

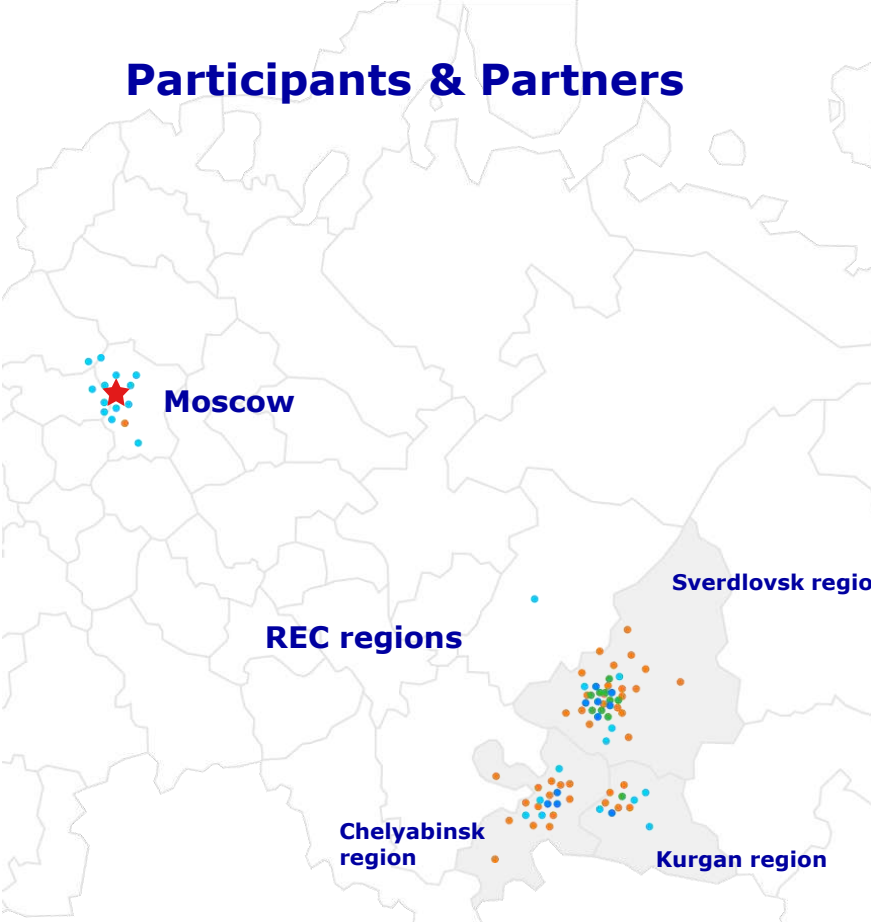


**URAL INTERREGIONAL  
RESEARCH & EDUCATION CENTER  
ADVANCED INDUSTRIAL  
TECHNOLOGIES & MATERIALS**

**УРАЛЬСКИЙ МЕЖРЕГИОНАЛЬНЫЙ  
НАУЧНО-ОБРАЗОВАТЕЛЬНЫЙ ЦЕНТР  
МИРОВОГО УРОВНЯ  
ПЕРЕДОВЫЕ ПРОИЗВОДСТВЕННЫЕ  
ТЕХНОЛОГИИ И МАТЕРИАЛЫ**

**Established at the initiative of the Sverdlovsk Region  
Ural Federal University – UIREC Project Office**

# Participants & Partners



## Education

- Ural Federal University named after the First President of Russia B.N. Yeltsin
- South Ural State University
- Kurgan State University
- Ural State Mining University
- Ural State Law University
- UMMC Technical University
- Nosov Magnitogorsk State Technical University
- Chelyabinsk State University
- Ural State Medical University

## Science

- Krasovsky Institute of Mathematics and Mechanics UB RAS
- Postovsky Institute of Organic Synthesis UB RAS
- Mikheev Institute of Metal Physics UB RAS
- Institute of Metallurgy UB RAS
- Institute of Solid-State Chemistry UB RAS
- Institute of UB RAS Electrophysics
- Russian Ilizarov Scientific Center for Restorative Traumatology and Orthopedics
- Ural Branch of the Russian Academy of Sciences (UB RAS)
- Institute of High-Temperature Electrochemistry UB RAS
- Institute of Mechanical Engineering UB RAS

## Real economy

- i-TOR LLC
- FutureLab LLC
- Ural Optical and Mechanical Plant named after E.S. Yalamov JSC
- High Technologies LLC
- EKSI Research & Production Company JSC
- ROTEC JSC
- General Staff LLC
- M-Profile LLC
- AKSALIT Soft LLS
- UmGorod LLC
- Ural Diesel Engine Plant LLC
- Scientific Production Association of Automation Association of Automatics Named after Academician N.A.Semikhatov JSC
- Megahim-Project LLC
- NPO Kurganpribor JSC
- ENERGOTECH-Ejector LLC
- KONAR JSC
- MSW Ecoservice LLC
- Grazhdanproekt LLC
- Sinara-Transport Machines JSC
- EVRAZ NTMK JSC
- Kirovgrad hard alloys plant (KZTS)
- Engineering Center AS Teplostroy LLC
- Kamensk-Uralsky Metallurgical Works J.S.Co. (KUMZ)
- Kurgan Plant of Road Machines
- CYBERSTEEL LLC
- PNTZ JSC (ChelPipe Group)
- Prosoft Systems LLC
- Magnitogorsk Iron and Steel Works PJSC
- Kurganmashzavod PJSC
- MZiK PJSC
- Scientific Research Institute of Mechanical Engineering JSC
- LLC Chelyabinsk Electrical Equipment Plant
- PG METRAN JSC
- Engineering Center AS Teplostroy LLC
- URALREDMET JSC
- Research Center STM LLC
- ChTPZ (ChelPipe) PJSC
- STC Drive Technology LLC
- MMK-METIZ OJSC
- Automobile Plant Ural JSC
- NPP SENSOR LLC
- IDGC of Urals OJSC
- NPO Electromashina JSC
- TsNIIM (Central Research Institute of Materials) JSC
- Innovation Development Center CTM LLC
- Advance Engineering LLC
- URAL ENGINEERING CENTER LLC
- POZ-Progress LLS
- Russian chromium 1915 JSC
- R&D Enterprise "Mashprom" JSC

## External Partners

- Troitsk Institute for Innovative and Fusion Research
- Makeyev Design Bureau of State Rocket Center
- Science and Innovation JSC
- Proryv JSC
- Fanuk

- Siemens
- Ural Locomotives
- Roscosmos
- Rosatom
- Sinara Group
- VSMPO-AVISMA

- Carbon Composite Materials Factory
- HC Composite (Moscow) CJSC
- Zlatoust Machine-Building Plant
- Krasnoyarsk Machine-Building Plant

- Miass machine-building plant
- Moscow State University (Chemistry Department)
- University of Leuven (Belgium)
- Institute of Polymer Mechanics (Latvia)

- Perm National Research Polytechnic University
- Russian Railways
- Skolkovo
- RUSNANO Group
- Experimental Plant RISC
- RTO (Russian Ilizarov Scientific Center)

- Open Laboratory for Ilizarov Biotechnology
- Specialized Center for Ilizarov Technologies
- High Medical Technology
- RIC JSC (Ekaterinburg)

## Development Indicators for Participant Regions (2019)

GRP

**RUB 4 trillion**

**4.7%\***

Population

**8.6 million**

**5.9%\***

Students

**8.6 million**

**5.7%\***

R&D costs

**RUB 49.7 billion**

**4.3%\***

R&D employment

**30.6 thousand**

**5.1%\***

Scopus publications

**6077 units**

**5.6%\***

Invention patents

**803 units**

**4%\***

Innovative products

**RUB 272 billion**

**5.6%\***

\* Cumulative share of REC regions indicators on a national scale

## Key Challenges for Participant Regions

Limited access to critical technologies

Robotics, control systems, digital technologies, etc.

Brain drain and reduction of the working-age population by 2035

up to 7.2% (Rosstat average forecast)

**7,2%**

Environmental impacts of urban-industrial development

Ekaterinburg, Kurgan, Chelyabinsk belong to the "at-risk" group in the Russian urban environment quality ranking

Socio-economic development gap between regions

up to 2.8 times (by the level of per capita income)

**2,8**

Slowdown of innovative activity in the real economy sector

Decline in the volume of domestic innovative products in 2017-2018

**-14%**

## UIREC PARTICIPANTS

9

Universities

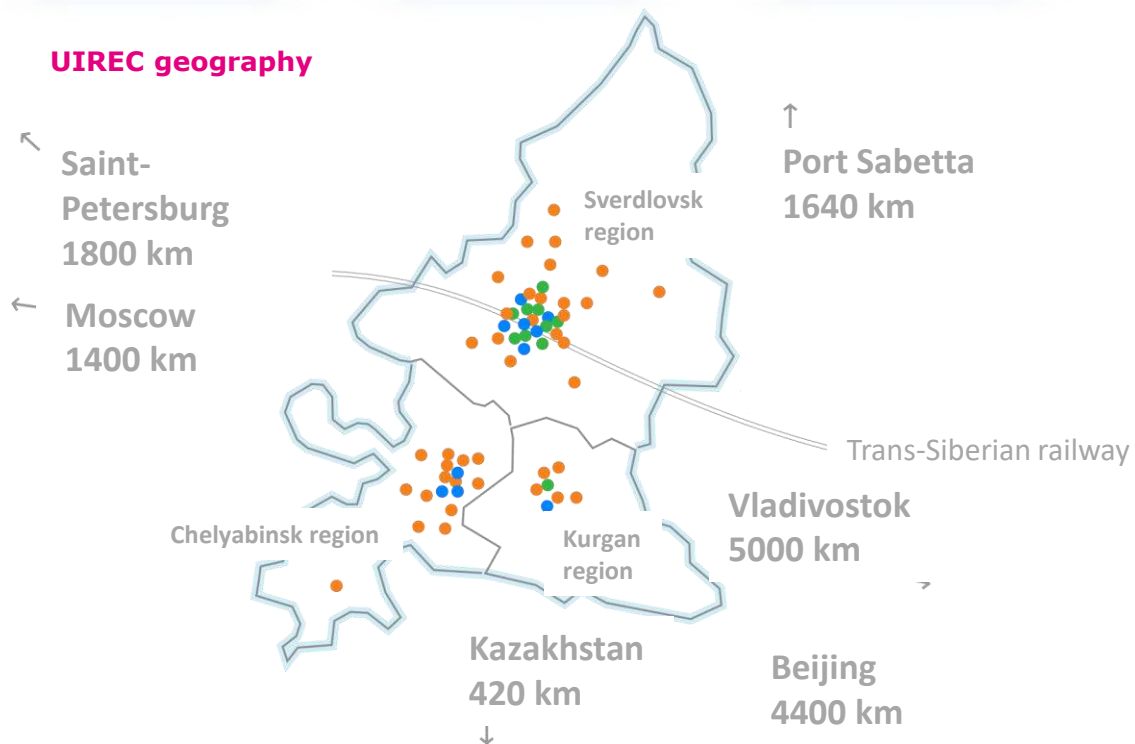
10

Scientific organizations

54

Industry Partners

### UIREC geography



## UIREC STATEMENT

01

**Vision**

Promoting Russian leadership in advanced manufacturing and new materials production

- Advanced aerospace systems
- Innovative transport systems
- Resource-saving technologies
- Eco-friendly production and waste management technologies

02

**Mission**

Ensuring sustainable forward-looking development of leading industrial regions

- Sverdlovsk region
- Chelyabinsk region
- Kurgan region

03

**Mechanism**

Interregional coordination of Industrial and Scientific and Technological Policy

Interregional integration chains around UIREC's technological projects

# UIREC Objectives & Benchmarks

**9 Bill. Rubles**

Gross volume of financial support from the regions in 5 years (all instruments)

Reduce social and economic imbalances across and within REC regions

429

2019

**1112**

2024

New highly qualified and technological jobs, places per year

Build positive working environment to recruit and retain highly qualified staff and gifted young employees

4664

2019

**7215**

2024

Gross volume of R&D implemented (prototypes), mil. rub. per year

Facilitate industry response to innovation, generate support to forward-looking R&D solutions from REC regional economies, contribute to the formation of new high-tech markets

4591

2019

**7746**

2024

Articles published in journals indexed in Scopus, Web of Science databases, per year

Build the framework for world-class scientific and technological excellence, including through international and interregional cooperation

23 500

2019

**25 000**

2024

International students share, number of students per year

Provide advanced staff training to meet the demands of high-tech economy and the priorities of science and technology development in Russia

77,2

2019

**79,2**

2024

Share of extrabudgetary funds in the total funding of the UIREC

work out sustainable cross-regional management and communication schemes for science, technology, and innovation using best domestic and global practice

# UIREC Priority Areas

Industry priorities



- Reduction in space launch cost
- Improving Size, Weight and Power (SWaP) characteristics of aircraft



- Minimizing environmental impact
- Waste management
- Quality of Life



- Improving energy efficiency and energy savings
- Increasing energy supply

## Basic end-to-end technologies



- Smart materials
- Innovative construction materials for extreme conditions
- Advanced magnetic materials
- New materials for technology and healthcare

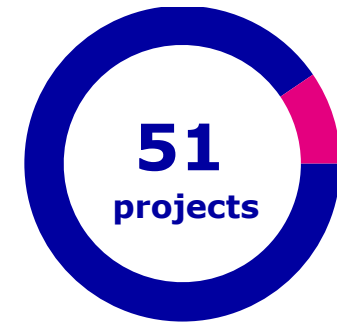


- Digital modeling and design, life cycle maintenance
- Robotic process automation
- Neurointerfaces

Participants and partners

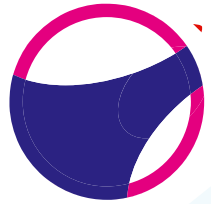


Current projects  
Текущие проекты



10 Breakthrough projects

# UIREC Breakthrough Projects



## AEROSPACE

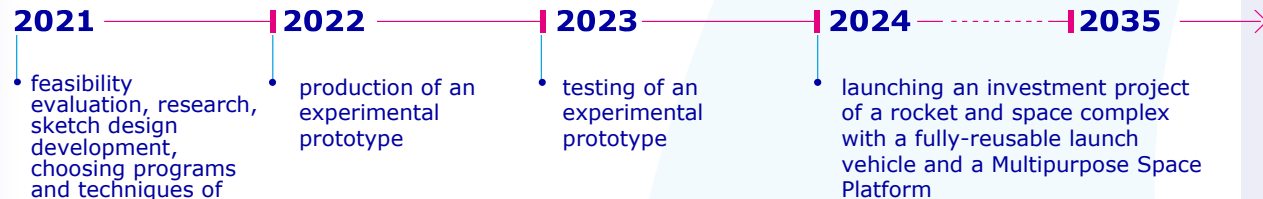
**Develop, design and build experimental prototypes of a propulsion system with a central body, an AI command and control system for a rocket and space complex with a fully-reusable launch vehicle and a Multipurpose Space Platform**

### Project novelty

The rocket is fully reusable

The spacecraft payload cost-per-launch is four times lower than that of competitors

Launch preparation time - 24 hours (for competitors - 4-6 months)



### Partnership



### Project costs

**735 million rub.**

R&D costs for prototype

**120 billion rub.**

R&D and high-tech manufacturing costs

### Market

**\$700 million**

Global commercial launch market size by 2030

**30%**

world freight traffic

**100%**

Russia's share of production localization

# UIREC Breakthrough Projects



## Building a scientific and industrial cluster for the design and production of high-speed rolling stock and urban transport

### Project Novelty

Development of new generation product families (platforms) and individual solutions for high-speed rail and urban transport

Development and implementation of new construction materials

Adaptation to local regulatory requirements and climatic aspects of sales markets composition



- Developing new control systems for complex and individual transportation units (trains, locomotives, urban transport)
- Creation of new power plants using new types of fuel and energy (gas, energy storage devices, hybrids)
- Designing new chassis (platform)

- Producing prototypes and installation series of high-speed railway rolling stock and urban transport
- Cluster project development
- New product platforms and models of high-speed railway rolling stock
- New generation of eco-smart urban transport

### Project Costs

**2.2 billion rub.**  
R&D and high-tech manufacturing costs

**20 billion rub.**  
R&D and high-tech manufacturing costs

### Market

**750 billion rub.**  
total revenue from the project by 2035

**7%**  
global market by 2030

**90%**  
Russia's share of production localization

### Partnership





# UIREC Breakthrough Projects



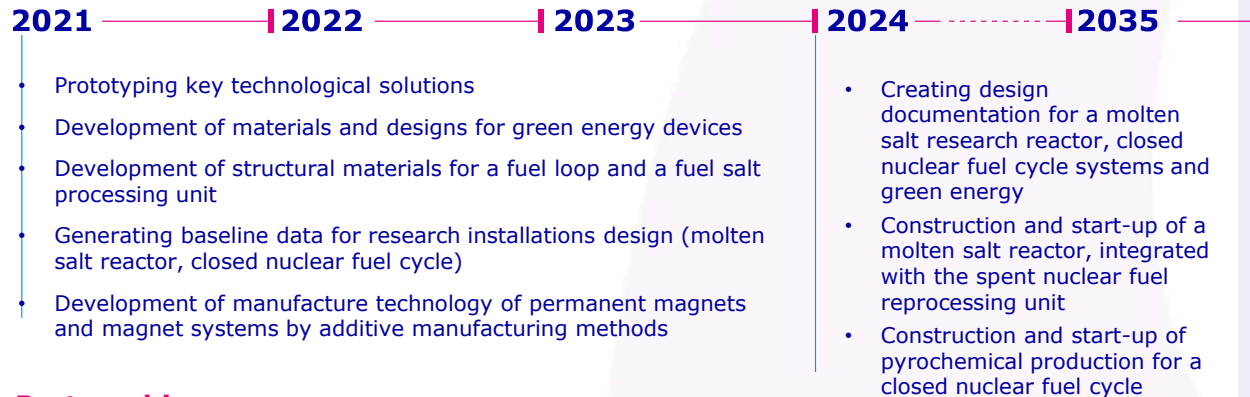
**NEW ENERGY**

## Advanced technologies for the nuclear industry

### Project novelty

Not-in-kind technologies:

- Sustainable closed-loop reprocessing of spent nuclear fuel using cutting-edge "dry" pyrochemical technologies
- Creating materials for a next generation molten salt reactor



### Partnership



### Project costs

**2.9 billion rub.**  
R&D costs covered by REC

**25 billion rub.**  
R&D and high-tech manufacturing costs

### Market

**5%**  
Russia's share in the global nuclear power generation market

**100%**  
share in the Russian and global market of minor actinide recycling

**> 5 bill. rub. per year**  
reduction of high-level waste storage costs

# UIREC Breakthrough Projects



## NEW MATERIALS

## Reconstructive surgery and fast-track implant surgery

### Project novelty

Design and implementation of cutting-edge technologies and materials for osseointegration and implants

Development of a new-concept *Medicine - Materials science* training framework

Introducing novel surgical and postoperative technologies using new-generation implants

### Project costs

2020-2024

**30 million rub.**  
R&D costs



- Elaborating a new concept in staff-training: *Medical Materials Science* Master's program at UrFU
- Manufacturing of a new-generation high-tech implants
- Preclinical and clinical trials and registration of new implants

- Introducing novel surgical and postoperative technologies using new-generation implants

### Market

**18 billion rub.**

Russian market of traumatology, orthopedics, and maxillofacial surgery products

**30%**

share in Russia, going global

**100%**

Russia's share of production localization

### Partnership



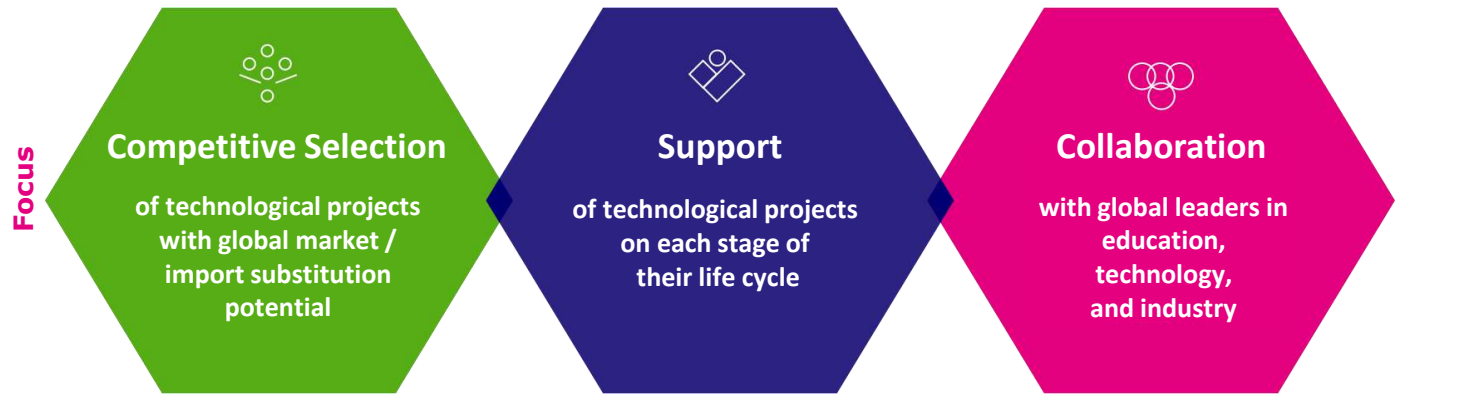
Правительство Курганской области



Правительство Свердловской области



# UIREC Pathways to Global Excellence



## Research

- Action Plan**
- Active collaboration with the Russian Academy of Sciences and other world-class research and education institutions
  - Publications in high-impact scientific journals indexed in international citation bases
  - Scale-up of the *Digital University* model across REC institutions

## Innovation

- Use of advanced innovation (science parks, university incubators and research hubs) infrastructure of the regions
- Support for obtaining international patents

## Technology entrepreneurship

- Use of advanced technological and industrial (Tatishchev Innovation S&T Centre, industrial parks, special economic zones) infrastructure of the regions
- International best practices of tech startup development

## Markets

- Product manufacturing and tapping into new markets with leading international partner support
- Industry-oriented staff-training framework using the capacity of Competence Development Center and digital educational platform



## Global Rivals

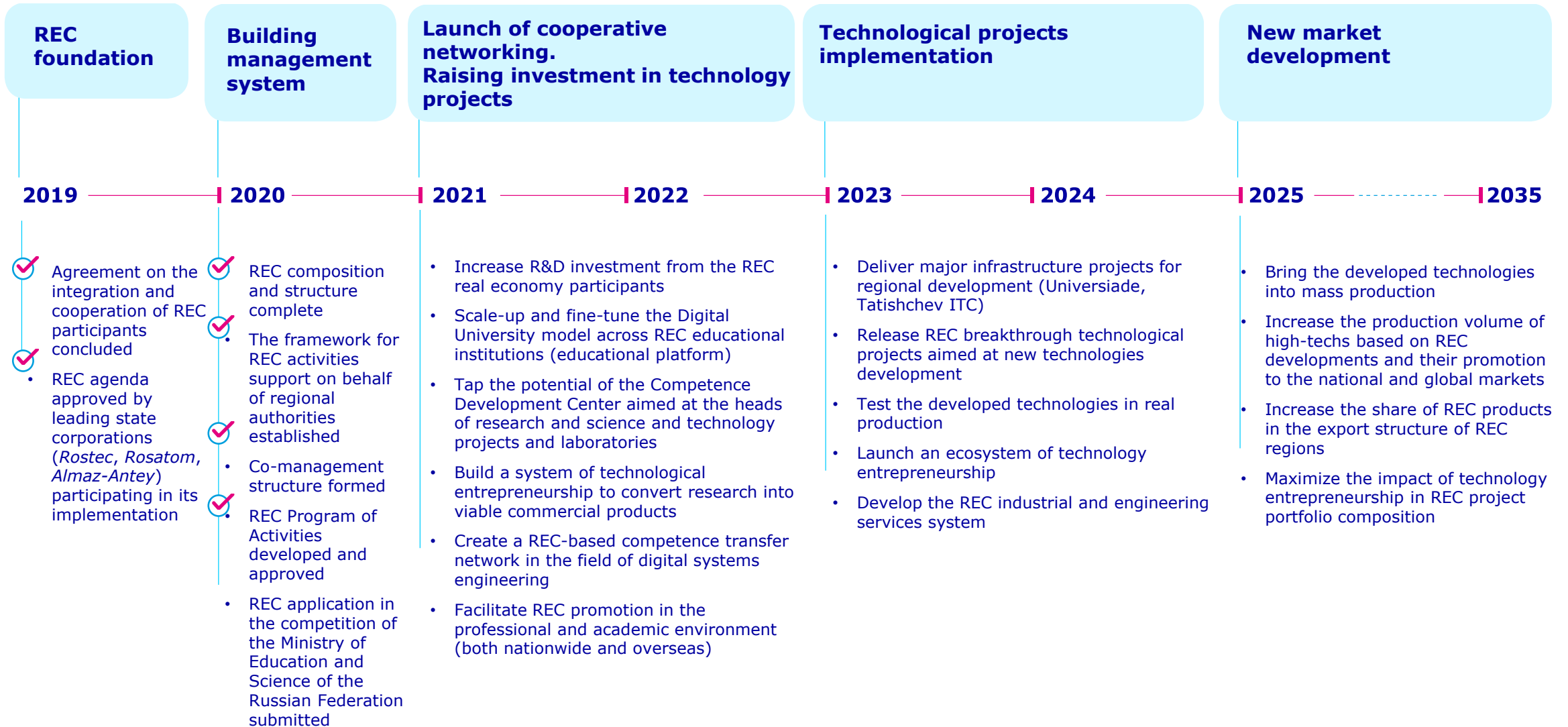


BTS RAIL SAXONY — railway engineering cluster, Germany



Space Exploration Technologies Corporation, USA

# Key Outcomes of the UIREC Roadmap Implementation



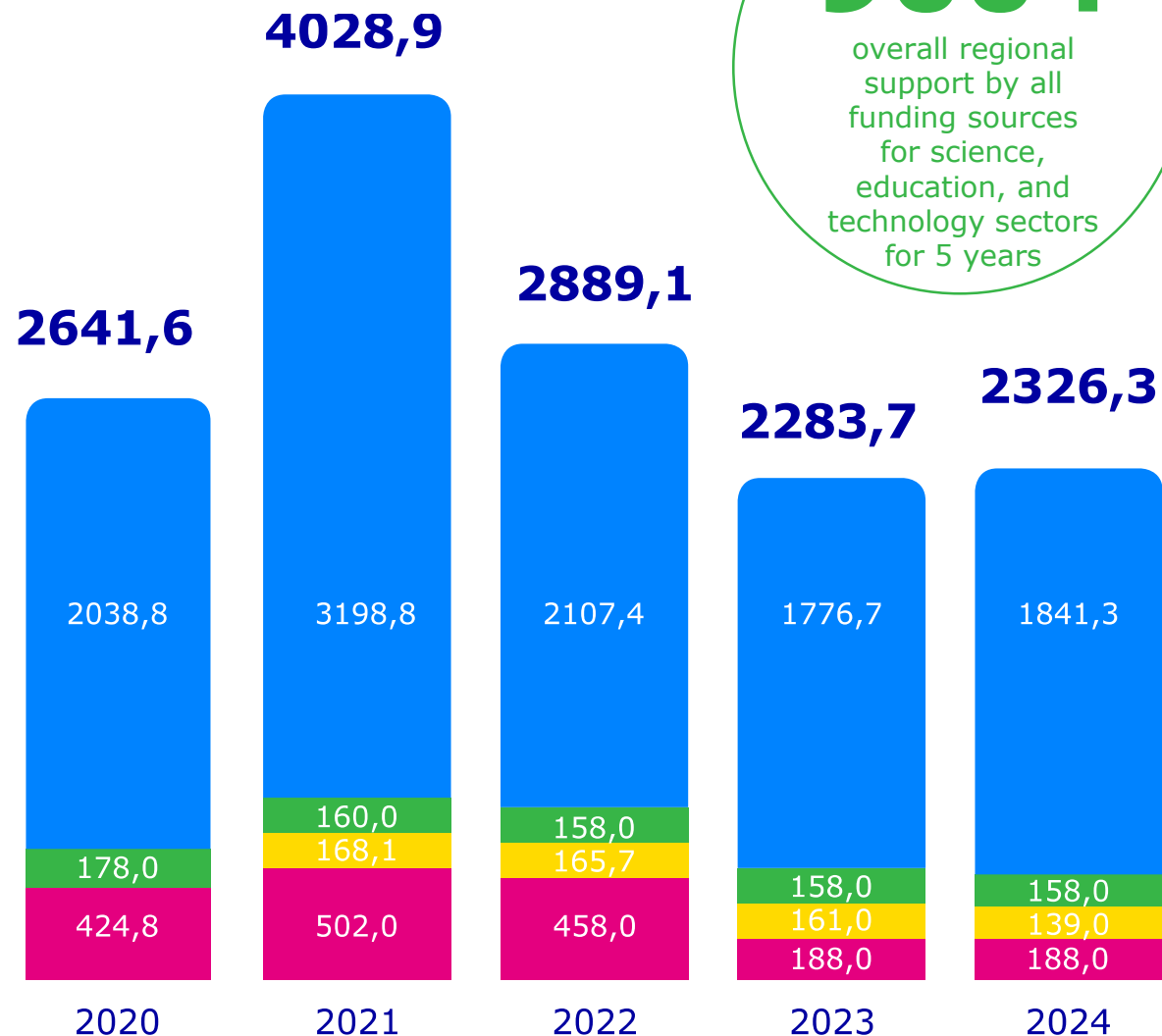
# Costs of UIREC Program Implementation for 2020–2024, million rubles

Funding structure



● External investment	<b>10 963</b>
● Regional government funding	<b>812</b>
● REC subsidy	<b>634</b>
● Other sources	<b>1761</b>

Funding dynamics



**9004**  
overall regional support by all funding sources for science, education, and technology sectors for 5 years

# UIREC Management Structure



URAL INTERREGIONAL  
RESEARCH & EDUCATION CENTER  
ADVANCED INDUSTRIAL  
TECHNOLOGIES & MATERIALS

УРАЛЬСКИЙ МЕЖРЕГИОНАЛЬНЫЙ  
НАУЧНО-ОБРАЗОВАТЕЛЬНЫЙ ЦЕНТР  
МИРОВОГО УРОВНЯ  
ПЕРЕДОВЫЕ ПРОИЗВОДСТВЕННЫЕ  
ТЕХНОЛОГИИ И МАТЕРИАЛЫ

Co-management  
level

<b>General Meeting</b>	<b>Supervisory Board</b>	<b>Expert Council</b>
	<b>Managing Board</b>	

## Program Management Office

Cross-regional  
level

<b>REC Media &amp; Marketing Manager</b>	<b>Workgroups, Scientific and Technological Councils by activity areas:</b> <ul style="list-style-type: none"> <li>• Aerospace</li> <li>• Urban environment and industrial ecology</li> <li>• New energy</li> <li>• Advanced manufacturing technologies</li> <li>• New materials</li> </ul>	<b>Competence Development Center for scientific and research project managers, lab directors</b>	<b>Collegial Management Support Office</b>
--	---	--	--

Regional level

<ul style="list-style-type: none"> <li>• <b>Sverdlovsk Region</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Chelyabinsk Region</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Kurgan Region</b></li> </ul>
<b>REC Sverdlovsk Region Manager</b>	<b>REC Chelyabinsk Region Manager</b>	<b>REC Kurgan Region Manager</b>
<ul style="list-style-type: none"> <li>• Structural subdivisions</li> <li>• Executive and operational committees</li> </ul>	<ul style="list-style-type: none"> <li>• Structural subdivisions</li> <li>• Executive and operational committees</li> </ul>	<ul style="list-style-type: none"> <li>• Structural subdivisions</li> <li>• Executive and operational committees</li> </ul>

## Expected Socio-Economic Impact of Program Implementation by 2024

**15.3%\***

REC contribution to regional GRP growth

**32.6%\***

REC contribution to regional industrial production growth

**36.1%\***

REC contribution to the growth of innovative production in the regions

**5.9 billion rub.**

Internal R&D costs of REC participants (for 5 years)

**3800+**

New high-tech jobs created by REC participants (over 5 years)

**3000+**

Specialists trained in REC competence centers (over 5 years)

**53.4%**

Share of researchers aged under 39

**1800+**

Advanced technologies developed and brought to market (over 5 years)



URAL INTERREGIONAL  
RESEARCH & EDUCATION CENTER  
ADVANCED INDUSTRIAL  
TECHNOLOGIES & MATERIALS  
УРАЛЬСКИЙ МЕЖРЕГИОНАЛЬНЫЙ  
НАУЧНО-ОБРАЗОВАТЕЛЬНЫЙ ЦЕНТР  
МИРОВОГО УРОВНЯ  
ПЕРЕДОВЫЕ ПРОИЗВОДСТВЕННЫЕ  
ТЕХНОЛОГИИ И МАТЕРИАЛЫ

\* Estimated based on "Estimating Innovation Spillovers: An International Sectoral and UK Enterprise Study", Input-Output Model

## Regional Transformation

Building a cross-regional networking framework improves economic, technological, and social connectivity of the Urals



Pooling of regional capacities helps streamline scientific, technological, and educational policies



Development of end-to-end technologies is a move to "smart" environments and a drive to the digital transformation of the regions



The power of newly introduced and renovated technologies at the REC enterprises creates similar dynamics in the related industries



Unlocking the science and education potential with global reach will be a huge leap towards achieving target indicators of a number of national projects ("Science" and "Education," "Digital Economy," "Healthcare," "Ecology," "Labor Productivity and Employment Support")

