

Research

The university serves as a vital link connecting fundamental research and applied development with industrial needs. It actively participates in the development of scientific and technical policies and strategies for the socioeconomic development of the Samara Region, as well as in setting technological priorities for key sectors of the regional economy.

As the system coordinator for the regional environmental safety and waste management strategy, Samara State Technical University (SSTU) implements projects to eliminate accumulated environmental damage in the Samara Region. Specifically, during the reporting year, as part of the national "Environmental Well-Being" project, Samara State Technical University (SSTU) conducted comprehensive studies and prepared design and estimate documentation for the liquidation of the "Mazutnoye Ozero" (Fuel Oil Lake) industrial waste pond within the Samara City District. For over 70 years, the area of these fuel oil lakes had been a source of negative impact on the Orlovka and Samara Rivers. Fires on the surface of these lakes during the warm season led to deterioration of air quality in the Kirovsky District of the city and were a source of fire hazards. The total area of the eliminated negative impact sites within the city's urban boundaries by 2025 was 19 hectares. Comprehensive environmental quality studies and engineering surveys with elements of systemic hydrogeological modeling, conducted by Samara State Technical University specialists in 2025, enabled the development of environmentally sound and technically feasible solutions to eliminate the source of the negative impact and restore the areas adjacent to the oil lake. Based on the comprehensive solutions proposed by the university's scientists, the Ministry of Natural Resources and Environment of the Samara Region has planned a project for 2026-2027 to eliminate the source of the negative impact and restore the areas, followed by their return to economic use.

In 2025, Samara Polytech University joined the Federal Scientific and Educational Consortium "Advanced EcoTechnologies" of the Rosatom State Corporation, whose goal is to unite scientific potential and create a personnel reserve for the industry handling hazardous industrial waste of I-II hazard classes. Samara Polytech University became an active participant in major events organized within the consortium: the VII All-Russian Scientific and Public Forum "Ecological Foresight" (November 6-8, 2025, hosted by Yu. A. Gagarin Saratov State Technical University), the VII All-Russian Scientific and Practical Forum "Disposal of Production and Consumption Waste: Innovative Approaches and Technologies" (November 18-19, 2025, hosted by the Institute of Biology of the Komi Scientific Center of the Ural Branch of the Russian Academy of Sciences).

Samara State Technical University continues its collaboration with the Samarskaya Luka National Park and has signed a new partnership agreement with the I. I. Sprygin Nature Biosphere Reserve. Key areas of future collaboration include joint research on the biodiversity of flora and fauna, environmental education for youth, ecotourism development, and the creation of a database of ecotourism routes in the Samara region and unique natural sites found within the protected area.

Representatives of the Samara State Technical University's branch network are also represented in research on ecology and sustainable development. For example, at the Syzran branch of the Samara State Technical University researchers have developed a composition for bitumen-polymer joint tapes used in road construction, replacing the primary raw material with waste from the Syzran Oil Refinery's bitumen production process. The project, supported by industrial partner Germetex and a grant from the Samara Region Fund for Support of Technological Entrepreneurship (2.2 million rubles) and involving the NS-Oil oil refinery, enables the production of a sealing material with improved properties while simultaneously

addressing the environmental issue of oil waste disposal. Chief Technologist Alexander Napalkov is also involved in the project.

The volume of funding for R&D in the field of environmental management, environmental protection and sustainable development in 2025 amounted to approximately 350 million rubles, including the volume of work carried out by the Scientific and Analytical Center for Industrial Ecology - 114.22 million rubles, the Institute for Design and Survey Work - 25.03 million rubles, and the Scientific and Educational Center "Energy of the Future" - 1.15 million rubles.

In order to utilize and commercialize the results of intellectual activity, in 2025, Samara State Technical University submitted applications for inventions, utility models, and databases in the field of environmental protection and sustainable development, including:

- 21 applications for inventions and utility models:

- No. 2025105726 "Hybrid power plant";
- No. 2025105738 "Method of operation of a hybrid power plant";
- No. 2025117541 "Hybrid power plant";
- No. 2025117546 "Method of operation of a hybrid power plant";
- No. 2025119755 "Method for discharging surface wastewater into a domestic wastewater disposal system";
- No. 2025120985 "Heat recuperator";
- No. 2025125026 "Device of water drainage system";
- No. 2025125162 "Electromechanical version of a hybrid vehicle";
- No. 2025126295 "Contact combined cycle gas turbine unit with gas overexpansion";
- No. 2025127377 "Method of operation of a cogeneration gas turbine power plant";
- No. 2025127385 "Cogeneration gas turbine power plant";
- No. 2025128054 "Waste-to-energy gas turbine power plant";
- No. 2025128230 "Device for producing hydrogen in hydrocarbon gas pyrolysis reactors with heat recovery";
- No. 2025128260 "Method for producing hydrogen from hydrocarbon gases with the supply of a catalyst in a fluidized bed and periodic removal of carbon products";
- "No. 2025128354 Method of operating a thermal power plant using hydrogen-enriched gas fuel";
- No. 2025128487 "Composition for the rehabilitation of man-made deposits";
- No. 2025131460 "Power plant of a vehicle";
- No. 2025132299 "Method of operation of a compressor station of a main gas pipeline with a power plant";
- No. 2025132685 "Method of operation of a gas pumping unit of a compressor station of a main gas pipeline";
- No. 2025133190 "Method of operation of a gas pumping unit of a compressor station on hydrogen and a device for its implementation";
- No. 2025134336 "Combined-cycle plant with a steam turbine compressor drive, a regenerative air heater and a high-pressure steam generator";

- 2 requests for databases:

- "Database of the results of systematization and ranking of chemical components and environmental characteristics of polymer-inorganic building composites" No. 2025625727;
- "Database of emissions of harmful substances into the atmosphere from motor transport in the Samara region" No. 2025626466;

In addition, protection documents for the results of intellectual activity were obtained:

- 10 Russian patents for inventions and utility models:
- No. 2835314 "Pilot industrial plant for continuous production of hydrogen and graphite by methane pyrolysis";

- No. 2840120 "Method for continuous production of hydrogen and graphite by methane pyrolysis";
- No. 2840200 "Cementing composition for eliminating absorption zones";
- No. 2840894 "Integrated system for monitoring the condition of culverts";
- No. 2842167 "Hybrid centralized heating system";
- No. 2842169 "Method of operation of a hybrid centralized heating system";
- No. 2842835 "Gas turboexpander power plant of a compressor station of a main gas pipeline";
- No. 2846578 "Method of operation of a hybrid power plant";
- No. 2846579 "Hybrid power plant";
- No. 240256 "Device for producing hydrogen in hydrocarbon gas pyrolysis reactors with heat regeneration."

The University is the founder of scientific and popular media:

- Bulletin of SamSTU, Series "Engineering Sciences", section "Power Engineering and Electrical Engineering";
- scientific journal "Urban Planning and Architecture", the main areas of which are: 05.23.04 - Water supply, sewerage, building systems for water resource protection; 05.23.19 - Environmental safety of construction and urban management;
- The popular science magazine "Technopolis Povolzhya," which contains exclusive publications about scientific schools of national and international renown, famous Samara scientists, unique developments, and innovative technologies in energy, environmental protection, and the food industry;
- The newspaper "Engineer" is one of the oldest corporate publications in Samara, published since 1933.

In 2025, the youth laboratory "Thermal Processes in Chemical Engineering (TERMOKHIM)" was established within the research department of SamSTU under the leadership of the head of the Industrial Thermal Power Engineering Department, Doctor of Engineering Sciences A.V. Eremin (funding volume in 2025: 16.197 million rubles) to form the fundamental basis for predictive analysis and optimization of chemical reactions, thermal and mass transfer processes, ensuring the efficient processing of renewable raw materials into fine and basic organic synthesis products.

In 2025, in the dissertation council 24.2.377.05 (1.5.15. One doctoral dissertation has been defended in the "Ecology" and 2.1.4 "Water Supply, Sewerage, and Construction Systems for Water Resources Protection" (Engineering Sciences). Three candidate dissertations for the degree of Candidate of Engineering Sciences are planned for 2026.

In 2025, 370 articles on sustainable development were published in leading scientific journals.

The fundamental role of scientists is not only in research, but also in the direct formation of the state environmental agenda as members of public councils and working groups at regional and federal ministries and departments, such as:

- Scientific Council of the Russian Academy of Architecture and Construction Sciences "Engineering Systems of Water Use";
- Scientific and Technical Council of the Ministry of Public Utilities of the Moscow Region;
- Expert Council of the Higher Attestation Commission on Energy, Electrification and Power Engineering;
- Expert and Technological Council of the Russian Association of Water Transport Inspectors, Section "Water Disposal and Wastewater Treatment";
- Public Council on Environmental Safety under the Governor of the Samara Region;
- Public Council under the Ministry of Forestry, Environmental Protection and Nature Management of the Samara Region.

The achievements of young Samara State Technical University scientists are widely recognized through their active participation in prestigious national and international conferences. Winning professional competitions not only demonstrates the scientific merit of their research but also significantly enhances the university's intellectual and technological capital.

According to the results of the 6th round of the Student Startup competition, held by the Foundation for Assistance to Small Innovative Enterprises as part of the federal project University Technological Entrepreneurship Platform, 23 representatives of Samara Polytech University (students, graduate students, and staff) were included among the grant recipients, receiving funding in the amount of 1 million rubles for the development of their projects. The winners are represented in six nominations reflecting priority areas of scientific and technological development. The most numerous nomination was New Devices and Intelligent Production Technologies (9 projects), including developments in the field of automated monitoring systems, non-destructive testing devices, devices for mechanical testing of materials and diagnostics of electrical equipment. In the New Materials and Chemical Technologies nomination, 6 projects related to the creation of catalysts, functional materials, chemical reagents for the oil and gas industry and industrial waste processing technologies were recognized. In the Creative Industries nomination, 4 projects in the field of furniture design and digital educational platforms were supported; In the Digital Technologies category, two projects on monitoring industrial facilities and environmental systems were recognized; one project each was recognized as a winner in the Biotechnology (creation of enzyme preparations for agriculture) and Resource-Saving Energy (distribution network monitoring devices) categories. The presented projects are aimed at solving current problems in the oil and gas, chemical, and mechanical engineering industries, as well as in digital technology and biotechnology. This high performance confirms the effectiveness of the university's system for supporting student innovation and scientific and technological entrepreneurship.

Six representatives of Samara Polytech University have received regional grants in science and technology for 2024. The research is supported by the Ministry of Education and Science of the Samara Region and covers chemistry, ecology, metallurgy, and quality management in the automotive industry. The largest grant (496,000 rubles) was awarded for the development of methods for laser modification of industrial steels and alloys. Grant support was also received for projects in competitiveness management in the automotive industry, reducing the negative impact of waste during oil and gas field development, synthesizing new organic materials, holding an international school-conference on ionic conductors, and publishing a monograph on the ecology of small rivers in the Volga basin.

The Samara State Technical University (SSTU) team "Polytech Leaders" reached the finals of the ESG Case Championship, organized by Moscow University named after S.V. Witte and the Sustainable Development Consortium. The project aims to foster a professional community in the field of sustainable development and engage young people in pressing environmental, social policy, and corporate governance issues. Participation in the championship allows students to integrate interdisciplinary knowledge and develop competencies in the ESG agenda. During the qualifying round, the participants successfully solved three cases in the following areas: environmental protection, creating favorable social conditions, and high-quality corporate governance. A jury of sustainable development experts and business representatives selected 15 finalist teams, including university representatives.

In 2025, the Samara State Technical University's Ecoclub "Life" won the "Student of the Year 2025" competition in the "Volunteer Association of the Year" category. Ecoclub "Life" activists, with the support of industrial partners, held the fifth annual youth festival on sustainable development, "VuzEcoFest-2025," at Samara Polytech University, in both in-person and online formats, bringing together over 600 participants. For the first time, the event covered Moscow, Novosibirsk, Cheboksary, Saratov, Buryatia, and Ulyanovsk. The program included: 4 volunteer events, 4 round tables, 4 cleanup days, a 2-day inter-age conference dedicated to Earth Day -

"Earth Ecology", 1 creative evening, 1 open lecture, the 2nd case championship "Green Cup", 4 online events, the presentation of 60 projects, the planting of 500 seedlings, and the collection of 1,500 kg of waste paper.

Samara State Technical University won silver in the University Race held at this youth festival. 550 eco-volunteers conducted over 150 informational and educational events, as well as charity and environmental campaigns, in collaboration with public, scientific organizations, and industrial enterprises in the region. The festival promotes environmental awareness, develops inter-university collaboration, and engages young people in addressing sustainable development issues.

Samara State Technical University is a recognized federal platform for scientific discussions, hosting prestigious conferences and large-scale festivals annually, such as:

- The tenth international congress "Ecology and Life Safety of Industrial and Transport Complexes" ELPIT-2025. It brought together more than 500 participants – executives and leading specialists from industrial enterprises, representatives of public environmental organizations, and leading scientists from various regions of Russia and abroad. Samara Polytech, as usual, was one of the main organizers of the scientific meeting. The program included a number of events: a plenary session, symposia, international roundtables, the Young ELPIT innovative forum for young scientists, the Eco-Leader 2025 international exhibition of ecology and life safety technologies and equipment, and more.

- an international conference on geoennergetics , organized by the Iranian Petroleum Geomechanics Association , the Petroleum Research Institute of the K.N. Toosi University of Technology (Tehran), and Samara State Technical University. The event was attended by 136 specialists, confirming the high interest in current geoennergetic issues . The conference facilitated the effective exchange of new scientific knowledge and strengthened international cooperation in this field.

- an all-Russian scientific and practical conference with international participation, "Current Issues of Sustainable Development in the Context of Uncertainty," which brought together 230 participants. The event aimed to discuss contemporary issues of sustainable development in states, territories, and enterprises, exchange experiences and test the research results of young scientists, and improve the competitiveness of graduates of Russian universities in economic fields and specialties.

- The interregional hackathon "Ecological Sovereignty and a Low-Carbon Future for Russia," organized with the support of the Sustainable Development Consortium, the Samara Luka National Park, and T-Plus. Thirty students from universities in the Samara Region and other regions of Russia participated in the event. The hackathon included two tracks: " Low-Carbon Development and Energy-Saving Technologies" and "Ecological Sovereignty of the Russian Economy," allowing participants to propose practical solutions for decarbonization and ensuring environmental independence.

- Russian Environmental Week (Ministry of Natural Resources of the Russian Federation), which was attended not only by Samara State Technical University students but also by schoolchildren, graduate students, industrial partners, and representatives of executive authorities. Based on its systematic work in ensuring environmental safety in a large industrial region, Samara State Technical University took second place in the "Green Universities of Russia" competition in 2025 and was included in the first ranking of Russian engineering universities 2025 by the Expert analytical center, ranking 28th out of 80 universities in the Russian Federation.