushinskie chteniya* (Novosibirsk, 1999): 173-187.

exploitation in the USSR, for example, argue that it was extensive and devastating.[8] Braden stresses that Soviet foresters treated forest resources "as a type of 'mining' operation, in which trees are cut down and then the logging brigades move on to new stands of trees, even further away from central regions."[9] Douglas Wiener examines nature protection in the Soviet Union and the trajectory of environmental activism. He illustrates that throughout the late Soviet period, Soviet industrial policy was danger for environment.[10] Focusing on modern states, Paul Josephson argues that "entire regions of Russia have become industrial deserts where nothing, not even the hardiest grasses, will grow."[11]He also contends that the Cold War period was a time of irreversible degradation for Soviet forests and the environment in general. Poor infrastructure, reckless harvesting and other production habits explained rapid deforestation.[12]

With partial exception of Wiener`s book, these works are in line with the concept of ecocide, a discourse that dominated the historiography until recently.[13]More recent works bring nuance to the examination of Soviet environmentalism, by revealing the small actors who discussed, defended, and advocated for nature.[14]Stephen Brain, in his recent book "Song of the Forest" and earlier works argues that in the Stalinist period, environmentalist intentions did exist, and often resulted in the successful sustainable use of forests. Stalin`s environmentalism implied limiting the activities of economic organizations in their intensive exploitation of forests.[15]

These and other works are primarily focused on the first half of the twentieth century, neglecting the mid- and late century. Also, the role of technology and innovation in the approach of industrial forest management and wood processing in the Soviet period are not well studied. Overall, similar processes in others countries also call for a deeper study by historians.[16]In trying

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[8] Brenton Barr and Kathleen Braden, *The Disappearing Russian Forest: A Dilemma in Soviet Resource Management* (Totowa: Rowman and Littlefield, 1988).

[9] Kathleen Braden, "Managing Soviet Forest Resources," Philip Pryde (ed.), *Environmental Management in the Soviet Union* (Cambridge, NY, Melbourne: Cambridge University Press, 1991), p. 119.

[10] Douglas Wiener, *A Little Corner of Freedom. Russian Nature Protection from Stalin to Gorbachev* (Berkeley, Los Angeles, London: University of California Press, 1999).

[11] Paul Josephson, *Resources under Regimes: Technology, Environment, and the State* (Cambridge, Massachusetts: Harvard University Press, 2005), p. 5. Compare with James Scott, Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed (Yale: Yale University Press, 1998).

[12] Paul Josephson, "War on Nature as Part of the Cold War: The Strategic and Ideological Roots of Environmental Degradation in the Soviet Union," John McNeill and Corinna Unger (eds.), *Environmental Histories of the Cold War* (Cambridge: Cambridge University Press, 2010), p. 25.

[13] See more in Boris Komarov [Zeev Wolfson], *The Destruction of Nature in the Soviet Union* (New York: White Plains, 1980); Murray Feschbach and Alfred Friendly, *Ecocide in the USSR* (New York, 1992); Ramachandra Guha, *Environmentalism: A Global History* (New York, 2000), and others.

[14] See, for example, Laurent Coumel and Marc Elie, «A Belated and Tragic Ecological Revolution: Nature, Disasters, and Green Activists in the Soviet Union and the Post-Soviet States, 1960s-2010s,» *Soviet and Post-Soviet Review* 40 (2013), 157-165; Laura Henry, *Red to Green: Environmental Activism in Post-Soviet Russia* (Ithaca, NY: Cornell University Press, 2010); Richard Tucker, "International Environmental Movement and the Cold War", *The Oxford Handbook of the Cold War* (Oxford University Press, 2013); Oleg Yanitsky, «From nature protection to politics: the Russian environmental movement 1960–2010», *EnvironmentalPolitics* 21 (2012), 922-940 ; Nicholas Breyfogle, « At the Watershed : 1958 and the Beginnings of Lake BaikalEnvironmentalism,» *Slavonic and East European Review* 93 (2015), 147-180, amongothers. Earlier exceptions are Donald Kelley, « Environmental Policy-Making in the USSR : The Role of Industrial and EnvironmentInterest Groups, » *Soviet Studies* 28 (1976), 570-589 ; Jane. Dawson, *Eco-Nationalism: Anti-Nuclear Activism and National Identity in Russia, Lithuania, and Ukraine* (Durham: Duke University Press, 1996), among others.

[15] Stephen Brain, *Song of the Forest: Russian Forestry and Stalinist Environmentalism, 1905-1953* (Pittsburg: University of Pittsburg Press, 2011); Stephen Brain, "Stalin`s Environmentalism," *The Russian Review* 69 (2010), 93-118; Stephen Brain, "Novyi vzglyad na unichtozhenie zapovednikov v SSSR v 1950-e gg.," Istoriko-biologicheskie issledovaniya 4 (2012), 57-72.

[16] See more on using wood in industry and beyond historically in Brian Bonhomme, *Forests, Peasants, and Revolutionaries: Forest Conservation and Organization in Soviet Russia, 1917-1929*. East European Monographs. (Columbia University Press, 2005); Dominique Moran, "Lesniki and Leskhozy: Life and Work in Russia`s Northern Forests," *Environment and History* 10 (2004), 83-105; Joachim Radkau, *Wood: A History* (Cambridge, Malden: Polity Press, 2012); Michael Williams, *Americans and Their Forests: A Historical Geography (Studies in*

to fill this gap, this article follows researchers who argue for close intersections between histories of technology and the environment.[17]

The following article emphasizes how post-Stalinism saw intensive industrial use of natural resources, while simultaneously many engineers, scientists and the Soviet leadership expressed a will to avoid overcutting forests. Most of these attempts were derived from the need to manufacture more, combined with a fear of losing forests as an industrial resource while some expressed their anxiety about the damaging of forests as such. Enterprises across the country undertook the search for alternative raw materials, in particular using wood and timber wastes, as a way to rationalize production. In the mid-1950s, both state officials and producers saw supplying forestry factories with wood as a critical problem. Alternative raw materials were proposed as a solution for poorly organized raw material supplies and an insufficient forestry industry system. As this paper states, the reason why these initiatives failed rested with that the Soviet administration and engineers did not invest into solving the problem of supply, but tried to develop a new technology instead. As a result, all the organizational problems of supply with raw materials and technical equipment spread into new technology. These initiatives took place in a number of smaller industries within the forestry industry, like those that manufactured plywood, furniture, and cardboard. While all these aspects deserve attention, this paper is limited to pulp production as a base for many other industrial uses. Pulp was the essential raw material which was used for making a wide range of paper and paper-based products.

Saying about the use of alternative raw materials, in particular about wood and timber wastes, this article means the operations called in Soviet sources "*pererabotka*" which might be translated as both "processing" and "recycling". Soviet engineers, workers and administrators used this word both when saying about "processing wastes" and "recycling used paper" for example. When speaking about wood wastes, this article proposes "treatment" and "processing" which correspond to "*pererabotka"* and imply that the industry tested new technologies in order to use wastes and annual plants instead of wood.

In the first section the article describes the views on forest resources in the USSR among the authorities and producers in the mid-1950s - mid-1960s and examines the relation between protecting forests and industrial production. Then it focuses on the practical implementation of alternative resources, answering why these initiatives were not transformed into systematic production. Last, it shows the role of contacts between East and West and the ways in which the Soviets drew upon Western, in the first hand Finnish experience of processing wood and timber wastes and other alternative sources in forestry production.

Industrial Wood Supply and the Use of Soviet Forests

Every Soviet book on the forestry industry began with a note that the Soviet Union possessed huge forest resources. While this was true, this statement hid a number of problems. Soviet forests grew unevenly: for example, in the late 1950s only 18 percent of mature forests grew in the European USSR, while the eastern regions were covered by 82 percent of Soviet trees. The reason for this distribution stemmed from natural conditions, in part, but more significantly were a product of intensive cutting in the northwestern Soviet Union. Industrialization and the construction of factories and railroads in densely populated zones resulted in clear cutting. Pine trees and the other species most appropriate for producing pulp and

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Environment and History) (New York: Cambridge University Press, 1989); Ken Drushka, *Canada`s Forests: A History* (Montreal and Kingston: McGill-Queen's University Press, 2003), among others.

[17]Jeffrey Stine and Joel Tarr, "At the Intersection of Histories: Technology and the Environment," *Technology and Culture* 39 (1998), 601; Theodore Schatzki, "Nature and Technology in History," *History and Theory* 42 (2003), 82-93; Sara Pritchard, "Joining Environmental History with Science and Technology Studies: Promises, Challenges, and Contributions," in D. Jørgensen, F.-A. Jørgensen, and S. Pritchard (eds.), *New Natures: Joining Environmental History with Science and Technology Studies,* pp. 1-20 (Pittsburg, 2013).

paper were the object of intensive exploitation. Also, the Russian Civil War and both World Wars made the use of wood even more intensive.[18]Finally, starting in the period of intense industrialization in the 1930s on, wood was exported to cover the cost of expensive foreign equipment, required for modernization and factory construction. As Breton Barr and Kathleen Braden contend, the result was the rapid disappearance of Russian forests by the late twentieth century.[19]

In mid-century, the lack of timber resources for industrial production became a critical problem for Soviet producers. If we look at Soviet industrial forestry as a large technological system, in the terminology of Thomas Hughes, the system faced a number of critical problems that hindered its development.[20]One of the difficulties was the long distances between most working factories and forest resources. Due to intensive cutting nearby, many factories were far removed from zones of wood harvesting. Thus, in 1913, the average distance wood was transported to factories by railroad was 415 kilometers, while by 1958-1959 it was as much as three times that distance.[21]This in turn required developing transportation from far-off areas, constructing railroads and planning raft routes. And it entailed exploring new territories and introducing industry in particular building pulp, paper and related factories as well as cutting forests in Siberia and the Far East.[22]

These efforts did result in more tree harvesting: in 1955 the volume of timber harvesting increased to 60 million cubic meters compared to 1953 based on significant growth in harvesting densely forested areas. For example, in the late 1950s industrial cuttings near Lake Baikal increased crucially. As a result, many nearby rivers like Barguzin, Turka, Goloustnaya were littered with timber and sunken logs as a byproduct of rafting. In just ten years, many rivers lost their fisheries as a result.[23]In addition, cutting in regions with poor forest infrastructure required large investments, while the construction of new plants was accompanied by significant water, air, and soil contamination in Siberia.[24] As Dominique Moran says, forestry enterprises "were the instrument of the state, felling the forest in accordance with the state Plans, sometimes neglecting the replanting of felled areas, and often choking the waterways with rafted timber."[25]

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[18]Nikolai Medvedev i Georgyi Bratsev, *Lesosyr`evye resursy i razmeshchenie lesnoi promyshlennosti* (Moskva, Leningrad: Goslesbumizdat, 1959), p. 3

[19]Brenton Barr and Kathleen Braden, *The Disappearing Russian Forest: A Dilemma in Soviet Resource Management* (Totowa: Rowman and Littlefield, 1988). At the same time, Sten Nilsson et al say that despite the redistribution of forest covered areas, between 1914 and 1988 the forested area as a percentage of total land area in the European USSR did not change a lot. See more in Sten Nilsson et al, *The Forest Resources of the Former European USSR* (Wiltshire: Cromwell Press Ltd., 1992), pp. 6-7.

[20] See more in Thomas Hughes, *Networks of Power: Electrification in Western Society, 1880-1930* (Baltimore, London, 1983); Thomas Hughes, "The Evolution of Large Technological Systems," Wiebe E. Bijker, Thomas P. Hughes, and Trevor Pinch (eds.) *The Social Construction of Technological Systems* (Cambridge: MIT Press, 1987), 51-83 and other works.

[21]Nauchno-tekhnicheskaya konferentsiya po ispol`zovaniu drevesnykh otkhodov, 26 iuiniya 1959 g.// Russian State Archive of Scientific-Technical Documentation (RGANTD). F. 342. Op. 1-1. D. 339. L. 74.

[22] See more on the historiography of constructing the space in Russia in Nick Baron, «New Spatial Histories of Twentieth Century Russia and the Soviet Union: Surveying the Landscape,» *Jahrbücher für Geschichte Osteuropas* 55/3 (2007), 374-400.

[23]Leonid Korytnyi, *Ekho ekologo-ekonomicheskikh skandalov*. Available at http://moi-goda.ru/leonid-koritniy/echo-ekologo-ekonomicheskich-skandalov--glava-7-btsbk-ekologicheskiy-serial-posleslovie

[24] Natalia Kuksanova points on a rapid escalation of pollution in Siberia in the late Soviet period. It included a quick grow of industrial enterprises and very weak activities on environmentalism. See more in Natalia Kuksanova, *Ekologicheskaya situatsiya v Sibirkom regione v period aktivnogo promyshlennogo osvoeniya (1950-1980*-e gg.). Available at http://zaimka.ru/soviet/ecology.shtml.

[25] Dominique Moran, "Lesniki and Leskhozy: Life and Work in Russia`s Northern Forests," *Environment and History* 10 (2004), 102.

Another pivotal issue related to intensive cutting was the habit of leaving large amounts of wood waste behind. The volume of cutting significantly exceeded the needs of the pulp, paper and woodworking industries, but only small amounts of wood were actually supplied to factories. Overall, Soviet industry used only 60 percent of harvested timber.[26]Significant losses took place in logging, transportation, and industrial operations. As a result, the overall production of forestry industry was much lower than it could have been based on the wood harvested. For instance, in 1955 the Soviet Union harvested 302 million cubic meters of wood, while the USA harvested 320, Canada – 93, and Finland – 39.At the same time, the USA produced four times more plywood, six times more paper, and twenty times more cardboard than the USSR. In average, about 35 percent of Soviet wood was destroyed as waste after sawmilling and about 40 percent as wastes in forests, while many other countries used these materials for manufacturing products like fiberboard, low quality paper, packaging, and others.[27] Soviet enterprises utilized wastes as firewood for power stations or simply left debris as waste.

Many engineers mentioned these problems as the main reason for poor product quality and production downturn. Local archival funds and factory newspapers are full of examples of how badly harvested and improperly stored wood upset production. For instance, in 1954 one of the largest enterprises in the Soviet northwest, the Svetogorsk pulp and paper plant, delayed production of pulp because it did not receive enough raw materials. It was supplied with just one tenth its requirement of wood. As a worker in the plant named Trophimenkov indicated, because of bad spruce timber, the sulphit plant delayed production on its required pulp volumes. There was a danger that the plant would not fulfill its plan, and the workers prioritized quantity instead of quality and used decayed and or otherwise inappropriate timber.[28]Later, however, the Svetogorsk plant lacked even enough low-quality spruce timber to fulfill its plan by the Twentieth meeting of the party as it was promised.[29] Engineers at Svetogorsk complained during a secret meeting of the local party organization that there were many of delays in supplies, and when timber arrived it was often decayed, unsorted, different in size, and contained metal elements and wire lines.[30]In order to meet the plan, however, workers and engineers were forced to use poor-quality wood. Using decayed wood or branch-wood, for example, produced pulp with black specks, while excessive moisture content in wood fibers made the pulp less consistent. Using the wrong tree species made it impossible for factories to produce white and firm pulp.

All this took place despite compulsory standards in the USSR. By the late 1950s, standards were created for 80 percent of wood products, including tree assortments for various purposes.[31]But in practice, the quality of raw materials remained a problematic issue. For instance, as the Commission on Nature Preservation of the Gosplan of the USSR (*Komissiya po okhrane prirody Gosplana SSSR*) reported on their 1956 trip to Karelia, one of the largest regional suppliers of wood, that intensive cutting and insufficiently organized transportation resulted in significant damage to forests. Timber procurers did not have necessary infrastructures

[26]For example, the proceedings of scientific-technical conference on a complex use of wood held in 1961 said that only up to 40 percent of wood was used in the industry in Karelia. Reshenienauchno-tekhnicheskoikonferentsiipokompleksnomuispol`zovaniudrevesiny, 1961 g.// State Archive of Russian Federation (GARF). F. 409. Op. 1. D. 1190. L. 158. See also Josephson, "War on Nature", p. 25. Sten Nilsson et al indicate that 33 percent of the harvested wood remained in forests. In the late 1980s from them only 30 percent were utilized. See Nilsson et al, *The Forest Resources*, p. 9.

[27]Medvedev, *Lesosyr`evye resursy,* pp.17-19.

[28]Godovoi otchet po osnovnoi deyatel`nosti SvetogorskogoTsBK, 1955// Leningrad Regional Archive in Vyborg (LOGAV). F. R-180. Op. 4. D. 324. L. 17. See more on workers in Khrushchev period in Donald Filtzer, *Soviet Workers and De-Stalinization: The Consolidation of the Modern System of Soviet Production Relations, 1953-1964* (Cambridge: Cambridge University Press, 1992).

[29]"V Chest` 20 c`ezda KPSS," Svetogorskyi rabochii (December, 1955), 1.

[30]Pis`mo direktora TsNIIB Minlesbumproma SSSR S.A. Pyzyreva direktoru "Enso" A. Sil`chenko, 1951// LOGAV. F. R-180. Op. 2. D. 15. L. 2.

[31]L. Karabanova, *Standartizatsiya i normalizatsiya v narodnom khozyaistve SSSR*. (Moskva, 1959), p. 7.

and could not transport cut wood from forests quickly. The commission saw large stacks of decayed wood and called Karelia "a cemetery of the forest". They also noted that there were cuts in protected zones.[32]

Industrial producers, in particular in the Ministry of the Forestry Industry, understood this problem well. As a specialist of the Ministry Lozinskii said in 1956, at a meeting of the Presidium of the Technical council of the Ministry, "we have a stereotype that there is no bad wood... We believe that we can take touchwood, work with it hard and then say that this material is proper, but this takes a lot of strength and money and can make the country poor…this is what we have now: our sawmilling factories are full of such a touchwood, we harvest wood which is damaged by timber beetle, which decays, casts, becomes covered with blue rot, and we transport this wood to enterprises."[33]

The reasons for slow transport of timber and the poor quality of raw materials were often the result of deficiencies the organization of wood cutting, storing and local transport of timber. From the 1930s until the early 1950s, a large proportion of timber work was done by GULAG prisoners and proved to be very ineffective. And despite de-Stalinization and changes in the organization of labor under Khrushchev, the development of cutting and storing technology, infrastructure, and other elements of the system did not improve radically. As Josephson says, "in the absence of incentives to promote productivity or individual initiative among workers such as higher wages, better consumer goods, comfortable housing, and meaningful promotions, leaders resorted to exhortation" the workers to "storm" the plans and follow to Stakhanov`s example.[34] Indeed, the workers motivated themselves to fulfill assignments through large events like Party meetings or on anniversaries of the revolution. For instance, when foresters challenged themselves to over-fulfill their plans, they measured their results in volume not quality.

As the note of the Leningrad Research Institute of Forestry (*Leningradskii NII leskhnogo khozyaistva*) said in 1959, logging enterprises did not have a stimulus to use industrial forests rationally or implement scientific principles in their activities.[35]In the 1950s-1960s, the main obstacles for proper timber harvesting were poor infrastructure, frequent forest fires, improper storage technologies, and poor wood preservation technologies. In particular, undeveloped infrastructure and difficult access to remote forest resources were the reason for clear cutting and the inability for foresters to transport wood wastes from the forest harvesting areas.

For the Soviet Union, the use of wastes and alternative resources could solve the problem of resource supply. At the time, this idea was not absolutely new. As early as in 1932 the Council of People`s Commissars of the USSR decreed that enterprises had to rationalize their manufacturing, mechanize industry and rationally use raw materials and industrial wastes.[36]The idea of a complex development of forestry industry dominated during the 1930s, and implied organizing pulp and paper production from timber wastes. In general, it was not very productive. One of just few results was the Solombal`sky plant which consumed a large quantity of lumber waste.[37]As described above, the supply of industrial enterprises with wood was a formidable problem in the post-war period.

Compared to earlier periods, Khrushchev`s era introduced a larger number of practical initiatives to bring alternative sources into the forestry production. Khrushchev`s modernization

[32]Otchet o komandirovke v Karelo-finskii filial AN SSSR, 1956 g.// Russian State Archive of Economics (RGAE). F. 544. Op. 1. D. 39. L. 13-14.
[33]Stenogramma zasedaniya prezidiuma tekhnicheskogo soveta Ministerstva lesnoi promyshlennosti SSSR po voprosam otcheta o komandirovke v Finlyandiu V.N. Zmeeva, 1956 g.// GRAE. F. 7637. Op. 1. D. 3256. L. 57.
[34] Josephson, "War on Nature," p. 24.
[35]Dokladnaiya zapiska rukovodstva LenNIILKH o sostoyanii i dal`neishem razvitii lesnogo khozyaistva, 1959 g.// TsGANTDSPb. F. 310. Op. 1-2. D. 876. L. 2.
[36] "Postanovlenie TsIK SNK SSSR ot 19 sentiabrya 1932 g. "Polozhenie o Narodnom komissariate lesnoi promyshlennosti," Sobranie zakonov SSSR (Moskva, vol. 71, 1932), 437. See also Sari Autio, *Suunnitelmatalous Neuvosto-Karjalassa 1928-1941: Paikallistason Rooli Neuvostoliiton Teollistamisessa* (Helsinki: Suomalaisen Kirjallisuuden Seura, 2002).
[37]Sergey Spritzyn, *Ekonomika ispol`zovaniya vtorichnykh drevesnykh resursov* (Moskva, 1990), p. 4.

entailed a clear search for alternative sources, both from forest harvesting, timber sawing, or even annual plants or reeds. It was not the idea of cutting less, but rather finding newest technologies for more effective industrial use. Engineers talked now about the complete use of wood, coming back the idea that took place at least in the 1930s. It meant that enterprises could use all the parts of the trees for different purposes, applying relevant technologies which now were more advanced internationally.

"Forest alarmism" and Soviet wood wastes

Until the mid-XX century, Russian and Soviet forestry industry traditionally based on using cut trees. At least until mid-century, the use of timber and wood wastes in industrial production was episodic and not particularly developed. An interesting illustration here is a former Finnish enterprise that the Soviet Union annexed after the Finnish-Soviet war in 1944. This plant, the Enso pulp and paper group of factories, which the Soviets renamed Svetogorsk, used sawmilling wastes in manufacturing sulfate pulp. This enabled the Finnish producers to decrease the volume of consumed wood. After the plant was moved to the USSR, methods of resource supply changed. The plant was located on the Finnish-Soviet border, and now the wood was supplied from the Eastern, Soviet territory.[38] Despite the fact that the plant had appropriate equipment, the Finnish experience of using waste was not adopted, and the enterprise operated on the base of new timber. The Soviets brought their own technology to the plant, and this technology required using pulpwood bolts only.

In 1955, the Central Committee of the Communist Party and the Council of Ministers of the USSR decreed that the ministries and administrative departments were to search for cheaper materials and "unfold works on the most efficient and possible use of different wastes."[39]This and similar decrees were taken seriously on the ministerial and lower levels. In 1956, the Minister of the Forestry Industry Georgyi Orlov traveled to Canada to learn about foreign techniques for dealing with forests. After the trip he produced a report where he explained how the Canadians harvested wood. He concluded that the Canadians destroyed their forests, left a lot of waste and, as he stated, "we cannot transfer to the Soviet conditions such a barbaric attitude towards the forest when a lot of valuable trees are left in the places of cut forests."[40]This report, published in a main professional newspaper "Forestry Industry" (*Lesnaya promyshlennost`*) was meant to demonstrate the difference between socialism and capitalism, but also revealed an attitude of industry leadership towards the wastes issue. Despite criticism, Orlov noted that the Canadians had experienced successfully waste, and concluded that "we decided to construct immediately twenty experimental logging enterprises in all the forest harvesting regions during 1957 – 1958" using Canadian practice. Also, he said about the need to construct shops for hogging at sawmilling factories and transport them into pulp enterprises.[41]I could not find from the sources if these plans were realized and assume that the largest part of this plan was not fulfilled.

Starting from the mid-1950s on, the question of using wood and timber wastes in pulp and paper production appeared more frequently in articles by engineers and industrial scientists in professional journals. Thus, Fedor Kuteinikov, a specialist of the Central Research Institute of Paper and Pulp (TsNIIB) stated in 1958 that only five percent of sawmilling waste was used in

[38]Akt proverki ispol`zovaniya proizvodstvennykh moshchnostei na Svetogorskom TsBK, 1953 g.// RGAE. F. 4372. Op. 59. D. 605. L. 12.
[39]"Postanovlenie Plenuma TsK KPSS," 4-12 July 1955, Kompartiya SSSR v rezoliutsiyakh i resheniyakh s`ezdov, konferentsii i plenumovTsK. (Moskva, T. 8: 1946-1955, 1985), 506-509.
[40]Doklad ministra lesnoi promyshlennosti SSSR G.M. Orlova "Lesnaiya promyshlennost` Kanady", 1956 g.// RGANTD SPb. F. 342. Op. 1-1.D. 293. L. 27.
[41]Doklad ministra lesnoi promyshlennosti SSSR G.M. Orlova "Lesnaiya promyshlennost` Kanady", 1956 g.// RGANTD SPb. F. 342. Op. 1-1.D. 293. L. 33.

industry while the forests remained full of wood wastes.[42]He argued that "the current level of scientific and technical development of pulp and paper industry allows using wood of lower quality and wastes for production of paper, cardboard" and pulp. But all this required the reorganization of production and new equipment as well as transferring technologies from other countries.[43]Some engineers stated that the Soviet Union lagged in processing wood and timber wastes compared to foreign countries.[44]

Other specialists expressed more anxiety about disappearing forests. Nikolay Medvedev and Georgiy Bratsev argued in their 1959 book on Soviet forest resources that in a few Soviet regions over-cutting was so significant the resources would only last for five or seven more years if cutting remained as it was. They proposed to explore new forests and construct railroads, in particular, in the Western part of Karelia on the border with Finland.[45]

Alarmist tendencies on the future of Soviet industrial forests were connected to general tendencies to protect nature, expressed by state actors and some scientists. Introducing wood and timber wastes was part of emerging response to "the extreme environmental degradation of the decade following Stalin's death in 1953" and was connected to rising Soviet environmental movement.[46] To a large extent this movement was stimulated by the discussions around Lake Baikal. The construction of the pulp and paper plant there in the mid-1950s caused a division of opinions and involved a larger audience, mass media and scientists.[47] Some initiatives in dealing with pollution and devastation of resources were expressed in a law "On Nature Protection in the RSFSR" published in October 1960. This law was of the republican level and was focused on Russia, not the whole country. Important here is how the law represented nature and the proper method of using natural resources. It stated that nature and its resources served to the Soviet economy and its people and said that the "Soviet social system and planned economy create a possibility to use rich natural resources of the Russian Federation rationally."[48]Nature was presented as a subject to supply the economy which, in its turn, provided for the rational use of resources. Like in this document, in the view of engineers, saving natural resources derived from the idea of using forests rationally in order to produce more, and originated in an idea that industrial production would benefit from protection of environment.[49]This might be called an industrial forestry discourse as Bas Arts et al propose. It meant that in the view of engineers, producers and leadership, the forests were strongly linked to economic development and saving forests meant saving them for industry first.[50] To illustrate this thesis, we may address to several

[42]Nauchno-teknicheskaiya konferentsiya po ispol`zovaniui drevesnykh otkhodov, 25 iuiniya 1959 g.// RGANTD SPb. F. 342. Op. 1-1.D. 339. L. 74.

[43]Otchet F.F. Kuteinikova ob ekonomicheskoi tselesoobraznosti ispol`zovaniya otkhodov i nizkosortnoi drevesiny v tselliulozno-bumazhnoi promyshlennosti// National Archive of the Republic of Karelia (NARK). F. 2834. Op. 2.D. 3/32. L. 84.

[44]Tezisy k dokladu inzheneraA.K. Sapozhnikova// RGANTD SPb. F. 342. Op. 1-1. D. 261. L. 10.

[45]Medvedev, *Lesosyr`evye resursy,* 28. Compare these debates about industrial forests with more general discussion about nature protection. See John Foster, "Late Soviet Ecology and the Planetary Crisis," *Monthly Review* 67 (2015). Available at http://monthlyreview.org/2015/06/01/late-soviet-ecology-and-the-planetary-crisis/, among others.

[46]Ibidem.

[47] See more on the history of Baikal in Wiener, *A Little Corner;* Philip Pryde, *Environmental Management in the Soviet Union* (Cambridge: Cambridge University Press, 1991); among others.

[48]Zakon RSFSR ot 27.10.1960 "Ob okhrane Prirody RSFSR," Available at http://www.bestpravo.ru/sssr/gn-gosudarstvo/n0p.htm. There were more regional laws on environmental protection of concrete water basins, regions, etc. For example, in 1963, the Council of Ministers of RSFSR issued a decree on the enhancement of River Tom` and air in the cities of the Kemerovskaya oblast`.

[49] Brain, *Song of the Forest*, p 4

[50]Bas Arts, Marie Appelstrand, Daniela Kleinschmidt, Helga Pülzl, and Ingrid Vissen-Hamakers, "Discourses, Actors and Instruments in International Forest Governance," IUFRO World series, 28 (2010), 64. See also on the idea about human dominating over nature in Iulia Prikhod`ko, Ekologicheskaiya politika gosudarstva na severe zapadnoi Sibiri vo vtoroi polovine XX – nachala XXI vv. (PhD diss., Surgut state pedagogical university, 2002), 75. Compare with what Brain says about the Stalin`s time: the state brought its environmental legislation "designed not to promote beauty or relaxation, but rather to increase the power of the state", Brain, *Song of the Forest,* p. 139.

publications. In 1962, a large professional journal "Lesnoe khozyaistvo" (Forestry) published a note titled "Develop and Improve Works in Forests", the result of the discussion of workers of the scientific-technical society on forestry and timber industry. It stated that the Party invoked the Soviet citizens to save forests. This entailed increasing the productivity of forests, grow them in order to provide the industry with timber, paper, pulp, as well as to use low-quality wood and wastes.[51] For industrial employees both economic and environmental drivers were connected and implied the rational use of forests.

Alternative resources were, thus, of importance in terms of enhancing the production in the pulp and paper sector. In 1959, processing (*pererabotka*) timber and wood wastes by the industry was included into the seventh plan for Soviet economic development. It meant that enterprises were now responsible for saving wood and using alternative resources for manufacturing. From 1959 onward, the leadership reformed forestry and the forestry industry by making industry responsible for administering industrial forests. The aim of this reform was to make the use of raw resources in industrial production more efficient, and to improve both industrial and environmental harvesting.

After the plan had been articulated, many engineers began to stress the need to use wood wastes in the forestry industry. Their efforts included organizing conferences and discussions as well as experimental work at factories.

Using alternative raw materials in practice

Starting from the mid-1950s, a number of conferences on using wastes were organized by research institutions and administrative organizations at the regional and state levels. In February 1956, a conference on using sawmilling and woodworking wastes was convened by the Scientific-technical society of forestry industry (*Nauchno-tekhnicheskoe obschestvo lesnoi promyshlennosti*) in Arkhangelsk. It hosted a large number of engineers from factories, research institutions, local administrations, and timber procurers. In their presentations, they often referred to Western experience – Finnish, Canadian, American - and an urgent need to use wastes. In June 1959, the Leningrad regional administration of the Scientific-Technical Society organized a conference on using wood and timber wastes. The participants were specialists of the Central Scientific Institute of Paper and Cellulose, Forest Technical Academy, the Planning committee of paper factories (*Giprobum*) and other research and administrative organizations and enterprises. Among other things they discussed ways of using waste to produce fiberboard, in pulp and paper production, and offered their inventions.[52]In 1961, Karelian wood procurers held a conference on the complete use of wood. The papers were built around the idea that a lot of waste was left in forests and factories had to use them.[53]These and other conferences proposed ways of using wastes in different spheres of the forestry industry.

The growing number of conferences and publications on wood and timber wastes illustrated how industrial and research institutions as well as regional administrations supported the idea of basing some production on new raw materials, other than wood, and learning about new technologies from abroad.

Both timber mills and pulp and paper plants made attempts to use wastes. In the 1950s several timber mills tried to prepare wastes into industrial chips. For example, in 1958 in Karelia, a big supplier of wood for the Leningrad region, timber mills produced a large amount of wood waste, 76 thousand of cubic meters.[54]In many cases, however, the producers did not manage to

[51]"Razvivat` i uluchshat` raboty v lesu," *Lesnoe Khozyaistvo*, 9 (1962), 2.
[52]Doklad GNTK SM SSSR o sostoyanii i tekhnicheskom urovne tselliulozno-bumazhnoi promyshlennosti// RGAE. F. 9480. Op 3. D. 1154. L. 57.
[53]Reshenie nauchno-tekhnicheskoi konferentsii po kompleksnomu ispol`zovaniu drevesiny, 1961 g.// GARF. F. 409. Op. 1. D. 1442. L. 158.
[54]Il`ia Shegel`man, *Lesnye Transformatsii (XV-XXI vv.)*, (Petrozavodsk: Izdatel`stvo PetrGU, 2008), p. 87.

deliver chips to pulp and paper enterprises as transportation remained the main problem of the industry as a whole. Thus, the enterprises of the Leningrad region used chips transported episodically from nearby logging camps or sawmilling plants. Some workers of sawmilling plants, however, complained that pulp and paper enterprises did not use wastes even when they were provided by saw millers. For example, the Priozersky plant, located not far from Leningrad, did not consume waste, although there were tons of wastes supplied by the timber mills.[55]

The former was the reason why workers of sawmills accused pulp and paper plants of a careless attitude towards using waste in industrial production. Even in 1956, the journal "Forestry Industry" (*Lesnaya promyshlennost`*) published an article by the head of the trust of the wood proceeding industry "Kareldrev" G. Bashmakov. He accused the administrations of Soviet pulp and paper plants of indifference towards the use of wastes. He explained that recently wastes were seen as an "evil" with which the producers struggled and spent huge amounts of money to destroy them. For example, he noted how the Kem` timber mill transported about 400 thousand cubic meters to waste during the last ten years. But now, Bashmakov argued, the mills were technologically equipped and capable of transforming wastes into chips, but pulp and papers factories did not take advantage of this. Thus, the Ministry of the Forestry Industry and the Ministry of the Paper and Pulp Industry approved a plan for 1956, which included supplies of 205 thousand cubic meters of wastes to Segezhsky and Svetogorsky pulp and paper plants. But in fact timber mills supplied only one sixth of the planned volume. Bashmakov explained that it happened because the heads of the plants considered using wastes as an episodic action only when the plants did not have enough wood, but felt obliged to fulfill the plan.[56]

This complaint hid a technical problem in both the timber mills and pulp and paper plants. It is probable that by publishing an article in a leading journal, Bashmakov wanted to draw a wider attention to the technical backwardness in waste supply by pointing to the unwillingness of the plant's director to comply with efforts on treating wastes. "Looking for guilt" and accusing factory leadership was typical in Soviet newspapers, but it was also a way to draw attention to technical problems. Timber mills suffered from the lack of transportation and means to load waste at the pulp and paper plants. Bashmakov himself complained that neither pulp and paper plants nor timber mills had sufficient amounts of chip flakers to transform wastes into chips. Timber mills also did not have vehicles to supply and transport waste. Because of that, supplies of wastes were episodic and often did not meet the timetables despite the planned economy. Thus, sometimes the plants waited for wood for weeks while sometimes they received an excessive amount of waste. Svetogorsk`s workers complained that in some months the plant did not receive any wood or wastes for months, but sometimes received several wagons of wastes and could not find storage place.[57] The supply of wastes, thus, replicated the supply of wood and all the problems it entailed.

If to believe Bashmakov, chip flakers were bought from abroad without replacement parts. Many timber mills were equipped with foreign machines to cut and sort wastes, in particular that manufactured by the Finnish companies "Karhula" and "Söderhams". Soviet machinery making did not manufacture the mechanical parts required for these apparatus, and this factor caused delays in making chips as well as influenced the quality of materials.[58]Also, engineers complained about a lack of sufficient expertise at factories as, for instance, workers often did not fix the blades in choppers properly. Thus, in Segezhsky pulp and paper plant, one of the largest producers in the USSR, workers changed blades too infrequently and set them in a wrong way.[59]It happened because unlike wood, branch timber and bough contained a lot of tar

[55]Otchet o deyatel`nosti predpriyatiya// TsGANTD SPb. F. 324. Op. 1-1. D. 430. L. 24.
[56] G. Bashmakov, "O nekotorykh voprosakh razvitiya lesopileniya v Karelii," *Lesnaya* Promyshlennost` 11 (1956), 27.
[57]Protokol// Central Archive of Historic-Political Documents (TsGAIPD). F. O-1542. Op. 4. D. 17. L. 2.
[58]Bashmakov, "O nekotorykh voprosakh," 27.
[59]*Tekhnologicheskaya shchepa – tsennoe khimicheskoe syr`e.* (Petrozavodsk: Karel`skoe knizhnoe izdatel`stvo, 1964), 12-13.

and soil. Because of this, blades were easily blocked. Being a specific and crucial element of chip graders, blades had to be well sharpened and be of proper hardness. The only producer of such blades in the USSR was the Gorkovsky instrumental factory, which did not manufacture blades for Finnish machines. At the same time, the apparatuses themselves were expensive. I did not find how much chip flakers cost, but, for example, in November 1957 the Finnish company Rauma-Repola sold one hundred chip graders for five million rubles, quite a large sum at that time.[60] This proves what Daniel Burghart said about transferring from one technological system to another: if a technology is transferred to an environment with worse infrastructure and supply system, it will fail to be implemented successfully.[61]The technical leadership, though, understood this problem, and in 1963 the Central Research Institute of Mechanical Processing of Wood made a series of experiments and produced an installation based on samples of Soviet chip graders. They concluded that all Soviet knives became less sharp quite rapidly because of their low quality and, thus, the industry had to invest into improving these details.[62]However, the industry did not launch the production of knives for Finnish machines which differed technologically.

Technology Transfer and the Soviet Image of Finnish use of wastes

The mid twentieth century witnessed a number of technological shifts in the forestry industry internationally. Gradually, engineers in many countries began to talk about the problem of resource devastation, in particular deforestation. The idea of using wood and timber wastes for production of pulp instead of timber became real in many countries. Finland was one of them, and some Soviet engineers traveled there to learn about new technologies. This section of the paper illustrates such contacts and their role in introducing alternative resources into Soviet forestry industry.

Starting in the 1950s, a few Finnish producers slowly began to mill wastes and use the bark that was left after debarking in production. In this period, Finland set itself the task of increasing forestry productivity rationally using wood.[63] In 1955, after the Soviet and Finnish governments signed an agreement on scientific-technical cooperation, Soviet engineers travelled to Finnish factories.

After coming back, the engineers reported on their trips and explained what they saw and heard abroad to their organizations, usually different departments of the Ministry. The question about the Finnish experience was, therefore discussed not only in reports of Soviet engineers, but on the ministerial level as well. Thus, in 1955 Soviet engineer N. Bochko made a trip to Finland to learn about wood harvesting. He visited a number of enterprises in Rautajärvi, Joensuu, Helsinki and other places. In his report, he indicated that the Finns cut wastes into chips, and the transportation of wastes was mechanized and organized directly to pulp cookers. After his trip, he concluded that "we need to organize transporting of this "droblenka" [grinded wastes] to nearest factories" and set grinder machines in all shops of sawmilling.[64] In the same year, the

[60]Zakaz ot Tekhnopromimport v Rauma-Repola// Rauma-Repolan arkisto. Pori kansio 1.Vanhoja Sopimuksia Neuvostoliittoon. UPM:n Valkeakosken keskusarkisto.

[61] Daniel Burghart, *Red Microchip: Technology Transfer, Export Control, and Economic Restructuring in the Soviet Union* (Aldershot, 1992), pp. 16-17.

[62] N. Rushnov, "Ispytaniya DU-2 TsNIIME po pererabotke otkhodov lesozagotovok, lesopileniya drov na tekhnologicheskuiu shchepu," Trudy TsNIIME 38 (Khimki, 1963), 177.

[63]See more on the developments of Finnish forestry industry in Niklas Jensen-Eriksen, *Metsäteollisuuden maa. 4, Läpimurto: metsäteollisuus kasvun, integraation ja kylmän sodan Euroopassa, 1950-1973* (Helsinki: Suomalaisen Kirjallisuuden Seura, 2007); Timo Myllyntaus and Timo Mattila, "Decline or Increase? The standing Timber Stock in Finland, 1800-1997," *Ecological Economics* 41 (2002): 271-288; Markku Rauhalahti (ed.), *Essays on the History of Finnish Forestry* (Punkaharju*:* Finnish Forest History Society/Lusto, 2006); Juhani Hirvonen ja Riita Hjerppe, Taloudellinen kasvu Suomessa, 1880-1980 (Helsinki: Suomen pankin tutkimusosasto, 1983), among others.

[64]Otchet N.A. Bochko. Lesozagotovki v Finlyandii, 1955// RGAE. F. 7637. Op. 1. D. 3238. L. 37.

report of a group of specialists of the Ministry of the Forestry Industry written after their visit to Finland recommended that the Soviet Union "intensify substantially" the building of factory shops on using waste.[65] All the reports contained a list of recommendations for equipment, ranging from machinery for cutting wastes into chips to technical parts. In April 1957 at the section of the pulp, paper, and cardboard industry of the Ministry of Paper and Woodworking industry engineers argued that the Finns dealt with the forest resources wisely. They treated forestry, forestry and timber industry too seriously, "even more seriously than Americans and Canadians", not in the sense of techniques, but in the sense of technology of cutting wood.[66]

The contacts with Finnish enterprises included not only trips, but also experiments conducted by Soviet and Finnish research and industrial institutions. Thus, the directives of the Twentieth Meeting of the Communist Party decreed that new pulp and paper as well as cardboard factories be constructed, designed to work by using reed as the main material. The key statement made by the officials to support this idea was that reed covered vast territories of the Soviet Union, grew fast, and could be used in the forestry industry. The State Committee on Science and Technology supported this argument, referring to that this material was used in China, France, Britain and other countries, although they had much less reed than the Soviet Union. In 1956, the Committee organized an experimental base on processing reed in Tsuriupinsk in order to learn about how this material grew and in which ways it could be used for manufacturing pulp and pulp-based products. Two years later specialists of the base held a conference on the technology of using reed.[67]Among other things, it stated that "a firm growth in the cultural level of Soviet people, increasing of number of books, periodicals, and newspaper leads to a growing demand for paper. At the same time the level of productions is lagged behind the capitalist countries". The conference recommended the producers and researchers to pay their attention to the Western experience in order to bring it to the USSR.[68]

As the base in Tsuriupinsk suffered from lack of new technologies, it found it important to ask Finnish producers for assistance. In 1958, specialists from the base transported reed to the Finnish enterprise "Inkeroinen" which had a digester "Pandia," an apparatus which could cook reed into pulp. The aim was to make experiments first in Finland and then purchase three similar digesters for the Astrakhan plant from the Finnish company "Tampella". The group of specialists was international and included Nikolai Malytin, the chief engineer of the Svetogorsk pulp and paper plant, Vitalyi Solomko, the Soviet advisor on science and technology in Finland, Perry, a specialist from an English machine making company Black-Clawson, Karhula from a Finnish machine making factory, Seppälä from the Finnish high technical school and others. The Soviet specialists delivered five wagons or 30 tons of reed chaff from Astrakhan cut by a cutting machine (*samorezka*). This appliance, however, was not appropriate for cutting reed, and the material produced was uneven, contaminated by dust and grit, and so was of dismal quality. Also, because Soviet specialists transported it in sacks, it became moldy.[69] The commission of engineers in the Finnish plant, however, experimented in using this material. I cannot say what the results of this meeting were, but after it the Soviet government purchased at least one machine for cutting reed.

After the experiment, Black-Clawson decided to directly address Soviet enterprises. In 1959, they sent a letter to the Sverdlovsk sovnarkhoz where they referred to an article of its vice head O. Rayev published in the journal "Paper Industry" (*Bumazhnaya promyshlennost`*). The

[65]Otchet "O lesopilenii v Finlyandii", 1959// RGAE. F. 7637. Op. 1. D. 170. L. 89.
[66]Zasedanie sektsii tselliulozno-bumazhnogo i kartonnogo proizvostva Ministerstva bumazhnoi i derevoobrabatyvaiushchei promyshlennosti SSSR, 12 apreliya 1957 g.// RGAE. F. 8513. Op. 1. D. 1677. L. 82.
[67]Pis`mo Iu. Maksarevu "Ob organizatsii postoyannoi komissii po ispol`zovaniu kamysha, trostnika i drugikh odnoletnikh rastenii v narodnom khozyaistve"// RGAE. F. 9480. Op. 3. D. 1178. L. 11, 17.
[68]Reshenie vsesoiuznoi konferentsii po tekhnologii ispol`zovaniya odnoletnikh rastenii v tselliulozno-bumazhnoi promyshlennosti, 5-8 fevralya 1958 g.// RGAE. F. 9480. Op. 3. D. 1178. L. 24.
[69]Opytnaya varka trostnika na uchastke Pandia na zavode Inkeroinen, Finlyandiya// RGAE. F. 9480. Op. 3. D. 1178. L. 200.

letter said that "we were inspired by your article "To use all the raw resources of the Sverdlovsk regions for the development of the pulp and paper industry." They explained that they could help the sovnarkhoz with this project and provided an advertisement for their machinery. In particular, they said that the company supplied apparatuses "Pandia" which were purchased by the Soviet Union for Astrakhan`, through the Finnish company "Tampella".[70] In practice, Soviet regional administration could not trade directly with foreign companies, while the trade operations were made by special trade organization. This letter was transmitted to the Ministry, and probably left without answer.

However, reed became a frequently used word in many scientific and technical papers, and it is possible to speak about an intensive campaign to use reed in industrial production. For example, this was reflected in 1959 decree "On the Measures of the liquidation of the backwardness of pulp and paper industry" ("*O merakh po preodoleniu otstavaniya tselluilozno-bumazhnoi promyshlennosti*"). This document stated that now it was important to use sawmill and timber wastes as well as Soviet stocks of reed, which were the largest in the world. At the same time, only a small number of new machines able to handle reed were available, and most in the country were not appropriate for producing a qualified material. To solve this problem and avoid purchasing more foreign equipment, the State Committee on Science and Technology organized a competition for machine making research institutions and industrial organizations on creating a machine for harvesting and transporting reed in the unforested regions in Ukraine, Uzbekistan, Astrakhan` and other areas.[71]

In 1960 the Krasnogorodskaya factory in Leningrad constructed an experimental pulp factory based on imported equipment which could work on paddy straw. This factory was used as a research station by the Central Research Institute of Paper and Pulp (TsNIIB).[72]After this project was launched, the Soviet government stopped negotiating with Finland and Sweden about joint experiments.[73]Despite this, the experiments were successful, but industrial production remained problematic. Overall, enterprises continued using waste or reeds occasionally as a means of overcoming a scarcity of raw materials. The main obstacle to using reeds or waste was a lack of equipment, which hindered implementing inventions. Another issue was the generally careless attitude towards nature and prioritizing plans. Thus, plants like reed were often destroyed through harvesting or other reasons. For example, after 1962 in Khersones the rich harvests of reed decreased significantly after the construction of the Kakhovkaya dam. Also, because of improper harvesting, up to 30 percent of reed was destroyed by tractors which were used instead of special harvesting machines.[74]

The discussions of trips made by Soviet engineers to Finland were rather critical towards the results of transferring foreign experience. In 1956, at the meeting of the presidium of the Technical Council of the Ministry of Forestry Industry, Soviet specialist Beninson said that "we need to implement everything in concert, not randomly," we need to appropriate equipment "not as single pieces, but entirely, in due form, as it is appropriated in the West."[75]Another engineer supported him, saying that "if someone in the Ministry will ask us what we have done after our business trips abroad, we cannot say what we had done after business trips as all we have is rather segmental." Engineer Lopukhov said that "some trips turned useless as they resulted in

[70]Pis`mo v Sverdlovskii snkh ot kompanii Liddon i ko, 1959 g.// RGAE. F. 9480. Op. 3. D. 1188. L. 130.
[71]Usloviya konkursa na razrabotku konstruktsii machin dlya uborki i transportirovki kamysha// RGAE. F. 9480. Op. 3. D. 187. L. 17.
[72]Pis`mo v GNTK ot direktora moskovskogo filial Gosplana RSFSR// RGAE. F. 9480. Op. 3. D. 1178. L. 158.
[73]Iz zasedaniya kollegii GNTK "O khode stroitel`stva eksperimental`no-proizvodstvennoi bazy tselliulozno-bumazhnoi promyshlennosti na Krasnogorodskoi bumazhnoi fabrike Leningradskogo snh// RGAE. F. 9480. Op. 3. D. 1194. L. 33.
[74]Annotatsii nauchno-issledovatel`skikh rabot. Seriya "Tselliulozno-bumazhnaya promyshlennost`".Vyp. 1. Kiev, 1962. S. 3-4.
[75]Stenogramma zasedaniya prezidiuma tekhnicheskogo soveta Ministerstva lesnoi promyshlennosti SSSR po voprosam otcheta o komandirovke v Finlyandiu V.N. Zmeeva// RGAE. F. 7637. Op. 1.D. 3256. L. 31.

that the guys looking at equipment abroad, then making a weak report which is put into archive, and that is all."[76]

Some engineers, however, travelled to Soviet factories after their foreign trips and informed them about what was going on abroad. They updated Soviet specialists on foreign techniques and new technologies, becoming essential channel of knowledge transfer. Thus, Feodor Kuteinikov was one of those who travelled to Finland to learn about waste use in pulp and paper industry in 1955. After coming back he was invited to the Svetogorsk plant to make a report on his experience.[77]I cannot say about the effects of his activities at the plant, but the plant purchased foreign cutting machines, although mostly used timber as the main resource.

Some more positive results of Soviet foreign trips should be noted. For example, after engineer V. Bogdanov travelled to Finland, the Balakhna pulp and paper plant began using waste, and as a result reduced the use of raw materials.[78] But this seems to be one of just few examples of successful implementation of Western experience. In later years, most enterprises continued using cut wood as before. By the end of the Soviet period, the Soviet forestry industry consumed only 16 percent of wastes[79] while using annual plants remained sporadic.

Conclusions

This article deals with the questions of introducing alternative raw materials or wood and timber wastes as well as annual plants in the Soviet forestry industry in the mid-1950s – 1960s. By this time, both Soviet leadership and engineers admitted that the supplying of raw materials suffered from extreme dysfunction, provoking the search for improvements. Using alternative resources could help produce pulp and other products by reducing the use of cut wood and thus contribute to saving forests. On the one hand, and most apparently, the intention was embedded into industrial forestry discourse and meant that alternative resources could help produce more. On the other hand, it was a sign of early Soviet environmentalism directed to the reducing of cuttings and saving more virgin industrial forests. In practice, however, initiatives lead by industrial scientists and engineers to use alternative raw materials were not successful at the national scale. Although research institutions had successful experiments, enterprises could not launch the systematic use of wastes and annual plants. There were instead a series of separate initiatives at research institutions and industrial enterprises which did not spread around the country and often were forgotten. The reason was hidden in a technical problem, or the lack of equipment for transporting and cutting wastes both in timber mills and pulp and paper factories. Both accused each other of indifference towards using alternative materials, while both suffered from technological backwardness. A backward technical system and poor infrastructure did not allow for the introduction of new technology, and factories continued to use wood and thus suffer from inconsistent and uneven supplies. In turn, this resulted in further damaging Soviet forests and clear cutting more forested regions.

Examining Western, in particular Finnish experience also did not improve the situation radically. The Soviet government negotiated for foreign expertise transfer abroad and also purchased Western equipment, but neither fit the Soviet technological environment, as in the case of blades for cutting machines. Improving the system would have required appropriate infrastructure and equipping both those who harvested wood and supplied wastes as well as those who used them. In practice, the centralized system could not provide such an improvement and therefore did not make use of alternative resources systematic. As this analysis revealed,

[76]Ibid. L. 60.
[77]Otchet o rabote pervichnoi organizatsii NTO pri Svetogorskom TsBK, 1955 g.// LOGAV. F. R-180. Op. 4. D. 329. L. 9.
[78]Otchet// TsGA SPb. F. 7384. Op. 36. D. 598. L. 169.
[79]S.M Spritzyn. *Ekonomika ispol`zovaniya vtorichnykh drevesnykh resursov* (Moskva, 1990), s. 4.

there were strong barriers and a profound lack of communication between wood harvesters and industrial plants. In addition, the system was not capable of providing required equipment and technologies. As a result, the supply and using alternative resources replicated technological problems of supplying and using cut wood. As both kinds of material resulted in the same problems with production, the plants were inclined to use wood as it was the more familiar raw material. Similarly, it was easier for timber mills to keep using cut wood than prepare wastes. As a consequence, many enterprises were supplied with wood as before. The modernization of the forestry industry, as it was formulated by Nikita Khrushchev, was not fulfilled. Experiments with wood wastes and annual plants as well as technology transfer contributed partly to the development of some factories, but did not result in a radical improvement of the forestry system and timber resource supply as the government expected.