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UKRAINIAN R&D CAPACITIES IN ENERGY



**EU 7th Framework Programme for Research
and Technological Development**

FP7 Thematic Area: ENERGY



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**Joint Support Office for Enhancing
Ukraine's Integration into the European
Research Area (JSO-ERA)**

Ukrainian R&D Capacities in Energy

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Introduction

Historically, Ukraine has a well-developed research and industrial capacity in the energy sector. It used to be one of the most powerful research and industrial regions of the former Soviet Union with its outstanding power engineering research institutions and companies. Since that time, the major Ukrainian scientific centres have been contributing to the development and upgrading of power generating plants and have been implementing the achievements of fundamental and applied research and high-end technological solutions into the manufacturing practice.

Most research institutions and technical universities are located in the economically developed regions of Ukraine. Traditionally, Kharkiv and Kyiv lead science and technology in the energy sector because research institutions, universities, and major industrial enterprises are located there.

The Ukraine's energy industry is represented by many unique closed-cycle manufacturers succeeded in all production stages from R&D to manufacturing, e.g., OJSC Turboatom, State Enterprise Plant Electrotyazhmash (Kharkiv), PJSC Sumy Frunze NPO, and Gas Turbine Research & Production Complex Zorya-Mashproekt (Mykolaiv).

- OJSC Turboatom is one of leading global turbine manufacturers specializing in production of steam turbines for thermal (TPP), nuclear (NPP) and heat power plants (HPP), hydro turbines for hydro power plants (HPP) and hydroelectric pumped storage power plants (PSP); gas turbines and combined-cycle plants (CCP) for TPPs and other power equipment.
- Electrotyazhmash designs and manufactures high power hydro generators, hydro generator motors, turbo generators for TPPs and NPPs, electric motors for drives of rolling mills, mine hoists, and other facilities.
- PJSC Sumy Frunze NPO – one of the largest machine-building companies in Europe –manufactures equipment for oil, gas, and chemical industries and specializes in production of compressors and turbo compressor units, unique chemical facilities, centrifuges, pumps and valves for gas pipelines, oil refining equipment and gas-filling stations.
- Gas Turbine Research & Production Complex Zorya-Mashproekt is one of the global leaders in designing and constructing gas turbines for sea-going merchant fleet and navy, power industry, and gas transport. ⚡



Ukrainian Research Landscape

In the Ukraine's energy sector, science and research (fundamental and applied research, design and development, S&T assistance) are the competence of research institutions representing four areas of science:

- academic research;
- field research;
- university;
- industry.

Academic research is the priority of the National Academy of Sciences of Ukraine (NASU). Research projects are also implemented by field institutions (e.g. those affiliated with the Ministry of Industrial Policy of Ukraine, Ministry of Energy and Coal Industry of Ukraine, etc.), higher educational institutions, industrial research institutions, engineering departments and special engineering offices within enterprises.

In the energy sector, fundamental and applied research is largely done by NASU institutions. Industrial research institutions have cut down their research projects to some extent over the last 10 years.

The actual share of RTD expenditure in Ukraine's GDP is about 1.4%.

The total budget funds allocated for public RTD target programmes have ranged 4.5 to 5% over the last three years. Almost one third of the budget is allocated to the National Academy of Sciences of Ukraine, while the Ministry of Education and Science of Ukraine receives up to 10%, the Ministry of Industrial Policy of Ukraine – 9 to 10%, and the Ministry of Energy and Coal Industry of Ukraine – up to 8% only.

The accurate quantitative overview of research and educational capacity of the Ukraine's energy sector could hardly be made. So, the review should therefore be focused on institutions with well-established scientific schools experienced in international collaboration and research in FP7 priority areas.

The major NASU R&D institutions with well-established scientific schools, which are experienced in international collaboration and research and succeeded in research projects in conventional and unconventional power engineering, renewable sources of energy, energy efficiency and saving are mainly located in 16 research centres within 3 NASU departments: Department of Physical & Technical Problems of Power Engineering, Department of Physical & Technical Problems of Materials Science, and Department of Chemistry. In 2010, these research centres employed 6406 staff members including 3224 researchers (336 with doctor-of-science and 1099 with candidate-of-science degrees) in total.

High-level research in material science and mechanical engineering, power engineering and power generating technologies, chemical technologies and chemical engineering, transportation and oil & gas storage is done by research centres and laboratories of the leading Ukrainian universities: National Technical University of Ukraine 'Kyiv Polytechnic Institute', Kyiv Taras Shevchenko National University, Donetsk National Technical University, National Mining University, National Technical University 'Kharkiv Polytechnic Institute', V.N. Karazin Kharkiv National University, National Aerospace University 'Kharkiv Aviation Institute', Lviv Polytechnic National University, and Ivano-Frankivsk National Technical University of Oil and Gas.

Bachelor, specialist, and master degree studies for the energy sector are carried out in 25 Ukrainian technical universities of III-IV accreditation levels. More than 3000 students specializing in power engineering and energy-related areas graduate from these universities every year. Both NASU institutions and major universities offer doctorate and post-graduate programmes for researchers in the energy sector. There are specialized academic boards, which award doctor-of-science and candidate-of-science degrees. ⚡



Ukraine's Energy Policy



Ukraine has recently developed and adopted certain laws in renewable energy systems:

Law of Ukraine “On Power Energy” (1997) as amended in 2000. The Law provides for government subsidies for wind power plant (WPP) construction and sets preferential tariffs for WPP generated electricity.

The Law of Ukraine “On Alternative Sources of Energy” adopted in February 2003. The Law lays down the legislative, economic, ecological, and organizational framework for utilization and promotion of alternative sources of energy. However, the Law does not provide for any financial incentive or any other mechanism to support RES utilization.

The Law of Ukraine “On Combined Heat and Power Production (Co-generation) and Utilization of Dump Energy Potential” adopted in 2005. According to the Law, owners of CHP plants (of whatever capacity) have free access to local power grids and can sell power they generate to individual consumers on a contractual basis. Owners of qualified CHP plants have the right to sell power they generate on the Ukrainian wholesale power market and to consumers throughout Ukraine under direct contracts. Tariffs are set by the National Commission for Regulation of Power Industry of Ukraine.

The Law of Ukraine “On Amendments to Certain Laws of Ukraine Concerning the Introduction of a Green Tariff” adopted in 2008. The green tariff applies to wind power, hydropower, biomass, biogas, and several methane capturing power productions. The National Electricity Regulatory Commission of Ukraine will almost double the prices, which energy producers in those sectors could normally charge, over the next ten years.

In March 2006, the Cabinet of Ministers approved the Energy Strategy until 2030 which outlines strategic objectives for energy sub-sectors to enhance the country's overall economic development and people's wellbeing.

The Strategy states the following main goals:

- to promote environment for a sustainable and high-quality energy supply;
- to ensure reliable and sustainable functioning and efficient development of the energy industry;
- to cut down energy dependency;
- to cut down energy intensity;
- to reduce environmental impact and ensure civil safety;
- to integrate the Ukrainian power industry into the European system, to expand power exports and strengthen the country's position as a gas and oil transit country.

According to the Energy Strategy, Ukraine will expand the use of renewable and non-traditional sources of energy from 10.9 MTCE in 2005 to 40.4 MTCE (18.3% of overall energy consumption, including 9.2% from biomass) in 2030.

The largest increase is expected in the use of solar energy, methane gas from coal mines and heat pumps operating on low-potential heat. According to the Strategy, electricity production from renewable energy sources will increase up to 1.6 billion kWh in 2020 and to 2.1 billion kWh in 2030.

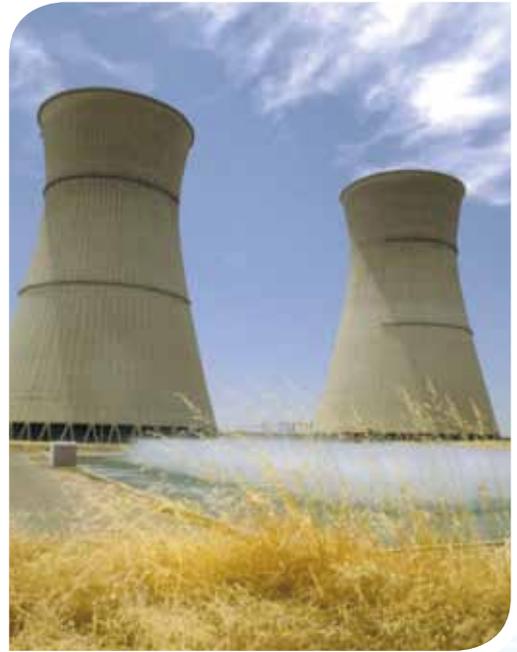
Target State Technical Programmes

Target state technical programmes and state S&T contracts are developed and implemented to meet the research and technology priorities in Ukraine until 2020. “Energy and power efficiency” recognized as one of the key priority areas of research and technology development is focused on:

- co-generation technologies to enhance efficiency of heat and energy supplies for industrial companies and households;
- alternative energy sources for heat supply to households and municipal facilities;
- new types of fuels to substitute oil and natural gas;
- environmentally friendly burning technologies to enhance efficiency of fuel chemical energy utilization;
- energy saving heat-pumping technologies to utilize low-grade heat;
- resource extension and less energy-intensive equipment in power engineering.

The majority of research projects fallen within the priority research area of the EU energy sector and, in particular, FP7 Energy Thematic Area are being implemented within NASU Target Comprehensive Research Programmes:

- Increasing the Reliability and Extending the Operation Life of Power; Facilities and Systems;
- Bio-fuel;
- Fundamental Problems of Hydrogen Energy;
- Research & Technological Problems of Integration of Ukraine’s Energy System into the European One (“Integration”);
- Research & Technological and Economic Problems of Ensuring Joint Operation of the United Energy System of Ukraine with EU Energy Systems’ (“Conjunction”). ⚡





International Research Cooperation in Energy

Research cooperation between EU and Ukraine is based on the Agreement on Cooperation in Science and Technology between the European Community and Ukraine signed in 2002. This Agreement explicitly covers cooperation in the area of non-nuclear energy.

This cooperation was boosted by the Memorandum of Understanding on Cooperation in the Field of Energy between the EU and Ukraine (MoU) signed on 1 December 2005 in the context of implementation of the EU-Ukraine Action Plan. MoU outlines the steps to organize joint work towards smooth integration of the Ukrainian energy market with that of EU and comprise road maps covering five specific areas:

- nuclear safety;
 - integration of the electricity and gas markets;
 - enhancing security of energy supplies and transit of hydrocarbons;
 - improving efficiency, safety and environmental standards of the coal sector;
- Increasing cooperation in energy efficiency and promotion of RES.

Recently bilateral programmes and joint research projects in the energy sector based on the signed intergovernmental S&T cooperation agreements are being implemented jointly with research institutions from Austria, France, Hungarian Republic, Slovenia, Turkey, Slovakia, Romania, Lithuania, Poland, Bulgaria, Netherlands, Belgium, and Sweden.

International Projects for Scientific Cooperation (calls for bilateral joint projects, short-term individual grants) are being implemented within the agreement signed by and between NASU and CNRS (France), the Royal Society (UK), and TUBITAK (Turkey).

Various calls for proposals to launch joint projects co-financed by foreign partners under respective bilateral agreements are becoming more common. Such cooperation promotes coordinated international cooperation policy in science and technology and develops projects jointly with EU research centres to fill the gap in energy and resources use based on the EU leaders' experience.

Ukrainian research institutions and universities take part in the current EU Programmes such as:

- EU Seventh Framework Programme for Research and Technological Development;
- ERASMUS MUNDUS;
- TEMPUS;
- INSC Instrument for Nuclear Safety Cooperation funded through ENPI (European Neighbourhood and Partnership Instrument);
- ENPI-funded CBC Poland-Belarus-Ukraine Programme;
- ENPI-funded INOGATE Interstate Oil and Gas Transport to Europe.

Furthermore, such intergovernmental organizations as NATO Science for Peace and Security (SPS) Programme, EU – ENPI, Central European Initiative (CEI), and Science and Technology Centre in Ukraine (STCU) offer grants for scientists in the energy research area. ⚡

Overview of Research Institutions in terms of FP7 Energy Thematic Area

Hydrogen and Fuel Cells

Interdisciplinary research on the target programme Fundamental Problems of Hydrogen Energy (<http://www.nas.gov.ua/programmes/hydrogen/EN>) is carried out in three directions: Production of Hydrogen, Hydrogen Storage and Using of Hydrogen. More than 25 institutions representing 10 NASU departments (Mechanics; Geosciences; Physics and Astronomy; Physical and Technical Problems of Materials Science; Nuclear Physics and Power Engineering; Chemistry; General Biology; Biochemistry, Physiology and Molecular Biology; Economics) are involved into more than 65 research projects which have been implemented within this program. Some of them are listed below:

- A. M. Pidhorny Institute for Mechanical Engineering Problems (development of technologies for hydrogen production);
- Gas Institute (deep purification of hydrogen, development of hydrogen storage systems, development of hybrid hydrogen-solar installations);
- V. I. Vernadsky Institute of General and Inorganic Chemistry (theoretical research on hydrogen energy, synthesis of powders for fuel cells);
- M. Frantsevich Institute for Problems of Materials Sciences (materials for fuel cells production, development of hydrogen storage systems, development of fuel cells);
- Institute of Macromolecular Chemistry (development of polymer fuel cells and materials for their production);
- Ye. O. Paton Electric Welding Institute (development of technology and equipment for non-destructive quality control of vessels for hydrogen storage savings and transportation)
- National Science Centre 'Kharkiv Institute of Physics and Technology' (accumulation of hydrogen in nanostructure alloys);
- Scientific & Educational Centre (SEC) "Nanomaterials in Accumulating and Generating Energy Devices", Vasyl Stefanyk Trans-Carpathian National University (development and refining of technologies for receiving oxide, chalcogenide and carbon nanomaterials for energy generating and accumulating devices).

In 2006, 883 manuscripts were published in total. 215 manuscripts devoted to hydrogen and fuel cells were published in 2010, including hydrogen production (102), hydrogen storage (44) and hydrogen use (69).

Renewable Electricity Generation

- Institute of Renewable Energy (technologies and systems for multipurpose use of renewable energy; physical-engineering fundamentals and technologies of solar, wind, hydro, geothermal and organic energy transformation and utilization);
- Institute of Hydromechanics (a vertical axis wind turbine (VAWT));
- Institute of Engineering Thermophysics (solar, geothermal and bio energy transformation and utilization technologies);
- A.M. Pidhorny Institute for Mechanical Engineering Problems (a windmill power plant with hydrogen accumulation of energy; micro low-head hydro turbine).

Renewable Fuel Production

- Institute of Cell Biology and Genetic Engineering (sources for bio-fuel production and biological methods to enhance efficiency of bio-fuel raw material);





- Institute of Bioorganic Chemistry and Petrochemistry (chemical technologies for bio-fuel production and use of concomitant products);
- SECB - Scientific Engineering Centre Biomass, Institute of Engineering Thermophysics (technological and ecological fundamentals for bio-fuel production and utilization).

Renewables for Heating and Cooling

- Institute of Engineering Thermophysics (technologies of ground heat accumulation of solar energy for household heating);
- A.M. Pidhorny Institute for Mechanical Engineering Problems (heat pump technologies for conversion and practical application of low-potential renewable energy from natural heat sources);
- HPL - Heat Pipes Laboratory, NTUU “Kiev Polytechnic Institute” (heat pipes; solar collectors for optical properties of low-dimensional semiconductor structures; heat exchange equipment; systems for thermal stabilization based on heat pipes for various kinds of devices).

CO2 Capture and Storage Technologies for Zero Emission Power Generation

- Gas Institute (technologies for industrial environmental discharge purification and waste recycling and protective atmosphere processing)

Clean Coal Technologies

- Coal Energy Technology Institute (technologies for gas- and residual-oil-free burning and gasification of high-ash coal that could be used to replace natural gas in power and metallurgy industries)

Smart energy networks

- G. E. Pukhov Institute of Modelling Problems in Power Engineering (development of research and technological fundamentals and methods to control and ensure the reliable functioning of complex engineering systems in the power industry and other sectors of the national economy based on computer technology and hardware);
- Institute of Electrodynamics (development of research and technological fundamentals and methods based on Smart Grid technology for integration of decentralized energy production systems with high-level technological diversity of energy sources into the United Energy System of Ukraine);
- Institute for Energy Saving and Energy Management, NTUU “Kiev Polytechnic Institute” (sustainable energy development and multi-criteria optimization of renewable energy and distributed generation resources allocation; analysis, forecasting and control of energy utilization; environmental and energy management system).

Knowledge for Energy Policy Making

- Institute of General Energy (development of scientific, procedural, regulatory and legal framework for functioning and advancement of the Ukraine’s power sector in compliance with EU requirements).⚡

Overview of Ukraine's Research Centres in terms of FP7 Energy Thematic Area

Institute of Engineering Thermophysics

2-a Zhelyabova St., 03057, Kyiv, Ukraine
Phone: +380 44 456 6282; fax: +380 44 456 6091
E-mail: admin@ittf.kiev.ua
<http://www.ittf.kiev.ua>

Institute of Engineering Thermophysics was founded in 1947 as a successor of the Institute of Power Engineering of the Academy of Science of Ukrainian SSR.

Major research areas:

- thermophysical studies of processes in heat power equipment while using traditional and renewable energy and development methods to enhance equipment efficiency, reliability, and environment safety;
- development and application of heat-transfer theory to enhance efficiency of heat transfer and utilization processes in machines and modules of new facilities;
- development of the heat and mass transfer theory to enhance efficiency of available thermal technologies and develop absolutely new energy-efficient and resource-saving technology;
- development and application of thermal value measurement theory to design innovative thermophysical devices and systems to improve metrological support of operating power and other thermal-engineering equipment.

A. M. Pidhorny Institute for Mechanical Engineering Problems

2/10 Pozharskoho St., 61046, Kharkiv, Ukraine
Phone: +380 572 94 5514, 94 3833; fax: +380 572 94 4635
E-mail: admi@ipmach.kharkov.ua
<http://www.ipmach.kharkov.ua>

Founded in 1972 as a successor of the Institute of Engineering Thermophysics, the Institute has been focusing on fundamental and applied research in such key areas as:

- optimization of processes in power equipment and improvements in its design;
- energy-efficient technologies and alternative power-engineering facilities;
- predicting the reliability, dynamic strength and service life of power equipment;
- simulation and computer technologies in power machine-building.





Institute of Electrodynamics

56 Peremohy Ave., 03680, Kyiv, Ukraine

Phone: +380 44 456 0151, 456 0051; fax: +380 44 456 9494

E-mail: ied@ied.org.ua

<http://www.ied.org.ua>

The history of NASU Institute of Electrodynamics dates back to 1939 when the Power Engineering Institute was founded. Its predecessor's studies focused on improving efficiency of electrical systems became a research priority for the Institute of Electrodynamics.

Major research areas:

- conversion and stabilization of electromagnetic energy parameters;
- improving the efficiency and reliability of electromechanical energy conversion processes;
- analysis, optimization and automation of operation modes of electrical power systems and system elements;
- information-measuring systems and metrological control in the power industry.

G. E. Pukhov Institute of Modelling Problem in Power Engineering

15 Generala Naumova St., 03164, Kyiv, Ukraine

Phone: +380 44 424 1063; fax: +380 44 424 0586

E-mail: ipme@ipme.kiev.ua

<http://www.ipme.kiev.ua>

Founded on January 6, 1981, the Institute focuses on such research areas as:

- fundamental problems of power-engineering theory, mathematical and electronic modelling of energy processes and systems;
- problems of computer technology and hardware-based control and reliable functioning of complex engineering systems in power industry and other sectors of the national economy;
- development of modelling systems for scientific research and industrial practice.

Coal Energy Technology Institute

19 Andriyivska St., 04070, Kyiv, Ukraine

Phone: +380 44 425 5068; fax: +380 44 537 2241

E-mail: ceti@i.kiev.ua

Major research areas:

- development of novel high-efficiency and environmentally friendly domestic coal burning and gasification technology with a view to utilise such technology in Ukraine's power industry;
- heat- and electro-physical studies to enhance efficiency of heat-power conversion into electrical power;
- development and implementation of state-of-the-art methods for diagnostics and prevention of harmful environmental emissions from power plants.

Institute of General Energy

172 Antonovicha St., 03680, Kyiv, Ukraine

Phone/fax: +380 44 220 1671

E-mail: info@ienergy.kiev.ua

<http://www.ienergy.kiev.ua>

Founded on February 26, 1997, the Institute focuses its research projects on the following areas:

- scientific background to forecasts achievements of power industry and power consumption; systems analysis and optimization of the power sector structure, branch and regional systems of power industry and energy balances;
- development of information and software tools for prognostication;
- research into structural development of the Ukraine's power sector, key trends in the development of its fuel-and-power complex with due consideration of environmental requirements, the task to achieve fuel-and-power balances and optimize imports and exports of fuel and energy resources;
- systems analysis and prognostication of R&D progress in the power sector, studies into the principal ways of improving energy efficiency and energy saving, prognostication and implementation of energy-saving potential;
- scientific principles of power sector management in the market economy; development of the regulatory and legal framework and economic environment for functioning and advancement of the power sector in Ukraine.

The Institute was the principal development contractor (2001–2003) and leading organization (2004–2006) in the development of the Energy Strategy of Ukraine until 2030.

Gas Institute

39 Dehtiarivska St., 03113, Kyiv, Ukraine

Phone: +380 44 456 4471; fax: +380 44 456 4471

E-mail: ig-secr@i.com.ua

<http://ingas.org.ua>

Founded in 1949, the Institute has the following major research priorities:

- development of energy- and resource-saving technologies in various sectors of the national economy based on higher efficiency of natural gas use;
- development of technologies for preparation and use of alternative off-balance energy sources in transport and power facilities of distributed heat-and-power supply;
- energy-efficient disposal of solid domestic waste and air protection.





Institute of Renewable Energy

20-a Chervonogvardiyska St., 02094, Kyiv, Ukraine

Phone: +380 44 206 2809; fax: +380 44 537 2657

E-mail: renewable@ukr.net

<http://www.ive.org.ua>

Founded on December 10, 2003, the Institute focuses on the following research areas:

- technologies and systems for multipurpose use of renewable energy;
- physical & engineering fundamentals of solar energy transformation and utilization;
- scientific fundamentals of wind power use and transformation;
- scientific fundamentals of transformation and utilization of the energy of small rivers and seas;
- thermo-physical fundamentals of geothermal energy;
- scientific fundamentals of transformation and utilization of renewable organic energy.

V. I. Vernadsky Institute of General and Inorganic Chemistry

32-34 Acad. Palladina Ave., 03680, Kyiv, Ukraine

Phone: +380 44 424 3461; fax: +380 44 424 3070

E-mail: office@ionc.kiev.ua

<http://www.ionc.kar.net>

The Institute was founded in 1918, when academician V. I. Vernadsky, the first President of the Academy of Sciences, set up a chemical laboratory within his Physical & Mathematical Department. This laboratory was reorganized into the Institute of Chemistry in 1929.

Today, the Institute has become a major centre of fundamental and applied research in inorganic chemistry, coordination chemistry, chemistry of solids, nanochemistry, electrochemistry and physical chemistry of melts, aqueous and non-aqueous solutions, processing of initial and recycled metal-containing materials.

The Institute makes research in priority areas of inorganic and physical inorganic chemistry, high-temperature coordination chemistry of melts, gas phases and plasma; synthesis and characterization of novel dielectric, semiconductive, optical, ultra pure oxide materials, superconductors and high-temperature ceramics. The structure and properties of ionic melts, solid electrolytes, inorganic sorbents, coordination compounds of rare, rare-earth and other metals, liquid ionic crystals, membrane materials are also studied here.

NASU Institute of Macromolecular Chemistry

Postal address: Ukraine, 02160 Kiev-160,
Kharkivske Shosse, 48
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E-mail: ihvs@ukrpac.net; ihvsnas@i.com.ua
<http://www.macromol.kiev.ua>

Institute of Macromolecular Chemistry (IMC) is a leading Ukraine's research centre which develops and studies different polymers, composites and related materials. IMC was founded in 1958 (former name until 1964: Institute of Chemistry of Polymers and Monomers). The Institute has several key areas of research: polymer science and fundamental aspects of polymer chemistry, chemistry and physical chemistry of polymer composite materials, technology of functional polymers and polymer-based composites, development of the theoretical background for modification of polymer materials and polymer researches for medical purposes.

I. M. Frantsevich Institute for Problems of Materials Sciences

3 Krzhizhanovskoho St., 03680, Kyiv, Ukraine
Phone: +380 44 424 2071; fax: +380 44 424 2131
E-mail: dir@ipms.kiev.ua
<http://www.ipms.kiev.ua>

Founded on April 18, 1955, the Institute pursues the following research priority projects:

- physical and chemical fundamentals of technologies and physical and chemical properties of inorganic materials; studies of phase equilibria, surface and contact phenomena in multi-component systems; hydrogen technologies of material synthesis and processing;
- physics of deformation and fracture; structural basics of developing constructional materials with high specific strength; computer modelling of materials structure;
- synthesis of refractory compounds and high-pressure phases; high-temperature, super hard, functional oxide-free and oxide ceramic materials on the basis of those phases;
- state-of-the-art powder metallurgy technologies; computer design and optimization of technological processes; sintered metal materials and composites, powder coatings with designated properties for various applications;
- nanocrystalline metals, nanoceramics and nanocomposites; synthesis of innovative nanostructural refractory substances and related materials.

Institute of Hydromechanics

8/4 Zheliabova St., 03680, Kyiv, Ukraine
Phone: +380 44 456 4313; fax: +380 44 455 6432
E-mail: vgr@ihm.kiev.ua
<http://www.hydromech.kiev.ua>

Founded on December 28, 1963 as a successor of the Institute of Water Economy of Ukraine (founded on April 30, 1926 and subsequently reorganized into the Institute of Hydrology and Hydraulic Engineering of the UkrSSR Academy of Sciences), the Institute focuses its research projects on such areas:

- hydromechanics of moving objects and turbulent flows;
- hydromechanics of water currents and hydro-engineering facilities.





Institute of Cell Biology and Genetic Engineering

148 Acad. Zabolotnoho St., 03680, Kyiv, Ukraine

Phone/fax: +380 44 526 7104

E-mail: iicb@iicb.kiev.ua

<http://cytgen.com/icbge/ua/ICBGE/>

Founded on June 6, 1990, the Institute has the following major research areas:

studying molecular & biological and molecular & genetic mechanisms of plant cell functions with biotechnology methods; developing novel technologies in cell and genetic engineering; developing genetically modified plants with useful properties; developing methods of plant biodiversity conservation; studying genome functioning in genetically modified plants; investigating adaptive response of plants to biotic and abiotic stresses; and studying the structure and functions of cell walls in higher fungi.

Institute of Bioorganic Chemistry and Petrochemistry

1 Murmanska St., 02660, Kyiv, Ukraine

Phone: +380 44 558 5388; fax: +380 44 573 2552

E-mail: kukhar@bpci.kiev.ua

<http://www.bpci.kiev.ua>

Founded on January 16, 1987, the Institute makes research in the following areas:

- chemistry of biologically active peptides, albumins, nucleic acids and their constituents;
- chemical models of biological processes, synthesis and studies of biological properties of new bioregulators for application in medicine and agriculture;
- development of scientific fundamentals of the synthesis and technology of obtaining practically important products and materials from hydrocarbon raw materials.

IEE - Institute for Energy Saving and Energy Management National Technical University of Ukraine "Kiev Polytechnic Institute"

Borschagivska 115, 03056, Kyiv, Ukraine

Phone: +380 44 406-86-07; fax: +380 44 406-86-43

E-mail: avp@iee.kpi.ua

Institute for Energy Saving and Energy Management (IEE) within the National Technical University of Ukraine "Kiev Polytechnic Institute" was founded in 1997 pursuant to the Joint Order of the State Committee for Energy Conservation and the Ministry of Education of Ukraine whereunder IEE was recognized as a leading educational, training, R&D and consulting institution in the field of sustainable energy development, energy efficiency and energy management in Ukraine. The Institute contributed to the planning of the Eco Smart Buildings & Eco Smart Cities. This project comprised a construction phase of the building, microclimate, technologies for the rational use and storage of energy, and monitoring and intelligent control systems.

HPL - Heat Pipes Laboratory
National Technical University of Ukraine “Kiev Polytechnic Institute”

Peremogy Ave, 03056, Kyiv, Ukraine
Phone: +380 44 4549602; fax: +380 44 4068366
E-mail: office@lab-hp.kiev.ua
<http://www.lab-hp.kiev.ua>

Heat Pipes Laboratory dates back to the establishment of the Heat Power Engineering Department of National Technical University of Ukraine “Kiev Polytechnic Institute” (<http://inter.kpi.ua/>) in 1972. Its research team developed scientific and technological background for efficient design and manufacture of advanced heat transferring devices (Heat Pipes, HPs).

SECB - Scientific Engineering Centre Biomass
Institute of Engineering Thermophysics

2-a Zhelyabova St., 03057, Kyiv, Ukraine
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E-mail: geletukha@biomass.kiev.ua
<http://www.biomass.kiev.ua>

Scientific Engineering Centre Biomass Ltd. (SECB) was incorporated in January 1998. To date, the Centre has become the leading commercial Ukrainian company in biomass-to-energy technologies. SECB mainly acts in an advisory capacity in energy production technologies based on renewable sources (mainly biomass), energy efficiency advisory services, R&D: solid biomass combustion, MSW gasification, anaerobic digestion in bioreactors, feasibility studies, RE project identification and assessment, project implementation and monitoring, support of credit lines, preparation of JI projects under Kyoto Protocol, etc.

SEC - Scientific & Educational Centre Nanomaterials in
Accumulating and Generating Energy Devices, Vasyl Stefanyk
Trans-Carpathian National University

Shevchenka, 57, 76018, Ivano-Frankivsk, Ukraine
Phone: +380 34 2596179; fax: +380 34 2231574
E-mail: sec_nano@pu.if.ua

SEC was founded in 2009. SEC's key goal is to get young researchers and graduate students involved in research projects. SEC's research objective is to develop and improve oxide, chalcogenide and carbon nanomaterials manufacturing technologies for energy generating and accumulating plants as well as to pursue fundamental research and forecast their physical and chemical properties.

The recent shift towards target programmes and competitive principles underlying organization of research at NASU has been playing an increasingly more important and positive role in improving the efficiency of its international collaboration. ⚡



Overview of EU FP7 Energy Projects with Involvement of Ukrainian Research Institutions



- BEE - Biomass Energy Europe (2008-2010)

BEE Project was initiated to harmonize methodologies for biomass resource assessments for energy purposes in Europe and EU neighbouring countries. Such harmonization will improve consistency, accuracy and reliability of biomass assessments for energy, which can serve the planning of a transition to renewable energy in the European Union.

UA Consortium Partner: Scientific Engineering Centre Biomass (SEC Biomass), Kyiv, Ukraine



- HESCAP - New Generation, High Energy and Power Density SuperCAPacitor Based Energy Storage System (2010-2013).

HESCAP Project focuses on the development of a new generation high energy supercapacitor based system (HESCAP system), capable of storing ten times more energy than the reported State of the Art SC technology, but keeping the high power density, long life cycle and total capital cost of currently available supercapacitors.

UA Consortium Partner: APCT-UKRAINE LTD, Kyiv, Ukraine



- APOLLON – Multi-APprOach for high efficiency integrated and intelLLigent CONCentrating PV Modules (Systems) (2008-2013)

APOLLON Project deals with the development of High Concentration Point Focus and Dense Array Concentrator Photovoltaic (CPV) systems based on monolithic and discrete multijunction technology with a final target cost of 2 €/Wp.

UA Consortium Partner: State Enterprise Scientific Research Technological Institute of Instrument Engineering, Kharkiv, Ukraine



- CoMeth - Coal Mine Methane – New Solutions for Use of CMM - Reduction of GHG Emissions (2008-2011)

CoMeth Project is aimed at reducing green house gas (GHG) emissions caused by the uncontrolled exhausting of coal mine methane (CMM) to atmosphere and to explore suitable economically interesting schemes for its energetic use by the development of universal decision guidance for optimal use of CMM under varying conditions. ⚡

UA Consortium partner: Eco-Alliance- LLC, Kyiv, Ukraine



**October, 2011
Kyiv, Ukraine**