



Ministry of Education and Science of the Russian Federation

**Science and technology policy
Ministry of Education and Science
Energy and energy efficiency**

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**Part of the Russian energy strategy implementation
State program of energy conservation and energy efficiency
improvement in 2020**

Program objectives:

Energy intensity reduction of GDP by 2015 – 7,4%;

Energy intensity reduction of GDP by 2020 – 13,5%;

Primary energy savings by 2015 – 300 mln **tut**

Primary energy savings by 2016 – 2020. 170 – 180 mln. **tut
(annually)**

**Ensuring the production of electricity using renewable energy –
4.5% of total electricity production in 2020 (17.0 GW)**



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Implementation mechanisms for scientific, technical policy development and implementation of energy efficiency

- ✓ Federal programs
- ✓ Public-private partnerships (technology platforms)
- ✓ International cooperation
- ✓ Support of SME's



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Seven main directions for science and technology in Russia – Energy & Energy Efficiency and the rational use of natural resources (approved in 2011)

List of 27 approved (???) by the (???) of the Russian federation:

- 2. Basic technologies of power electronics
- 9. Technology for nuclear energy, nuclear fuel cycle, safety of radioactive waste and spent nuclear fuel
- 15. Technology for renewable energy including hydro power.
- 25. Imaging technology and energy-efficient light-bulb (???) devices
- 26. Technologies for energy-efficient systems of transportation, distribution and energy use.
- 27. Technologies for efficient energy production and transformation to fossil fuels.

- 19. Technologies for monitoring and forecasting of the environment, preventing and eliminating pollution.
- 20. Developing technology and searching for mineral sources and their location.
- 21. Technology for handling and preventing disaster situations of natural and manmade kind.



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Russian Ministry of Education implements science, technology developments and energy efficient technologies

FTSTP “Research & Development in priority areas of science and technology” for 2002- 2006

Federal Program “Research and Development in priority development areas of scientific and technological complex of Russia in 2007-2013”

“Energy and Energy Efficiency”

In the period 2007 – 2010 60 projects were financed with a budget of 1,008 million roubles.

“Energy and Energy Efficiency”

In 2011 – 210 projects were funded with a budget of 3,400 million roubles.



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Project funding for 2012

As part of the Federal Programme:

Conducting research – 675 mln. roubles

Carrying out development work – 1,063 mln. roubles

Conducting research by small businesses – 100 mln. roubles

Conducting research with foreign organizations – 244 mln. roubles



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Examples of developments made to order by the Russian Ministry of Education and Science in 2009-2011

Under the Federal Program of activities:

- Environmental management
- Energy and energy efficiency

Clusters “Generation of Knowledge”, “Technology Development”

In the framework of public-private partnership:
Cluster “Technology Commercialization”

In support of SME's

The international scientific and technical cooperation



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Cogeneration power plant: eco-friendly hydrogen production for energy-autonomous consumers

The establishment of the Russian Science institute for High Temperatures of RAS (RAS OIVT)



The co-generation power plant (CEM-10)



Power technology complex ETC-100

Results of the development:

- ✓ Cogeneration power plant 10 kW_e, CEM-10 for autonomous power supply for consumers
- ✓ Energy technology complex for ETC-100 power supply of 100 Nm³ per hour of hydrogen.

The developed power plant provides:

- Complete process with no waste and nearly complete environmental safety;
- Obtaining oxide or aluminium hydroxide – highly marketable products;
- Simplicity and low cost of storage and transport of aluminium.



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Equipment to reduce power consumption in pipeline transportation and technological environments

State educational institute "Moscow Power Engineering Institute (Technical University)



Installation for modifying surfaces of pipelines



Experimental batch of items, shut-off and control valves, coated

Results of the development:

- ✓ An integrated technology to increase the resistance of equipment piping systems through the use of nanocomposite coatings.
- ✓ An operating installation of forming nanocomposite coatings on functional surfaces, and the installation of pipelines for surface modification.

The developed technology provides:

- Reduction of at least 30% of hydraulic resistance during transportation and technological resources
- 2-fold increase in the share of pipelines and equipment.

Experimental batches operated at the Astrakhan gas condensate field.

Work performed on STS-18 and STS-54 JSC "MIPC"



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Autonomous CHP systems using non-food biomass

Association «ASPECT»

Development results:

- ✓ Basic module design of an autonomous CHP system for small household objects.
- ✓ Developed options for the design and industrial production of compact, complex autonomous systems based on raw non-food biomass.



The bioreactor

The developments will provide:

- 2 useful products – biogas used to produce electricity & heat and high bio-organic fertilizer
- Production of electricity and heat with an efficiency above 75%
- Short payback period (from 1 to 3 years)



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Electrophysical and sorption-membrane complexes to clean energy, transformer, transportation and fuel oils

Federal State Unitary Enterprise "State Scientific Centre", Russian Federation
Physics and Power Engineering Institute. Al. Leypunsky



Sorption module
clean energy oils



Integrated Cleaning System
energy oils

Results of the development:

✓ A set of filtration equipment based on electrosorption and membrane modules for cleaning power, transformer, transportation fuels and oils applied to the enterprises of fuel and energy complex.

Design complex provides:

- Increase the life of the power of oils to 25-30%
- Reduction of 20% of the economic costs of the equipment at fuel and energy facilities
- Increase service life of the cleaning system

Integrated Treatment system installed in the central mashlohozyaystve (TSMH) of Smolensk NPP (Desnogorsk)



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Power technology complex for the joint production of electricity and synthetic liquid fuels from natural gas

Establishment of the Russian Academy of Sciences
Joint Institute for High Temperature of RAS (RAS OIHT)



The general form of the ETC

Results of the development:

Developed complex power technology (based on existing OIHT RAS gas turbine of 1 MW). It provides:

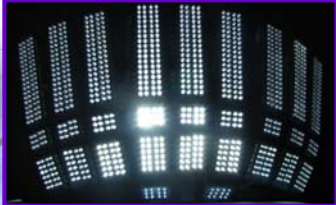
- ✓ High fuel utilization factor (KIT), which reaches 85-90%
- ✓ Reducing the cost of energy generated by 30-70% through the implementation of synthetic liquid fuels (methanol) at a cost of its production in the modern large chemical plant

✓ Obtaining clean energy complex (the flue gases after the gas turbine are substantially free of toxic nitrogen oxides).



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Energy-saving lighting devices for lighting mast systems based on high power multi-chip LED
(The project is a public-private partnership)



Samples of the mast luminaire



Initiator: OAO "RZD"

Developer: JSC "Svetlana Optoelectronics"

Results of the development:






The result of the work is an energy-saving lighting devices for lighting mast systems based on high power multi-chip LEDs, providing:

- Reduction factor of 2 (1 kW);
- Increase the life of the light bulb (not less than 50,000 hours instead of 9,000 hours)
- Lower operating costs for repairing and replacing light bulbs



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Development of small businesses

<p align="center">Device temperature control for energy-saving system of individual registration, distribution and consumption of heat and electricity in buildings</p>   <p>Implementation of the development will reduce the energy consumption for heating of building by 15-20% Developer: JSC "Elema INFO"</p>	<p align="center">Heat transfer equipment for the disposal of low-grade heat</p>  <p>Implementation of the development provides up to 70% utilization of the heat capacity of wastewater Developer: Joint Stock Company INSOLAR</p>
<p align="center">LED lights to illuminate the premises of public, residential and ancillary buildings</p>  <p>Implementation of the development will reduce electricity consumption by 6 times compared with the lamps to incandescent lamps Developer: JSC "Engineering Technologies"</p>	<p align="center">High precision electronic voltage regulator for lighting systems with remote monitoring and control</p>  <p>Implementation of developed products will save 15-20% of electricity in lighting systems Developer: OOO "Soft-Pro"</p>

The agreed areas of cooperation between Russia and EU

- Hydrogen technologies and fuel cells
- Production of biofuels
- Renewable energy
- Technologies to reduce greenhouse gas emissions (“clean coal technologies, CO₂ capture, etc.)
- **Energy efficiency and conservation, including the highly efficient generation of electricity and heat, the combined regional and transnational power**

Скоординированные конкурсы, реализуемые в 2011 г.:
(co-financing of projects: 2 + 2 million euro for a project)

- **Electricity production from biomass**
- **Control systems and equipment for large power networks**



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THANK YOU!

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