

Energy Production, Storage, Transmission and Use

As the Nation ramps up its R&D in the energy field, many of the existing Federal Labs, not just the Department of Energy, will be seen to have related and extensive, existing programs and resources. In the Mid-Atlantic Region, following provides a window on some of these capabilities.

U.S. Army

Aberdeen Test Center

www.atc.army.mil/pages/aboutATC/aboutus.html

The ATC conducts testing for federal, state and local governments, academia, private industry, and foreign governments.

- Evaluation of fuels and fuel efficiency
- Shock and vibration evaluation of equipment
- Electromagnetic evaluation of equipment - The EMITF delivers high degrees and ranges of attenuation to test military systems and subsystems against controlled electromagnetic, military standards.
- Environmentally safe enclosed facility for testing weapons and targets that have component made from depleted uranium (DU)
- Electro-magnetic (EM) gun and electro-thermal-chemical (ETC) gun testing facility complete with pulsed power supply.
- Industrial X-Ray facility - X-ray units which span the range of 20KeV to 11 MeV
- Infrared Thermal Imaging - state-of-the art infrared camera system operating in the 3- to 5-um spectral range

Army Research Laboratory

www.arl.army.mil/www/default.cfm?Action=6

The ARL provide scientific and technological innovation in a variety of technical disciplines, through direct in-house laboratory efforts and joint programs with government, industry, and academia.

- Novel Energetic Research Facility (NERF)
- Aerosol Laser Facility
- Environmental Sensing and Optical Spectroscopy Research Facility
- Directed Energy Anechoic Chamber
- Microwave/Multimeter-Wave Anechoic Chamber
- Microwave/Multimeter-Wave Anechoic Chamber
- Electrochemical Facility
- Ultra Wideband (UWB) Synthetic-Aperture Radar (SAR) Testbed
- JP-8 Fuel Reformation

Night Vision & Electronic Sensors Directorate

www.nvl.army.mil

The research labs of this directorate deal with various forms of electro-magnetic energy and how to utilize it for such purposes as:

- night vision
- thermal imaging

Institute for Water Resources

www.iwr.usace.army.mil

The U.S. Army Corps of Engineers is the largest operator of hydroelectric power plants in the United States and one of the largest in the world. Corps hydropower plants provide 100 billion kilowatt-hours annually, enough power to serve more than 10 million households.

Department of Commerce

National Institute of Standards and Technology (NIST)

www.nist.gov/

NIST's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life. Research revolves around the measurement process. Some example energy-related research that has come out of this process is revealed in several patents:

- High Spectral Purity Microwave Oscillator Design Using Air-Dielectric Cavity
- Optical Waveguides On Glass Substrates And Lasers Formed Therefrom
- Fluidic Temperature Gradient Focusing.
- Rare-Earth Doped Phosphate-Glass Lasers And Associated Methods
- Mode-Locked Pulsed Laser System and Method

Manufacturing Extension Partnership

www.mep.nist.gov/

The Hollings Manufacturing Extension Partnership is a nationwide network of resources that help manufacturers to compete globally, supporting greater supply chain integration, and providing access to technology for improved productivity. One of the areas of focus is the reduction of the energy footprint associated with manufacturing.

Defense Advanced Research Projects Agency

www.darpa.mil

DARPA manages and directs selected basic and applied research and development projects for DOD, and pursues research and technology where risk and payoff are both very high. Research areas include improving energy (fuel) efficiency of basic military components such as the gas turbine engine, high energy capacitors, devices with a high energy density footprint along with many other long-term energy-related, future requirements.

Defense Technical Information Center

www.dtic.mil

The center provides a comprehensive source for energy-related topics within the DOD.

Department of Energy

U.S. Department of Energy

www.pi.energy.gov/orgsummaries.html

The DOE has oversight responsibilities for the multi-agency Clean Energy Initiative. The Clean Energy Initiative seeks to provide millions of people in the developing world with access to affordable, reliable, clean, healthy, and efficient energy services. These goals will be accomplished through programs that will emphasize:

- Efficient Energy for Sustainable Development Partnership to improve the productivity and efficiency of current operating systems, while reducing waste, saving money, improving reliability, and delaying the need for expensive new generating capacity.
- The Global Village Energy Partnership will increase access to modern and affordable energy services in areas either not served or under-served by current energy delivery systems.
- Healthy Homes and Communities Partnership will promote clean transportation fuels (e.g. unleaded gasoline, low sulfur fuels), and healthier indoor cooking and heating practices to reduce the estimated 3 million annual and readily preventable deaths associated with air pollution and unhealthy patterns of energy use.

Research areas include:

Bio-energy	Coal	Electric Power
Fossil Fuels	Fusion	Geothermal
Hydrogen	Hydropower	Natural Gas
Nuclear	Oil	Solar
Wind	Renewables	Biological Sciences
Chemical Sciences	High Energy Physics	Life Sciences
Material Sciences	Building Design	Transportation
Weatherization		

National Energy Technology Laboratory

www.netl.doe.gov/business/index.html

NETL implements research, development, and demonstration programs to resolve the environmental, supply, and reliability constraints of producing and using fossil resources. Major energy initiatives are centered around:

- Secure and reliable energy supplies
- Clean power generations
- Move towards a hydrogen economy
- Energy options to combat climate change
- Energy efficiency and renewable energy
- Security of energy infrastructure

Research focus areas to achieve the above goals involve:

- Computational and basic science
- Energy system dynamics
- Geological and environmental systems
- Material science

The lab's research portfolio includes more than 1,800 projects, with a total award value of over \$9 billion and private sector cost-sharing of over \$5 billion. NETL has sites in Morgantown, West

Virginia; Pittsburgh, Pennsylvania; Tulsa, Oklahoma; Albany, Oregon; and Fairbanks, Alaska. In total, these sites include 81 buildings and 14 major research facilities on nearly 200 acres. More than 1,100 employees work at NETL's five sites; roughly half are Federal employees and half are site support contractors.

Thomas Jefferson National Accelerator Facility

www.jlab.org

As a center for both basic and applied research, The Thomas Jefferson Lab is funded by the Office of Science, U.S. Department of Energy. It conducts experiments for its partners and contractors in basic theoretical nuclear physics which may have long term energy implications.

Environmental Protection Agency

The EPA employs 17,000 people across the country, including the headquarters offices in Washington, DC, 10 regional offices, and more than a dozen labs. The agency acts as an information source for environmental impact resulting from the energy industry, provides information on alternative energy sources and supports research for both new types and cleaner forms of energy. The following link provides areas of interest/concern that EPA is studying and supporting. <http://es.epa.gov/ncer/>

Department of Interior

US Geological Survey

www.usgs.gov/tech-transfer

The USGS has an Energy Resources Program. This program addresses the challenge of increasing demand for affordable energy from environmentally acceptable energy sources by conducting basic and applied research on geologic energy resources and on the environmental, economic, and human health impacts of their production and use. The program provides reliable and impartial scientific information on geologically based energy resources, including: oil, natural gas, coal, coalbed methane (CBM), gas hydrates, geothermal resources, uranium, oil shale, and bitumen and heavy oil.

USDA

Agricultural Research Service

www.ars.usda.gov/partnering

The petrochemical industry deals with a product that required millions of years to form. The USDA takes the precursors of this product and seeks to extract the intrinsic energy trapped inside without the wait. Some of the current identified areas of research are as follows:

- Biofuel
- Biobased process modifications to exploit different energy forms/levels
- Biodiesel process modifications for intact oils & fats
- Production of chemical feedstocks and fuels with more renewable and more environmentally acceptable methods
- Development of new microorganisms and biocatalysts that can be employed in the fermentative conversion of renewable agricultural materials to fuels and other value-added products

- Development of cost-effective pretreatment, enzymatic saccharification, fermentation and downstream processing technologies, and their integration for production of biofuels from lignocellulosic biomass
- Genetic modification of ethanologenic yeast for improved ethanol production from lignocellulosic material
- Identification and evaluation of existing catalysts for production of biofuels (mixed alcohols and hydrocarbons) from animal-wastes
- Replacement of petrochemical-based metal cutting fluids with biobased alternatives
- Replacement of petrochemical based lubricant additives with biobased alternatives

MAR State Initiatives

Each state in the MAR has its own energy programs and new initiatives. For example:

Virginia Coastal Energy Research Consortium

<http://www.vcerc.org>



In August 2006 an Act of the Virginia General Assembly passed the landmark "Virginia Energy Plan" which establishes a foundation for the research and development of future renewable energy resources.

The Virginia Coastal Energy Research Consortium (VCERC) was established in Chapter 6 of the Virginia Energy Plan. The VCERC was created to "serve as an interdisciplinary study, research, and information resource for the Commonwealth on coastal energy issues" with an initial focus on offshore winds, waves, and marine biomass.

Energy Gateways

Energy and Energy Conservation

www.science.gov/browse/w_121.htm

Search by alphabetical topic an/or by keyword

Key Resources from the DOE Office of Scientific and Technical Information

www.scienceacceleration.gov

Includes R&D results, project descriptions, accomplishments and more

Energy and Fuel

www.usa.gov/citizen/topics/environment_agriculture/energy.shtml

Official information and services from the U.S. Government

Energy Efficiency and Renewable Energy

www.eere.energy.gov