The Growth of a Chemicals Industry in Russia

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Russia's chemicals industry has experienced ups and downs since its formation. Although the country was hit hard by the Great Recession, it appears to have bounced back and is now investing in modernizing highly outdated equipment and processes.

Russia's chemicals industry has ebbed and flowed — through several political structures, wars, the dissolution of the Soviet Union, and the global economic crisis of 2008, among other significant events. Through these changes, the chemicals industry has had to adapt, and although it has experienced several downturns, chemicals and petrochemicals remain a bright spot for Russian industry.

The chemicals produced in Russia rely on the country's abundance of natural resources and raw materials. Its large deposits of oil, natural gas, coal, and uranium ore serve as the basis for Russia's energy and fuels production. The country is also rich in mineral deposits, which are mined for many strategic metals (aluminum, chromium, copper, gold, iron, nickel, polymetals, silver, tin, and tungsten), nonmetals (phosphates, potassium salts, sulfur), and rare earth elements. Timber is also plentiful in Russia. Nevertheless, formidable obstacles, including climate, terrain, and distance, hinder the exploitation of these resources.

Russia ranks first in the world in proven natural gas reserves and eighth in oil resources. It is the world's largest producer of crude oil, second-largest producer of dry natural gas (behind the U.S.), and third-largest liquid fuels producer (behind the U.S. and Saudi Arabia).

This article narrates the story of the development of the chemicals industry in Russia (including the Russian Republic of the Soviet Union), highlighting the major sectors within the industry — including fertilizers, nitric and sulfuric acid, petrochemicals, and pharmaceuticals — and how they came to be. Chemicals are now produced throughout Russia in all of its major districts (Figure 1).

The start of an industry

The history of Russia's chemicals industry can be traced back to the 17th and 18th centuries, when manufacturers were established to produce resin, colophony (a component extracted from natural resin), turpentine (a solvent distilled from resin), soda ash (potassium carbonate), glassware, and iron sulfate to satisfy both domestic and export needs. Nitric acid and sulfuric acid production began in the early 19th century, with the startup of the first sulfuric acid facility in 1805. The early 19th century also saw the establishment of manufacturers of sodium carbonate from Glauber's salt (sodium sulfate decahydrate) and saltpeter.

In the middle of the 19th century, however, Russia's domestic chemicals industry declined due to the import

Note: Monetary values have been converted from Russian rubles to U.S. dollars, based on yearly currency exchange values from www.oanda.com/currency/historical-rates, which range from RUB9.7 in 1998 to RUB24.86–31.83 between 2000 and 2012.

of cheaper chemicals, including sulfur pyrite and rubber resin, as well as raw materials for varnishes and paints, fats and oils, perfumes, personal-care products, and pharmaceuticals.

By the beginning of the 20th century, Russia lacked the basic infrastructure necessary for the production of mineral fertilizers and pharmaceuticals — which led to a recession in these sectors of the chemicals industry. At the same time, the domestic manufacture of soda ash and rubber products almost satisfied the country's needs. The plants producing aniline dyes (with annual capacity of 4,300 m.t.) were owned by German companies, such as BASF, Bayer, and others. In 1913, Russia's chemicals industry consisted of 349 state-owned and private cottage enteprises that employed 43,000 people, and Russia's total chemicals production ranked eighth in the world.

After the 1917 Russian Revolution, the new government considered the development of the chemicals industry a priority. As part of the Soviet plan for national economic recovery and development (known as the GOELRO plan), the government set a goal for the chemicals industry to increase production by 250% over the level in 1913. The industry reached that goal in 1927.

During the period between the 1917 Revolution and the Great Patriotic War (Russia's term for the period of World War II from June 22, 1941 to May 11, 1945), the chemicals industry experienced relatively good growth. Many large plants were constructed for the production of synthetic ammonia and nitrogen fertilizers, phosphate fertilizers, and chemical fibers. Two old factories were upgraded with new technologies for the production of synthetic resins and plastics. In 1925, a potassium plant was constructed in Solikamsk, a town in the Ural Mountain region, and in 1931, a combined mining and chemical processing complex was started in Russia's Northwestern district. Called Apatit, this complex was able to satisfy the national demand for phosphates, which allowed Russia to stop importing phosphates into the region and begin to export them.

By 1940, the Soviet Union's production of chemicals and petrochemicals ranked fifth in the world. Chemicals production reached annual levels of 1.8 million m.t. of sulfuric acid; 800,000 m.t. of mineral fertilizers; 509,000 m.t. of soda ash; 175,000 m.t. of caustic soda; 34,300 m.t. of synthetic dyes; 11,100 m.t. of chemical fibers; and 10,900 m.t. of synthetic rubbers and plastics. (Although these statistics are for the Soviet Union, they are representative of production in Russia, because the majority of the chemicals plants were located within modern Russian boundaries.)

Russia's chemicals industry progresses

The Great Patriotic War posed an enormous challenge for Russia's chemicals industry. In 1941, chemicals production dropped dramatically — sulfuric acid by 77%, ammonia by 50%, and soda ash by 83% — because many factories

*The combined share of chemical production for these three districts is 16%.

▲ **Figure 1.** Chemicals are produced in all of the major districts of Russia, with the Volga district producing the largest share.

were destroyed by military attacks, while other factories were shut down and production was later relocated to the eastern part of the country.

With new plants starting up in the east, chemicals production started increasing in 1943, and by 1949, production had increased by 150% over pre-war (1940) levels. During the 1951–1960 period, many new facilities were constructed and existing plants were renovated and expanded. The May 1958 decree of the Soviet Union Communist Party Central Committee Plenum, the title of which translates roughly as "Acceleration of Chemical Industry Development and Production of Synthetic Materials to Satisfy the Needs of Population and the National Economy," set forth tremendous capital funding for the chemicals industry within the framework of the Soviet Union planned economic system. (Under this system, economic resources were the property of the state, and development and coordination of economic activities were carried out via centralized planning, administration, and control.)

In 1960, the Soviet Union's chemicals production included 5.4 million m.t. of sulfuric acid, 3.3 million m.t. of mineral fertilizers, 1.8 million m.t. of soda ash, 704,000 m.t. of caustic soda, 312,000 m.t. of synthetic rubbers and plastics, 211,000 m.t. of chemical fibers, 83,900 m.t. of synthetic dyes, and 32,300 m.t. of crop protection chemicals.

Table 1. From 1960 through the 1980s, many chemical companies were established across the Soviet Union.

Region*	Chemicals Produced	Number of Companies
Volga	Petrochemicals	3
	Synthetic Rubbers	4
	Tires and Rubber Products	1
	Synthetic Detergents and Surfactants	2
	Mineral Fertilizers	1
Siberian	Petrochemicals	1
	Synthetic Rubbers	1
	Tires and Rubber Products	1
Northwestern	Mineral Fertilizers	3
Central	Synthetic Detergents and Surfactants	1
	Mineral Fertilizers	1
Southern	Synthetic Detergents and Surfactants	1
North Caucasus	Petrochemicals	1

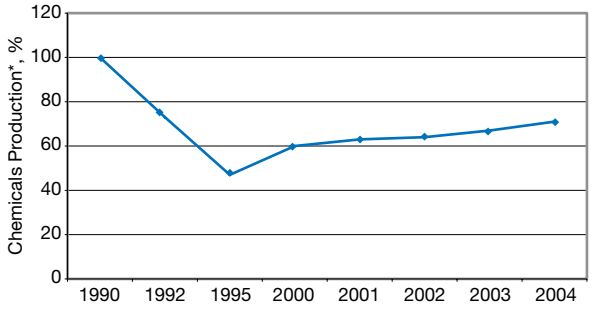
* Although the Soviet Union was not separated into regions at this time, present-day regions are included here to show where in the country these companies were located.

Starting in 1960, the country's chemicals industry underwent significant growth. The period between the 1960s and 1980s has been called the Years of Great Chemistry — a phrase used in the official literature of that period as a slogan to promote development of the chemicals industry. During this period, a strong infrastructure was built for the mining and processing of raw materials as well as fuel and energy. This infrastructure included mining complexes for apatites and rock phosphates in the Northwestern district, potassium salts in the Ural district, oil in the Volga, Ural, and Siberian districts, and natural gas in the northern regions of the country. More than 20 large chemical enterprises were constructed in various regions of Russia (Table 1) by the state-owned companies between the 1960s and 1980s.

In the early 1990s (after the perestroika, or reformation, period of the 1980s), development of the chemicals industry slowed considerably. Production rates dropped significantly before beginning a slow rebound in 1995 (Figure 2). In the early 2000s, production intensified slightly in response to the 1998 depreciation of the local currency and resulting sales of more-competitive domestic goods.

In 2006, the Russian chemical companies produced about 1% of the world's chemicals, and Russia ranked 20th in the world in total chemicals production, having dropped from second place as recently as the 1980s. The fall in ranking can be attributed to several factors. The base for the accumulation of statistics changed slightly from including all chemicals production taking place in the Soviet Union to including only chemicals production in the Russian region — excluding any production taking place outside of these boundaries in the former Soviet Union. In addition, Russian industry faced a severe recession that began during the perestroika period and continued into the early 1990s.

The global economic crisis of 2008 hit Russia's chemicals industry hard. Chemical companies' revenue rose from US$42.52 billion in 2007 to $60.91 billion in 2008, then fell



*1990 = 100%

▲ **Figure 2.** Chemicals production dropped dramatically during the early 1990s, then started a slow recovery in 1995.

to $41.59 billion in 2009 — a 32% drop. Chemicals production also fell over that same period, although not uniformly across all chemicals sectors. For example, the production of mineral fertilizers decreased by 12–16%, while the drop in production for other chemical products varied between 5% and 7%. The tire industry experienced the largest decline, with overall tire production declining by 3% in 2008 and by another 23% in 2009. An additional indicator of the impact of the economic crisis on Russia's chemicals industry is the 11–16% decrease in production of thermoplastic pipes and piping components between 2008 and 2009.

Fortunately, the overall turnover of chemical goods and services increased in 2010 and 2011, and by 2012 reached US$71.56 billion — a 17.5% gain since 2008. The resulting increase in capacity utilization allowed the country to approach its pre-crisis level in the production of mineral fertilizers (86% of 2007 production), sulfuric acid (84%), ammonia (93%), and other chemicals. By 2012, Russia's chemicals industry had overcome the effects of the 2008 economic downturn, and chemical companies were utilizing 80–90% of their production capacity for major chemicals and petrochemicals. Unfortunately, for some products, the large capacity margin that existed before 2008 still exists today.

Russia's chemical companies

After the breakup of the Soviet Union, Russia went through a period of privatization, in which previously state-owned assets were transferred to private owners. Today, Russia's chemicals industry is represented mostly by large corporations funded with private capital, including Sibur Holding, EuroChem Group, Gazprom Neftekhim Salavat, Nizhnekamskneftekhim, PhosAgro Group, Akron Group, Uralkali, Silvinit, Uralchem Group, and Kazanorgsintez. These companies are the largest producers and exporters of chemicals and petrochemicals in Russia (Table 2), and account for more than 50% of the mineral fertilizers produced in Russia, 40% of the polymer materials, 50–70% of the synthetic rubbers, and 82% and 95% of the tires for cars and trucks, respectively.

Chemical companies are located in all Russian federal districts. One of the leading regions for the chemicals industry is the Republic of Tatarstan, situated in the Volga federal district. In 2006, a state-of-the-art industrial park named Technopolis Himgrad was established in Tatarstan to support small- and medium-scale businesses in fine chemistry, polymer processing, nanotechnologies, and related areas. Today, 111 companies operate facilities there, producing about 100 products.

In 2011, the Center of Cluster Development of Engineering in Polymers opened at Technopolis Himgrad in collaboration with Kazan National Research Technological Univ. The Center includes an accreditation laboratory and an industrial production platform equipped with pilot plants. Industry partnering with universities is common among chemical companies in Russia. A somewhat new trend is the creation of university departments at industrial companies to support applied-research projects.

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Table 2. The sales and net profits of the largest chemicals producers in Russia have grown since the global economic crisis of 2008.

Company	2009		2010		2011		2012	
	Sales, US$ million	Net Profit, US$ million	Sales, US$ million	Net Profit, US$ million	Sales, US$ million	Net Profit, US$ million	Sales, US$ million	Net Profit, US$ million
Sibur Holding*	5,088	606.9	7,874	No data	8,461	2,021.5	8,730	2,044
EuroChem*	2,320	349.4	3,219	658.7	4,468	1,030.5	5,356	1,108
Gazprom Neftekhim Salavat†	2,136	–101.9	4,011	105.7	5,030	139	4,943	4.086
Nizhnekamsk-neftekhim*	2,006	–23.9	3,177	278.9	4,288	537.0	4,198	519.8
PhosAgro*	1,957	163.0	2,533	348.4	3,420	641.4	3,388	702.8
Akron Group*	1,184	222.7	1,538	183.9	2,226	589.7	2,288	505.6
Uralkali*	1,066	285.8	1,698	548.4	3,496	1,119.6	3,950	1,688
Silvinit*	1,053	523.3	1,285	379.8	---	---	---	---
Uralchem Group*	949	–76.9	1,389	33.9	2,080	416.1	2,423	703.2
Kazanorgsintez*	697	–65.7	1,105	33.1	1,249	12.5	1,463	111.2

* Values calculated in accordance with international financial reporting standards.
† Values calculated in accordance with Russian accounting standards.
Data were obtained from company annual reports.

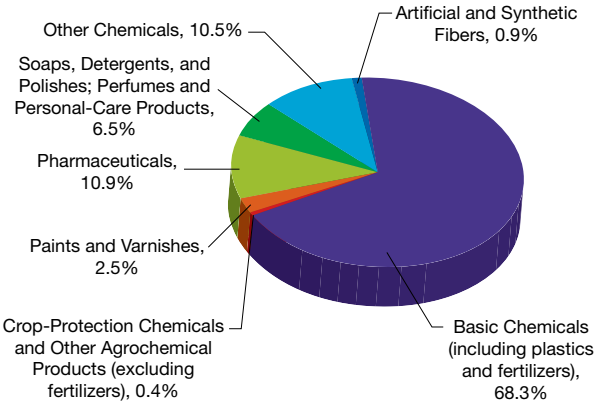
Present challenges

According to the latest available statistics (2011), chemicals production accounts for 8.1% of Russia's overall processing industry based on sales. The chemicals industry consists of more than 800 large- and medium-scale industrial companies and around 100 research institutes, project design organizations (some of which are independent while others are owned by chemical manufacturers), and company-owned pilot plants. By the end of 2011, the total chemicals industry output — which included basic chemicals, pharmaceuticals, and soaps and detergents, among other products (Table 3, Figure 3) — exceeded US$72.4 billion.

Russia's pharmaceutical industry consists of approximately 350 companies concentrated in several regions (Volga and Central districts). In 2011, the overall production reached US$6.3 billion; pharmaceutical preparations and materials accounted for 74% of that, and basic active-pharmaceutical ingredients (APIs), the remaining 26%. Pharmstandard is the only national company in the top 20 companies that provides pharmaceuticals to the Russian market, according the market-research firm DSM Group. The remaining 19 companies are foreign suppliers.

Table 3. Among the wide variety of chemicals produced in Russia, the largest categories are mineral and chemical fertilizers, sulfuric acid, and primary plastics.

Chemical	2011 Production	
	1,000 m.t.	% of Total
Mineral and Chemical Fertilizers (in terms of 100% nutrient)	18,800	38.60
Sulfuric Acid (Oleum)	10,700	21.97
Plastics	5,436	11.16
Polyethylene	1,659	—
Polystyrene	348	—
Polyvinylchloride and Other Halogenated Polyolefins	639	—
Polypropylene and Other Polyolefins	722	—
Other Plastics	2,068	—
Methanol	3,138	6.44
Disodium Carbonate	2,822	5.79
Ethylene	2,469	5.07
Insecticides	2,068	4.25
Detergents	1,549	3.18
Benzene	1,117	2.29
Paints, Coatings, Printing Inks, and Mastics	1,092	2.24
Sodium Hydroxide	1,049	2.15
Styrene	486	1.00
Herbicides	28.30	0.06
Fungicides, Rodenticides, and Similar Products	7.70	0.02
Anti-Sprouting Agents and Plant-Growth Regulators	0.04	0.00
Total	48,701	100



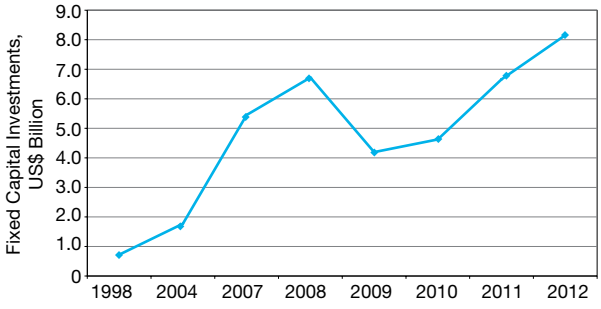
▲ **Figure 3.** Chemicals production in Russia in 2011 included basic chemicals, pharmaceuticals, and soaps and detergents, among others.

More than 5% of Russia's industrial fixed assets are concentrated in the chemicals industry. The industry today faces the challenge of outdated production equipment that has been in service for more than 20 years. To address this, in 2006, the Ministry of Industry and Trade of the Russian Federation released a development strategy for the chemicals and petrochemicals industry. The strategy calls for equipment upgrades and expansions to be completed by 2015.

Capital investment

Starting in 2000, capital investment by Russia's chemicals industry increased, with the exception of 2009 (Figure 4).

From 2004 to 2012, annual investments in fixed capital increased by 360%. National chemical companies with both domestic and foreign capital started commissioning facilities and modernizing existing ones with the use of energy-



▲ **Figure 4.** Capital investment in the chemicals industry has grown, for the most part, since a low in 1998.

efficient technologies. One of the largest investments (completed in 2013) was for the construction of a polypropylene production complex, with a capacity of 500,000 m.t./yr, at Tobolsk-Polymer (Siberia) by Sibur Holding.

Imports and exports

Today, Russia exports many chemical and petrochemical products. The main exports include mineral fertilizers, synthetic rubbers, plastics, ammonia, methanol, and caprolactam.

Between 2000 and 2006, exports more than doubled due to the rise in global prices for chemicals and petrochemicals, as well as an upsurge in global prices for hydrocarbons during 2003–2004. The export turnover dropped during 2009–2010, but by 2011 it had rebounded to exceed the level of 2008 (Figure 5).

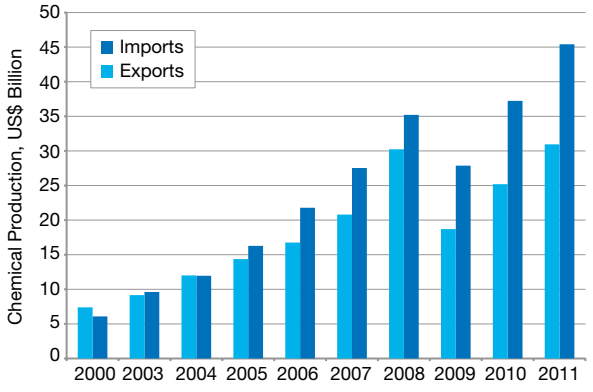
During the 2005–2011 period, imports exceeded exports (in terms of value) due to an increase in demand for a wide range of chemicals and petrochemicals and an insufficient range of product types produced by the Russian chemicals industry (especially in the small-scale chemical production sector).

Imports of all types of chemicals rose in 2013. Nevertheless, the Ministry of Industry and Trade of the Russian Federation reports that the balance of trade in chemical products remains positive.

A bright spot for Russia

The chemicals industry is one of the few growth drivers for Russian industry. Experts forecast an average 5% per year growth in production as new chemical facilities come onstream. The commissioning of these plants combined with renovation and modernization of old facilities are needed to address the outdated equipment of existing plants.

Prospects for the development of the chemicals and petrochemicals industry in Russia are based on the positive forecast for chemicals consumption in the Russian market and an abundance of natural resources. Russia ranks first in the world in explored natural gas resources and production, and second in oil resources. Unfortunately, the natural gas and oil fields are in hard-to-reach areas, where climate, transportation, and infrastructure are real challenges to creating gas chemicals and petrochemicals complexes near these fields. Despite these challenges, oil and gas production in Russia is growing (Table 4).



▲ **Figure 5.** With the exception of 2009, both imports and exports of chemicals have grown since 2000. In most years, imports have outpaced exports. Data obtained from the Federal Customs Service.

Table 4. Production of oil and gas in Russia, 2010–2012.

Indicator	2010	2011	2012
Production of Oil with Gas Condensate, million m.t./yr	512.4	518.7	523.2
Russian Oil Exports, million m.t./yr	244.4	240	234
Primary Processing of Crude Oil at Russian Refineries, million m.t./yr	258.2	271.4	277.3
Gasoline, million m.t./yr	36.7	38.2	39.3
Diesel Fuel, million m.t./yr	70.9	69.4	72.6
Total Gas Production, billion m^3	670.8	654.7	668
Domestic Gas Consumption, billion m^3	469.1	460	205.6
Russian Gas Exports, billion m^3	196.8	186.2	453.4

With the growing demand for petrochemicals and a positive forecast for the extraction of raw materials, experts anticipate new petrochemicals facilities to be commissioned in eastern Siberia starting in 2017, and in the Russian Far Eastern district starting some time before 2020. Gas chemicals enterprises will likely appear in the Krasnoyarsk Territory and the Republic of Sakha (Yakutia).

An analysis of the investment programs of leading oil and petrochemical companies in Russia and development forecasts for the oil, gas, and petroleum refining industries reveals good development potential for petrochemicals, while abundance of mineral resources is a good prerequisite for the development of chemicals production. CEP

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