



World-Class Research and Academic Centre "Kuzbass"



Kemerovo
state
university
Bringing together
knowledge and people



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About Kuzbass

Kemerovo
is the administrative
centre of Kuzbass

86%
of its population
is urban

Kuzbass is the **third**
most populated
region in the Siberian
Federal District



**Location: Siberian
Federal District**



Area: 95,725 km²



**Population: 2 674 256
people**



**Density: 27,9 people
per km²**



**Time zone:
UTC+7/Moscow+4**



**Kemerovo -
558 700 people**

**Novokuznetsk -
552 100 people**

Kuzbass: facts and figures

Kuzbass is the leading coal mining region of Russia

Metallurgy is its second main industry

Chemical industry is the third pillar of Kuzbass economy

Mountain skiing is the fastest-growing branch of local tourism

Kuzbass is one of the fastest-developing regions of Russia

58,2%

Kuzbass delivers 58.2% of all Russian coal
71.2% of Kuzbass coal is metallurgical

Extraction of mineral resources - 38,9%



Manufacturing - 14,7%



Energy production and water supply - 4,8%



Agriculture, fishery, and forestry - 3,3%



Construction industry - 3,3%



Handling and storage - 6,9%



Trade industry - 9,4%



Other industries - 20%



100%
of all tram rails

1/2
of all Russian manganese ore

>50%
of investments go to the core assets of the coal mining industry

About Kemerovo State University

Motto:
Bringing together
knowledge and people

21 985
students

 **1** Number one university
in Kuzbass

 **ТОП10**
Best Basic Universities
of Russia

 **ТОП100**
Russian Universities
with the Best Financial
Management

 **ТОП400**
Best BRICS Universities
according
to Quacquarelli Symonds

Kemerovo State University today



Kemerovo State University (KemSU) is the largest university in Kuzbass, **one of 33 basic universities in Russia**



KemSU is an academic centre of innovative, technological, and social development of the Kemerovo Region



1 000 students will graduate from KemSU annually by 2021

935 foreign students from 24 countries study at KemSU



50 foreign students have completed their internship at KemSU



40 KemSU students are currently doing field work abroad



Kemerovo
state
university

Bringing together
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World-Class Research and Academic Centre "Kuzbass"

Kuzbass is one of the five regions chosen as bases for world-class research and academic centres in Russia

World-Class Research and Academic Centre "Kuzbass" develops **best practices** in the sphere of rational, energy-saving, and sustainable development on the basis of **knowledge intensive technologies** of mineral extraction and advanced processing, cutting-edge mechanical engineering, **clean energy**, coal handling and storage



Programme sponsor



Grant recipient

#clean coal =
#green Kuzbass

Figures and members



850 Scopus
and Web of Science
publications

550 million roubles –
performed scope
of works

286 patents of invention

Achievements of the Research and Academic Centre "Kuzbass" in 2016– 2018

Leading academic organisations of higher education and research centres



Real economy enterprises



Key initiative of the Research and Academic Centre "Kuzbass"

#clean coal =
#green Kuzbass

Activity areas of the Research and Academic Centre "Kuzbass" follow the Scientific and Technical Guidelines of the Russian Federation



Transition to environmentally friendly and resource-saving energy, efficiency upgrade of production and advanced processing of hydrocarbons, new sources of energy, handling and storage methods



Transition to personalised medicine, high-tech healthcare and health-saving technologies



Effective response of Russian society to major challenges in the spheres of man and nature/technology interaction and social institutions at the present stage of global development

Activity areas of the Research and Academic Centre "Kuzbass"

Digital mining enterprise



Digital Ob-Irtysh Basin



Clean coal technologies



Comprehensive mineral processing of low-grade coal and by-product coal



Mine operating robotic systems



Efficiency upgrade of coal handling



Social change strategies in resource-type regions



Development and production of medical equipment for cardiovascular surgery



Health-saving biochemical technologies



Development of antibiotic-free animal products against antibiotic resistance



Laying foundations for personalised medicine, hi-tech healthcare, and health-saving technologies



Digital mining enterprise

Maximum efficient use of calendar time

Minimal specific costs of labour and goods

Maximum labour and equipment productivity

Head contractor



Members
and partners

Contacts

Project coordinator:

Gennady F. Alekseev, General Director of JSC Holding
Company SDS-Ugol, tel.: +7-923-610- 11-59

Digital mining enterprise formation strategy



Raw coal



**Processing plant
Kuzbass-300**
Increase in high-quality coal products



Low-energy coal



Mini combined coal-burning heat and power unit (≤ 25 MWatt)



Energy
Automatic fuel supply point (battery changing and charging)



Uncovering transport
Excavator in the coal and pre-coal zone



Heat
Greenhouse complex



Robot-aided shuttle hauler running on accumulator battery or trolley wire

Digital Ob-Irtysh Basin

Maintaining the ecosystems and improving the state of the water sources

System implementation of ecological rehabilitation activities

Improving the ecological conditions for the local population



**Members
and partners**

Head contractor

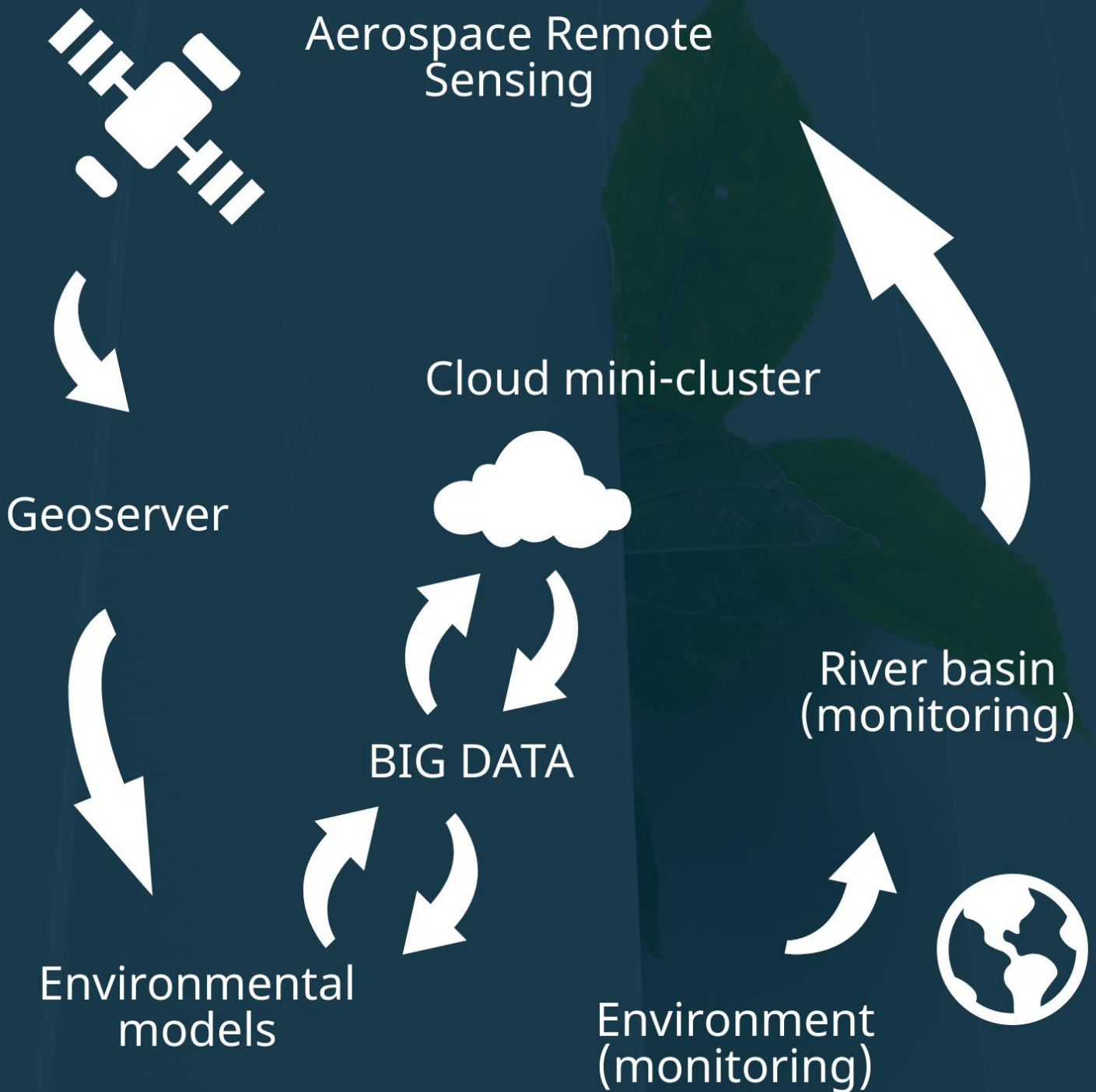


Contacts:

Yuri A. Manakov, Head of the Laboratory for Environmental Assessment and Biodiversity Management, Department of the Kuzbass Botanical Garden, Institute of Human Ecology, Federal Research Center for Coal and Coal Chemistry of the Siberian Branch of the Russian Academy of Sciences, tel.: +7-913-401-48-60

Project coordinators:
Konstantin G. Wenger,
Deputy Governor of Kuzbass,
tel.: +7-913-070-70-06

Entity-relationship model of an eco testing ground in the Ob-Irtysh river basin



Clean coal technologies

New technologies of emission reduction

Head contractor



Members and partners

Contacts:

Zinfer R. Ismagilov, Director of the Institute of Coal Chemistry and Chemical Materials Science, Federal Research Center for Coal and Coal Chemistry of the Siberian Branch of the Russian Academy of Sciences, tel.: +7-913-000- 90-51

Project coordinators:
Oleg V. Tailakov, Deputy Director for Research, Institute of Coal, Federal Research Center for Coal and Coal Chemistry of the Siberian Branch of the Russian Academy of Sciences, tel. : +7-903-907-06-11

Challenges



Research



Results



a high share of coal in the global energy balance: 26% in 2014, 27% in 2016 (IEA, 2018)

large volumes of NO_x, SO_x, and CO₂ emissions in the atmosphere

growing demand for clean coal technologies that reduce man-made impact and anthropogenic emissions of greenhouse gases into the atmosphere during coal mining and processing

use of sulphur-absorbing agents in coal fuel to remove sulphur and obtain gypsum

catalytic purification of exhaust gases from SO_x and NO_x

adsorption purification of exhaust gases from mercury vapour during coal processing

sequestration of CO₂ to be placed in coal seams to stimulate methane production

utilisation of mine methane to generate electricity and/or chemical products

new technologies that reduce emissions of pollutants

production of synthesis gas

CO₂ sequestration

**#clean coal =
#green Kuzbass**

Integrated processing of low-grade coal and by-product coal

Environmentally friendly emissions

50% reduction of fertiliser application rate

Yield enhancement up to 40%

Key performance indicator of heat fuel energy – 93%

Head contractor



Members and partners

Yuri A. Manakov, Head of the Laboratory for Environmental Assessment and Biodiversity Management, Department of the Kuzbass Botanical Garden, Institute of Human Ecology, Federal Research Center for Coal and Coal Chemistry of the Siberian Branch of the Russian Academy of Sciences, tel.: +7-913-401-48-60

Contacts:

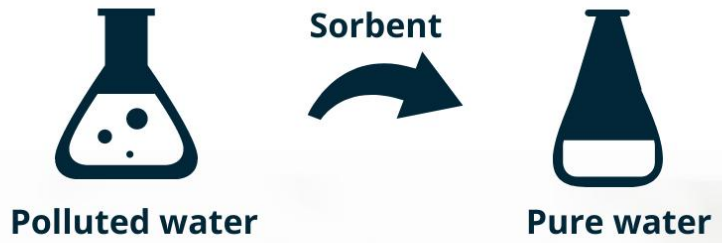
Project coordinators:

Tatyana G. Cherkasova,
Director of the Institute of Chemical, Oil and Gas Technologies, Kuzbass State Technical University,
tel.: +7-961-726-55-00

Sorbent production

Consumption:

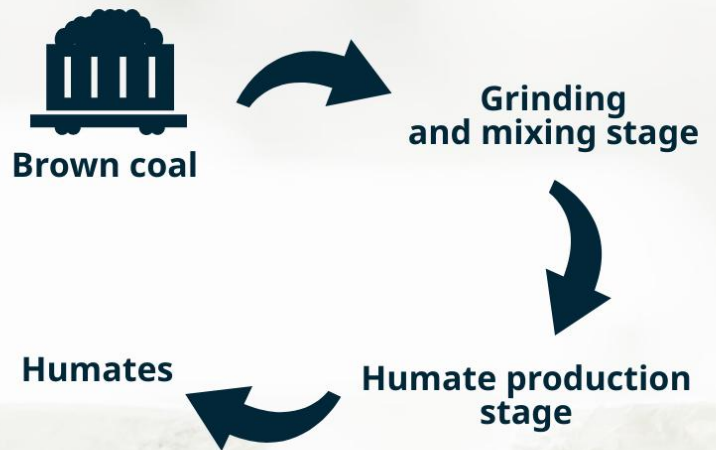
chemical industry
treatment facilities



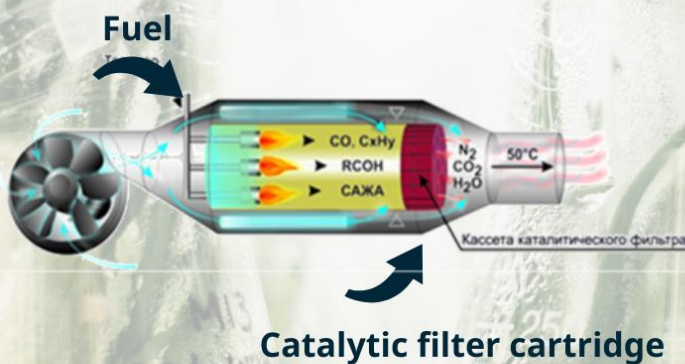
Production of humic substances from brown coal

Consumption

agriculture
oil industry
mechanical engineering
land reclamation



Catalytic Burning



Consumption

local heat supply
treatment facilities

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Robotic mine operating systems

To introduce robotic systems into production processes

To increase the annual volume of engineering products

To create and maintain $\approx 1\ 000$ jobs

Head contractor



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and partners

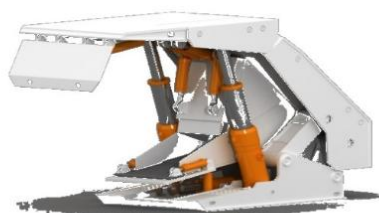
Contacts

Project coordinators:

Vladimir I. Klishin, Director of the Institute of Coal,
Federal Research Center for Coal and Coal Chemistry
of the Siberian Branch of the Russian Academy of Sciences,
tel.: +7-913- 920- 54-57

Robotic complexes are designed to implement cost-effective and safe technologies for underground mining of coal, non-ferrous and precious metals

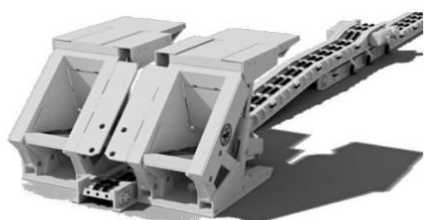
For flat high coal seams



For high-speed driving and extraction of alluvial deposits and ores



For vertical high coal seams



The project complies with the modern international standards for mining technologies and equipment established by the international committee ISO/TC82/SC 8 "Advanced automated mining systems"

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Efficiency upgrade of coal handling

Development of rail steels with special operational properties

Development of new knowledge intensive smelting technologies

Development of new innovative rolling technologies

Head contractor



Members and partners

Georgy M. Dubov, Director of the Engineering Centre for Production Technologies, Kuzbass State Technical University, tel.: +7-903-984-81-71

Contacts

Project coordinators:
Mikhail V. Temlyantsev,
Vice-Rector for Research and Innovation,
Siberian State Industrial University,
tel.: +7-903-941-66-25

High resistant 2.5 rails



New knowledge intensive production technologies

New steel



New innovative processing technologies

Special operating properties



Export

Transport of the future



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Social change strategies in resource-type regions

The project objective is to simulate and plan social changes in resource-type regions to provide integrated sustainable inclusive development

Head contractor



Members and partners

Contacts

Project coordinator:

Vladimir V. Poddubikov, Head of the Scientific and Innovation Department, Kemerovo State University, tel. : +7-913-297-50-26



State of the local industries



Quality of life



Development level of the region

Research

Study of the mechanisms of regional socio-political interaction in resource-type regions

Innovations

Designing social mechanisms to implement new technological and economic agenda

Technologies

Technologies for social change and informed policies in resource-type regions

Market

Implementation of regional and international expert practices

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Development and production of medical equipment for cardiovascular surgery

Production scaling and product distribution to the world market

Development of tissue-engineered bioresorbable vascular prostheses

Development of sutureless prosthesis



Participants and partners

Head contractor






Contacts




Project coordinator:

Olga L. Barbarash, Director of the Research Institute for Complex Problems of Cardiovascular Diseases, Professor, Doctor of Medical Sciences, corresponding member of the Russian Academy of Sciences, tel .: +7-905-969-64-35




Biological valve prostheses for cardiosurgery

-  Collaboration with leading clinics of the Russian Federation
-  Authentic conservation method
-  Unique design

Small diameter vascular prostheses

-  No decision making for prosthetics of small diameter vessels
-  Ability to form a bioprosthesis at the implantation site
-  No complications

Repetitive heart valve replacement system

-  No decision making for prosthetics of small diameter vessels
-  Ability to form a natural prosthesis at the implantation site
-  No complications

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Health-saving biochemical technologies

Protection against chemical carcinogenic environment

Reduction of oncological morbidity

Development of new gene-engineering methods



Members
and partners

Contacts

Project coordinator:

Andrey N. Glushkov, Director of the Institute of Human Ecology, Federal Research Center for Coal and Coal Chemistry of the Siberian Branch of the Russian Academy of Sciences,
tel .: +7-913-431-88-93

2024

**The largest
in the Russian Federation
pilot production of medical
products for cardiosurgery**

31%
of the Russian market
of biodegradable suture
surgical materials

26%
of the Russian market
of prostheses
for cardiovascular surgery

1,5%
of the global market
of biodegradable adhesion
membranes



Genetic profiling of coal industry workers



Current health status



Risks of professional
diseases



Individual programme
of treatment
and prevention

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Development of antibiotic-free animal products against antibiotic resistance

Development of a series of multifunctional feed additives for cattle and poultry based on phytobiotics as an alternative to feed antibiotics

Head contractor



Members and partners

Contacts

Project coordinator:
Ekaterina A. Izmulkina, Acting Rector of the Kuzbass State Agricultural Academy,
tel. : +7-903-909-22-73

Development of a series of multifunctional feed additives for cattle and poultry based on phytobiotics as an alternative to feed antibiotics

Multifunctional feed additives



Humates



Phytobiotics



Metabiotics



Probiotics



Organic acids



Prebiotics

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2019

A new research laboratory of molecular genetic studies of microbiota will be opened

2020

A series of feed additives will be certified according to ISO 22000. The product will enter the Russian market

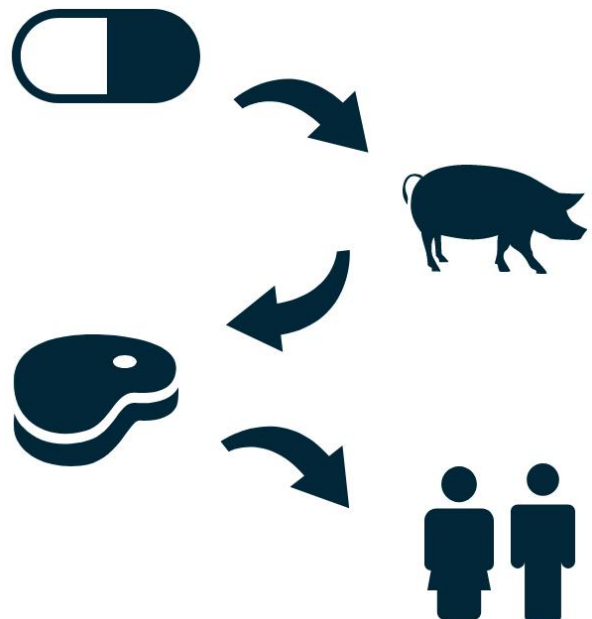
2021

The feed additive will get a GMP + certificate and enter the Indian market

2022-2024

The complex feed additives will enter the pan-Asian market

Spread of antibiotic resistance



Laying foundations for personalised medicine, hi-tech healthcare, and health-saving technologies

This direction will include development of medical technologies and original domestic drugs, as well as innovative components for breakthrough scientific research and competitive production in the Russian federation



Members
and partners

Head contractor



Contacts

Project coordinator:

Elizaveta N.Gulyaeva, Vice-Rector for Scientific and Medical Work and Development of Regional Health Care, Kemerovo State Medical University, Ministry of Health of Russia, tel. : +7-903-944-71-25



Development of an innovative broad-spectrum antibacterial drug

Innovative broad-spectrum antibacterial drug Ak - 003



Development of a series of dental hygienic and therapeutic medicines

Dental Hygiene Product Line:

Mouthwash "DentaXant"
Dental gel "DentaXant"
Dental film "DentaXant"



Development of an innovative antipsychotic drug

Innovative antipsychotic drug Ha - 009



Analgesic anti-inflammatory ointment

diology

Development of medicines that meet the GMP and GLP standards, as well as State Standard GOST 52249-2009 and ISO 13485: 2016

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Contacts

Address: Kemerovo State University, 6, Krasnaya St.,
Kemerovo, 650000, Russia

Tel/Fax: +7-923-613-56-98

E-mail: projectoffice_Kuzbass@mail.ru



Research and Academic Centre

KUZBASS

300th Anniversary of KUZBASS



July 6, 2021