Office of Energy Efficiency and Renewable Energy

Funding by National Laboratory

(dollars in thousands)

	FY 2007 (Actuals)	FY 2008 (Actuals)	FY 2009 (Planned*)
Ames Laboratory	840	1,021	2,325
Argonne National Laboratory (East)	30,637	52,561	28,534
Brookhaven National Laboratory	3,935	4,400	4,150
Idaho National Laboratory	11,794	18,409	11,627
Lawrence Berkeley National Laboratory	25,609	28,263	24,752
Lawrence Livermore National Laboratory	4,590	8,220	5,829
Los Alamos National Laboratory	9,423	16,017	14,936
National Renewable Energy Laboratory	314,025	295,691	210,353
Oak Ridge National Laboratory	78,335	97,245	76,841
Office of Scientific and Technical Information	84	27	TBD
Pacific Northwest National Laboratory	36,774	42,450	43,214
Sandia National Laboratories	41,810	50,946	43,610
Savannah River National Laboratory	1,344	2,441	2,200
Total	559,200	617,691	468,371

- FY 2009 Funding amounts are based upon the EERE FY 2009 Congressional Request funding level

Site Descriptions

Ames Laboratory

Introduction

Ames Laboratory is a multi-discipline laboratory located in Ames, Iowa, providing support to Vehicle Technologies and Industrial Technologies.

Vehicle Technologies

Ames Laboratory is conducting research on new materials with unique properties. It also is working on power electronics to improve magnetic powders for bonded permanent magnets.

Industrial Technologies

Ames Laboratory work includes the development of a new class of materials with extreme resistance to abrasive and erosive wear for use in industrial tools and components.

Argonne National Laboratory East

Introduction

Argonne National Laboratory (ANL) is located in Argonne, Illinois. It is a multi-discipline laboratory providing support to Hydrogen Technology, Biomass and Biorefinery Systems R&D, Vehicle Technologies, Industrial Technologies, Weatherization and Intergovernmental Activities, and Program Support.

Hydrogen Technology

ANL is conducting research and development of advanced hydrogen storage concepts including modeling of storage systems and life cycle analyses, and provides technical assistance in the management of DOE cooperative agreements with industry. ANL is the lead laboratory in the research and development of fuel processor catalysts and fuel cell system analysis. To minimize the cost of fuel cell cathode catalysts, ANL is developing non-platinum cathode electrocatalysts based on bimetallic base metal-noble metal systems.).

Biomass and Biorefinery Systems R&D

ANL conducts research on biomass conversion processes and environmental benefits analysis for several EERE programs, including energy balance and emissions for biofuels in conventional and advanced vehicles with and without fuel cells.

ANL will conduct R&D related to convert biomass to bio-based products with the goal of making the technologies more competitive with petroleum-based alternatives.

Vehicle Technologies

ANL provides the Vehicle Technologies (VT) program with expertise in materials, combustion chemistry, electrochemistry, systems simulation, computational fluid dynamics, and techno-economic analysis. In materials ANL performs research on non-destructive testing, recycling of lightweight materials, novel bonding techniques for dissimilar materials, and lubrication and friction reduction. Many of these efforts take advantage of ANL's unique Advanced Photon Source to characterize materials and sprays.ANL's

combustion research includes development of in-cylinder emission-control methods for CIDI (direct-injection Diesel) engines as well as post-combustion emissions control. The lab's expertise in materials and combustion comes together in development of catalysts and sensors to improve engine efficiency and reduce emissions.

ANL's capabilities in system simulation and fluid dynamics support VT efforts to improve under-hood thermal management (including nanofluid technology and novel heavy-vehicle cooling systems) and to reduce aerodynamic drag on heavy vehicles. ANL also develops the system simulation software necessary for "hardware-in-the-loop" testing and validation of component and subsystem performance and develops test procedures for advanced vehicles. Systems simulation also supports development of optimal control strategies for both combustion and hybrid-vehicle propulsion and battery systems. ANL uses its expertise in electrochemistry to perform both R&D and standardized testing of advanced batteries and ultracapacitors. The lab uses both its system simulation and techno-economic analysis capabilities to support VT planning and program evaluation with energy, economic, and environmental analyses. ANL also provides general technical and analytical support to VT's battery R&D activity, the Graduate Automotive Technology Education (GATE) activity, and VT's student vehicle competitions.

Industrial Technologies

ANL performs research and development for the chemical industry R&D area. Argonne provides unique expertise in advanced separations process technologies and new innovative membrane systems. The laboratory also conducts research on refractory materials for the steel industry, and provides unique expertise in anode and cathode development for the aluminum industry using technology to analyze the surface effects conditions on the advanced candidate materials.

Weatherization and Intergovernmental Activities

Funding to ANL has supported international activities, primarily in the Asia-Pacific Economic Cooperation (APEC) area, and included technical assistance and support to the program's APEC related projects. No work will be performed in FY 2009.

Program Support

Provide analytical support for major crosscutting issues, such as market and benefit analyses.

Brookhaven National Laboratory

Introduction

Brookhaven National Laboratory (BNL) is located in Upton, New York. It is a multi-disciplinary research laboratory dedicated to basic, non-defense scientific research. BNL provides support to Hydrogen Technology, Solar Energy, Vehicle Technologies, Industrial Technologies, Weatherization and Intergovernmental Activities, and Program Support.

Hydrogen Technology

Brookhaven supports the Hydrogen Technology Program in the development of advanced metal hydride hydrogen storage concepts primarily based on alane. BNL also conducts research and development of electrocatalysts alloys fuel cells focusing on synthesis and characterization of the materials.

Solar Energy

BNL performs research and development for the Photovoltaic Energy Systems efforts. BNL has the responsibility for environmental, health, and safety (ES&H) impacts associated with photovoltaic energy production, delivery, and use. BNL also conducts ES&H audits, safety reviews, and incident investigations and assists industry to identify and examine potential ES&H barriers and hazard control strategies for new photovoltaic materials, processes, and application options before their large-scale commercialization.

Vehicle Technologies

BNL performs analysis, studies and conducts research in advanced materials to improve the performance and abuse tolerance of lithium battery systems and provides research support for analysis of internal combustion (IC) engine emissions for program.

Industrial Technologies

BNL supports Industrial Technologies Program activities in the area of hierarchical nanoceramics for industrial process sensors. These materials will enable a new generation of sensors for industrial process environments, including furnaces and process heaters.

Weatherization and Intergovernmental Activities

BNL supports the Asia Pacific Partnership by providing technical assistance and in developing concepts, designs, constructing, and operating complex, leading edge, user-oriented facilities in response to the needs of DOE and its APP partners.

Program Support

Provides analytical support for crosscutting issues such as market and benefit analyses.

Idaho National Laboratory

Introduction

Idaho National Laboratory (INL) is located in Idaho Falls, Idaho. It is a multi-discipline laboratory providing support to Biomass and Biorefinery Systems R&D, Wind Energy Systems, Water Power, Geothermal Technology, Vehicle Technologies, Industrial Technologies, and Federal Energy Management Program.

Biomass and Biorefinery Systems R&D

INL provides biomass-related R&D services and support for the feedstock infrastructure development effort. This work is performed in close collaboration with ORNL and NREL.

Wind Energy Systems

INL provides technical support to the program to enhance government, military applications and Tribal use of Wind Energy Systems, and to address technical and market barriers to wind.

Water Power

INL provides engineering support in the area of hydropower engineering and system assessments.

Geothermal Technology

INL served as the lead laboratory for research and development in geosciences and reservoir management. INL conducted research in exploration technologies, Enhanced Geothermal Systems, and advanced heat and power systems.

Vehicle Technologies

INL benchmarks and assesses the performance of new ultracapacitors for hybrid vehicles. The laboratory also conducts tests of high-power batteries, develops battery test procedures, tests and simulates hybrid vehicle performance, and develops energy storage models for electric and hybrid vehicles. INL conducts field testing and evaluation and collects performance data from electric, plug-in hybrid and hydrogen light duty vehicles and infrastructure, and supports Federal Fleet acquisition reporting as required.

Industrial Technologies

INL provides critical support in project management and analysis for the Forest Products and Steel activities. Work is ongoing for an advanced black liquor spray atomization process for the Forest Products industry, and on the development of controlled thermal-mechanical processing of tubes and pipes for enhanced manufacturing performance and in the development and application of laser-assisted arc welding in the steel industry.

Federal Energy Management Program

INL will support FEMP with continued enhancement and maintenance of the Federal Automotive Statistical Tool (FAST). In addition, it will provide management and organizational support to the Department of Energy (DOE) sponsored Interagency Committee on Alternative Fuels and Low Emission Vehicles (INTERFUEL).

Lawrence Berkeley National Laboratory

Introduction

Lawrence Berkeley National Laboratory (LBNL) is located in Berkeley, California. It is a multi-discipline laboratory providing support to Hydrogen Technology, Wind Energy Systems, Water Power, Geothermal Technology, Vehicle Technologies, Building Technologies, Industrial Technologies, Federal Energy Management Program, Weatherization and Intergovernmental Activities, and Program Support.

Hydrogen Technology

LBNL develops membranes for fuel cells that do not require water for proton conduction thus easing water and thermal management. LBNL has also supported the development of advanced materials-based hydrogen storage technology.

Wind Energy Systems

LBNL performs analyses of opportunities for Wind Energy Systems applications in the electricity market.

Geothermal Technology

LBNL performs research on Enhanced Geothermal Systems, including studies of reservoir dynamics and seismic phenomenon.

Vehicle Technologies

LBNL conducts exploratory research in advanced battery technology, including development of new electrode and electrolyte materials and understanding of fundamental electrochemical phenomena. BNL develops devices to measure particulate matter from engines and also develops nondestructive testing techniques for evaluation of aluminum and composite structures in manufacturing environments.

Building Technologies

LBNL conducts research and development activities in lighting, windows, appliance standards, analysis tools and design strategies and space heating and cooling.

Industrial Technologies

LBNL supports technology delivery activities of the Best Practices Program including assistance in facilitating Allied Partners with supplier industry organizations (e.g., Hydraulic Institute, Compressed Air and Gas Institute). The laboratory supports the tracking of Best Practices implementation results including the impact of training, software tools and other program delivery mechanisms on manufacturing plants.

Federal Energy Management Program

LBNL facilitates projects, develops guidelines and provides expert advice on the monitoring and verification protocols for energy projects savings, laboratory sustainable design principles, public benefit funds, and lighting.

Weatherization and Intergovernmental Activities

LBNL performs research and technical assistance for the Asia Pacific Partnership. Activities include technical assistance for U.S.-China energy cooperation, and support for Collaborative Labeling and Appliance Standards Projects (CLASP). It previously supported the International Renewable Energy Program.

Program Support

LBNL provides analytical support for major crosscutting issues, such as market and benefit analyses.

Lawrence Livermore National Laboratory

Introduction

Lawrence Livermore National Laboratory (LLNL) is located in Livermore, California. It is a multi-discipline laboratory providing support to Hydrogen Technology, Geothermal Technology, Vehicle Technologies and Industrial Technologies. It previously supported the Geothermal Technology Program.

Hydrogen Technology

LLNL serves as the lead laboratory in the research and development of a novel concept known as cyro-compressed tank technology for hydrogen storage. LLNL is capable of producing composite and

conformable storage tanks for environmental testing to verify the advantages of various engineering concepts to increase the storage capacity while reducing the cost of manufacturing. LLNL also conducts research and development of high surface area materials such as carbon aerogels in support of DOE's Hydrogen Sorption Center of Excellence in hydrogen storage. LLNL has applied these materials to metal hydrides to reduce the temperatures and increase the rates of hydrogen release.

Geothermal Technology

LLNL conducted research and development in Enhanced Geothermal Systems and exploration technology, including isotope and geochemical studies.

Vehicle Technologies

LLNL applies advanced methods of computational fluid dynamics to the aerodynamics drag of heavy vehicles for increased energy efficiency. It also performs studies of combustion under diesel and homogeneous charge compression ignition (HCCI) conditions (including natural gas engines) using

chemical kinetic modeling and other methods to determine means for increasing fuel efficiency, reducing emissions, and increasing peak output power of advanced internal combustion engines (ICEs). LLNL develops specialized materials like aerogel-based NO_x catalysts for CIDI engines and high-voltage ultracapacitors based on nanostructure multilayer oxide materials. The lab's expertise in materials science is also applied to advanced automotive manufacturing concepts such as metal treatment using Plasma Surface Ion Implantation (PSII). LLNL's sensor expertise is applied to development of advanced NOx sensors for diesel engines and to both nondestructive evaluation of cast light metals and development of in-line sensors for improved metal casting. The lab is also constructing and testing hydrogen sensors for both safety and fuel stream monitoring in a fuel cell vehicles.

Industrial Technology

LLNL provides expert resources for the investigation of innovative forming in the aluminum industry.

Los Alamos National Laboratory

Introduction

Los Alamos National Laboratory (LANL) is located in Los Alamos, New Mexico. It is a multi-discipline laboratory providing support to Hydrogen Technology, Biomass and Biorefinery Systems R&D, Vehicle Technologies, and Industrial Technologies.

Hydrogen Technology

LANL is conducting research and development of advanced hydrogen storage concepts supporting chemical hydrogen storage and leads DOE's Chemical Hydrogen Storage Center of Excellence. The primary focus of LANL's work in hydrogen storage is on ammonia borane based materials and improving the regeneration of spent fuels applicable to on-board vehicular hydrogen storage technologies. LANL serves as the lead laboratory in research and development of fuel cell components, reduction of precious metal loading while maintaining performance, and understanding the effects of impurities on fuel cell performance. Other fuel cell related work at LANL includes identification and analysis of component water transport properties, modeling of water transport, and characterization of

the durability of fuel cell stacks operating on hydrogen (targets are 5,000 hours for transportation applications and 40,000 hours for stationary applications).

Biomass and Biorefinery Systems R&D

LANL supports the program's technical analysis activity to enhance the probability of achieving cost reduction goals for the biorefinery concept.

Vehicle Technologies

LANL performs research on combustion in internal combustion engines using simulation and modeling to increase efficiency and reduce NO_x in lean-burn engines and develops microwave regeneration components and design tools for emission controls. Los Alamos is also performing R&D to discover and develop next-generation emission-control catalysts for lean burn engines and developing technology for onboard generation of chemical reductants from diesel fuel.

Industrial Technologies

LANL supports program work for the Chemical industry R&D area. The laboratory provides unique capabilities in theoretical scientific analysis, including modeling fluid flows and understanding chemical reactions and catalysis phenomena. LANL provided the computer analysis of industrial fluid flows, and the computer technology prepared for use by the civilian sector. LANL also supports the Industrial Materials of the Future activities in the development of new materials for membrane separation systems.

National Renewable Energy Laboratory

Introduction

The National Renewable Energy Laboratory (NREL) is located in Golden, Colorado. NREL is the principal research laboratory for the DOE Office of Energy Efficiency and Renewable Energy and also provides research expertise for the Office of Science, and the Office of Electricity Delivery and Energy Reliability. NREL develops renewable energy and energy efficiency technologies and practices, advances related science and engineering, and transfers knowledge and innovations to address the Nation's energy and environmental goals. It is a multi-discipline laboratory providing support to Hydrogen Technology, Biomass and Biorefinery Systems R&D, Solar Energy, Wind Energy Systems, Water Power, Geothermal Technology, Vehicle Technologies, Building Technologies, Industrial Technologies, Federal Energy Management Program, Facilities and Infrastructure, Weatherization and Intergovernmental Activities, and Program Support.

Hydrogen Technology

NREL serves as the lead laboratory for DOE's Hydrogen Sorption Center of Excellence and is conducting research and development on sorbent and carbon-based materials for hydrogen storage. NREL also leads the Systems Integration and Analysis function for the program. Models of the technical, economic, and integration aspects of the hydrogen infrastructure and fuel cell vehicle systems provide guidance for the development of hydrogen fuel cell components and materials. NREL also performs data analysis from the vehicle and infrastructure validation activity which includes more than 75 hydrogen vehicles and 14 hydrogen refueling stations. NREL has also been involved in facilitating the development of codes and standards and working with code officials and other key stakeholders.

Biomass and Biorefinery Systems R&D

NREL is the lead laboratory for biomass R&D. NREL also develops analytical methodologies (chemical and life-cycle) that are used to facilitate industry's commercialization efforts, including economic assessment of technologies. NREL operates two user facilities, the Thermochemical Users Facility (TCUF) for syngas technologies, and the Alternative Fuels Users Facility (AFUF) for bioconversion technologies. Private sector participants may use the facilities after appropriate arrangements are made. NREL contributes to bio-based product tasks.

Solar Energy

NREL serves as the lead laboratory for the Solar Energy Technology Program. NREL conducts fundamental and applied materials research on photovoltaic devices, photovoltaic module reliability and systems development, data collection and evaluation on solar radiation, and implementation of cost-shared government/industry partnerships. Basic research teams investigate a variety of photovoltaic materials, such as amorphous silicon, polycrystalline thin films, high-efficiency materials and concepts, and high-purity silicon and compound semiconductors. NREL conducts simulated and actual outdoor tests on photovoltaic cells, modules, and arrays. The test results are used in developing standards and performance criteria for industry and to improve reliability.

Wind Energy Systems

NREL is the lead laboratory for national wind R&D, performing research in aerodynamics, structural dynamics, and advanced components and control systems related to Wnd Energy Systems. The National Wind Technology Center (NWTC), located at NREL, provides research and testing facilities for fatigue testing of turbine blades, dynamometer testing of wind turbine drive trains and generators, atmospheric testing of turbines, and certification testing which are required for sales and operation in many overseas markets. NWTC staff also implements the Department=s Cooperative Research and Development Agreements (CRADAs) and cost-shared R&D industry partnerships for large (> 100kW) wind turbine systems, and provides technical assistance for the Wind Powering America activity.

Water Power

NREL is the lead laboratory for ocean energy, participating in water power resource assessments, leading technology characterization activities, and developing CRADAs for technology development and demonstration of water power technologies.

Geothermal Technology

NREL serves as the lead laboratory for Systems Analysis and supports HQ with Planning, R&D Integration and Deployment activities.

Vehicle Technologies

NREL develops system models and provides analysis and simulation of advanced hybrid and fuel cell configurations using analytical software developed at the lab, as well as other tools; provides CAD/CAE for optimized vehicle system solutions in support of FreedomCAR and Fuels Partnership goals; and general engineering assessments of HEV and AFV technologies. The laboratory investigates and develops advanced battery thermal management for hybrid and fuel cell vehicles. For heavy duty vehicles, NREL provides analysis, modeling, and technical support for power electronics and electric machines; conducts engine/vehicle integration and platform studies; and leads an effort to identify the effects of sulfur levels in diesel fuels on emissions control devices.

NREL also leads an effort to determine the lube oil effects on exhaust after treatment devices; and conducts tests of bio-based diesel fuel blending agents to determine their ability to act as reductants in

the exhaust stream of diesel engines. Additionally, NREL supports EPACT 1992 regulatory programs including Federal Fleet, State and Fuel Provider, Private and Local, and Fuel petitions; and supports the Clean Cities deployment program with technical assistance to regional coalitions and fleet partners, and program analysis and evaluation.

Building Technologies

NREL provides technical leadership, conducts research and provides technical management support in a number of BT activities. The primary one is Building America (Residential Building Integration). For the past five years (until the function was transitioned to the PMC at NETL), NREL also performed the contract management and procurement function for the Building America project. They will now integrate the BT Stage Gate Management process into the Building America and Commercial Buildings technical management processes. They will also manage and report on the accomplishment of the Joule requirement for Building America. They also provide technical support to the implementation of Building America by conducting research, providing technical assistance to the teams and coordinating the research among the partners. They also develop and implement tools such as BEOpt for the management of the project. For Commercial Buildings Integration NREL conducts analyses (Assessment of Energy Savings Opportunities); provides technical support for development of the Advanced Energy Design Guide for Schools; provides technical support to national retail building owners such as Food Lion, PETCO and Wal-Mart, enabling Commercial Building initiative to quickly develop a new commercial buildings technical assistance project called the Retail Energy Alliance; and provides support for the new National Retail Energy Alliance in FY2008. Other NREL activities in support of BT include technical support for Energy Smart Schools and Hospitals in New Orleans and in Greensburg, KS., development and implementation of new models and features that expand the capabilities of EnergyPlus, and development of tests for the durability of dynamic fenestration products.

Industrial Technologies

NREL supports the Best Practices Program in communication activities and products. NREL also supports overall Industry Program analysis of the logic of individual program activities including the relationship between program goals, milestones and the budget formulation process for several areas including Industrial Materials of the Future, Aluminum and Metal Casting.

Federal Energy Management Program

NREL facilitates projects, develops guidelines and provides expert advice on sustainable and renewable facility designs, green power procurement, and alternative financing.

Facilities and Infrastructure

The Facilities and Infrastructure Program provides funding for plant and capital equipment (PCE) which provides routine upgrades and maintenance of the National Renewable Energy Laboratory's office, research, user facilities, and infrastructure. The program also supports major construction projects at NREL that will further the research and development mission of EERE, such as: the Science and Technology Facility (completed in FY 2007); the Research Support Facility and the Integrated Biorefinery Research Facility (design/construction selections will occur in FY 2008); and the Energy Systems Integration Facility and the South Table Mountain Infrastructure project (first phases recently funded in the FY 2008 appropriations; solicitation development underway).

Weatherization and Intergovernmental Activities

NREL assisted in the development of communication strategies for the Weatherization and Intergovernmental Program; improves program and subprogram web pages; and provides technical assistance on energy efficiency and renewable energy technologies, practices, and opportunities for States, Tribes and international partners.

Program Support

Provides analytical support for crosscutting issues, such as market and benefit analyses.

Oak Ridge National Laboratory

Introduction

Oak Ridge National Laboratory (ORNL) is located in Oak Ridge, Tennessee. It is a multi-discipline laboratory providing support to Hydrogen Technology, Biomass and Biorefinery Systems R&D, Wind Energy Systems, Water Power, Vehicle Technologies, Building Technologies, Industrial Technologies, Federal Energy Management Program, Weatherization and Intergovernmental Activities, and Program Support.

Hydrogen Technology

ORNL performs research and development activities in hydrogen storage in support of the lead labs, NREL and Sandia National Laboratories as part of DOE's Centers of Excellence in hydrogen storage. ORNL has collaborated with NREL and UC Berkeley to develop a microalgae system for the production of hydrogen. Oak Ridge National Laboratory is the primary National Laboratory for materials R&D aimed at reducing cost and increasing the durability of fuel cell components. ORNL carries out R&D on metal bipolar plates with nitride surface layers. ORNL also characterizes the structure of membranes and membrane electrode assemblies .

Biomass and Biorefinery Systems R&D

ORNL conducts biomass technologies R&D, evaluates harvesting technology for biomass, and conducts environmental research, residue and forests research, and resource and market analysis. These efforts are closely coordinated with INL and NREL.

ORNL provided assistance on biomass technology assessment and information transfer.

Wind Energy Systems

ORNL provides analysis and support to wind integration studies and applications.

Water Power

ORNL will participate in the resource assessment of ocean energy in the United States, including current (tidal) resources. ORNL is the lead laboratory for hydropower activities. It will also participate in water power resource assessments, lead technology characterization activities, and develop CRADAs for technology development and demonstration of water power technologies.

Vehicle Technologies

ORNL provides the Vehicle Technologies (VT) program with expertise in materials, combustion, electrical engineering, systems analysis, vehicle testing and data collection, and techno-economic

analysis. ORNL uses its materials expertise to develop and test a wide range of lightweight materials for vehicle applications, including carbon-fiber, lightweight alloys, and novel materials such as thermally-conducting carbon foams for high-performance engine radiators. ORNL also operates the High-Temperature Materials Lab as a user facility for materials characterization, funded by VT. ORNL supports VT's combustion R&D with development of in-cylinder diagnostics, development and testing of catalytic converters, measuring and modeling the chemical kinetics of emissions-treatment devices including NOx absorbers and selective catalytic reduction, and toxicity analysis of unregulated emissions from engines operating on advanced fuels. This work also supports VT's Fuels R&D activity by analyzing and modeling the fuel characteristics that affect emissions control and efficiency `in diesel engines. ORNL uses its electrical engineering expertise to research and test power electronics (converters and controllers) and electric motor/generators for hybrid vehicles. The lab performs system cost analyses and techno-economic trade-off studies for advanced combustion, emissions-control, and power-electronic components. ORNL backs up its modeling of engine and emissions-control processes with the collection of real-world, on-road heavy truck performance data. ORNL also maintains the legislatively-mandated automobile *Fuel Economy Guide* and website.

Building Technologies

ORNL is part of a National Laboratory/industry/university consortium conducting research and development for the following activities: Building America; space heating and cooling; envelope and emerging technologies.

Industrial Technologies

In support of the Best Practices effort, ORNL provides support to Plant-Wide Assessments and other technical assistance and also assists in the tracking of program impacts. The lab also helps in the development and delivery of software tools and training. ORNL is the primary laboratory supporting the Industrial Materials of the Future activities to develop advanced materials for industrial use that meet technical requirements identified by industry in the visions and technology roadmaps.

Federal Energy Management Program

ORNL facilitates projects, develops guidelines, and provides expert advice on combine heat and power systems, biomass opportunities, whole building design, and alterative financing.

Weatherization and Intergovernmental Activities

ORNL assists in the implementation of the national evaluation of the State Energy Program and assists in stakeholder outreach for DOE energy efficiency initiatives.

Program Support

ORNL provides analytical support for major crosscutting issues, such as market and benefit analyses.

Office of Scientific and Technical Information

Introduction

The Office of Scientific and Technical Information (OSTI) is located in Oak Ridge, Tennessee. It provides technical support for Geothermal Technology.

Geothermal Technology

OSTI distributes information for the Geothermal Technology Program, including publishing and maintaining on-line full text of electronic publications.

Pacific Northwest National Laboratory

Introduction

Pacific Northwest National Laboratory (PNNL) is located in Richland, Washington. It is a multi-discipline laboratory providing support to Hydrogen Technology, Biomass and Biorefinery Systems R&D, Water Power, Vehicle Technologies, Building Technologies, Industrial Technologies, Federal Energy Management Program, Weatherization and Intergovernmental Activities, and Program Support.

Hydrogen Technology

PNNL is the lead laboratory in the development of safety materials and systems for various end use applications. PNNL performs research and development tasks such as hydrogen storage and other technical support to address safety issues involved with various technologies, including underground storage, pipeline transmission and hydrogen sensing. PNNL also supports LANL in a leadership role for DOE's Chemical Hydrogen Storage Center of Excellence, focusing primarily on ammonia borane materials.

PNNL is also a key contributor in the hydrogen safety panel, safety analysis and risk mitigation activities, working with safety/code officials and other key stakeholders.

Biomass and Biorefinery Systems R&D

The Pacific Northwest National Laboratory provides thermochemical research and development in support of the syngas platform and related products. Major program components include thermocatalysts for fuels and chemicals and wet biomass for syngas production.

Water Power

PNNL participates in environmental studies and marine life impacts related to the Water Power Program.

Vehicle Technologies

PNNL supports Vehicle Technologies (VT) primarily through their expertise in a variety of materials technologies. PNNL evaluates advanced energy storage materials for battery R&D. PNNL supports VT materials R&D effort by developing energy-efficient production and processing techniques for magnesium, titanium, polymer, natural fiber and glass composite components for advanced automotive and heavy vehicle designs. The laboratory also develops environmentally friendly processes for the manufacture of planar thin film ceramic sensors. To improve combustion efficiency and reduce emissions, PNNL develop tools and analytic techniques for developing new catalytic materials for engines using computational methods and materials-by-design approaches, and also develops materials for high-durability lean-burn spark plugs and NO_x sensors. PNNL supports development of thermoelectric devices for recovering waste heat in diesel engines (thus improving fuel efficiency) by working on the scale-up process for depositing Si/SiGe super-lattice materials.

Building Technologies

The Pacific Northwest National Laboratory conducts research and development activities for: building codes; appliance standards; and emerging technologies.

Industrial Technologies

In support of the Industries of the Future (Specific) and (Crosscutting) activities, Pacific Northwest National Laboratory provides key support to track past program impacts including the over 190 commercial technologies, as well as their energy and environmental impacts. Other efforts include the evaluation of emerging technologies The laboratory produces an impacts report summarizing commercial and emerging technologies and past program results and methodologies. The laboratory also provides support to Aluminum, Sensors and Controls, Glass, Industrial Materials of the Future and Forest Products.

Federal Energy Management Program

PNNL developed guidelines and provides expert advice on energy efficient buildings maintenance and operations, utility load management, utility restructuring, building commissioning, building diagnostic systems, resource energy management, and analytical support for benefits modeling.

Weatherization and Intergovernmental Activities

PNNL increases energy capacity and reduces dependence on imported oil through research of hydrogen and biomass-based fuels. The lab also works to reduce the effects of energy generation and use on the environment. PNNL conducts research and provides technical assistance for the Asia Pacific Program.

Program Support

Provide analytical support for major crosscutting issues, such as market and benefit analyses.

Sandia National Laboratories

Introduction

Sandia National Laboratories (SNL) is located in Albuquerque, New Mexico and in Livermore, California. It is a multi-discipline laboratory providing support to Hydrogen Technology, Solar Energy, Wind Energy Systems, Water Power, Geothermal Technology, Vehicle Technologies, Federal Energy Management Program, Weatherization and Intergovernmental Activities, and Program Support.

Hydrogen Technology

SNL in California serves as the lead laboratory in the research and development of metal hydride storage materials and leads DOE's Metal Hydride Center of Excellence in hydrogen storage. SNL also serves as the lead for the design, implementation, and testing of hydrogen systems to verify building codes and equipment standards for many applications. In addition, SNL conducts material property characterization and testing to determine material reactivity for hydrogen storage. Safety and combustion analysis related to hydrogen has been another core capability area at SNL. These studies are valuable in determining set back distances and codes and standards for hydrogen infrastructure.

Solar Energy

SNL supports the Photovoltaic Energy Systems efforts with the principal responsibility for systems and balance-of-systems technology development and reliability. Indoor and outdoor measurement and evaluation facilities provide support to industry for cell, module, and systems measurement, evaluation,

and analysis. Systems-level work concentrates on application engineering reliability, database development, and technology transfer. SNL is the lead laboratory for the Concentrating Solar Power activity; technical responsibilities include power tower R&D, dish R&D, and the management of technical tasks and subcontracts to industry and universities.

Wind Energy Systems

SNL department staff work closely with counterparts at the National Renewable Energy Laboratory to provide the program and the U.S. wind industry with engineering expertise to further the program's knowledge and goals.

Water Power

Sandia provides expertise on technology development and assessment, particularly related to hydrokinetic systems.

Geothermal Technology

Sandia National Laboratories (SNL) serves as the lead laboratory for Research and Development in drilling technologies. SNL will also provide technical expertise to manage cost-shared exploration activities with industry partners.

Vehicle Technologies

SNL supports the Vehicle Technologies (VT) program with its capabilities in aerodynamics and fluid dynamics, combustion chemistry and kinetics (especially using the laser diagnostic tools at SNL's Combustion Research Facility), materials R&D, and advanced manufacturing technologies. SNL performs modeling and simulation to reduce aerodynamic drag on heavy vehicles. The lab's expertise in fluid dynamics, combustion kinetics, and laser diagnostics are combined for research on the formation of pollutants in piston combustion and the effects of fuel-borne oxygen using optically and non-optically instrumented engines. SNL also uses laser diagnostics to characterize diesel engine particulate emissions to improve exhaust treatments. SNL develops and evaluates abuse-tolerant electrode materials for lithium-based batteries and rugged high-temperature film capacitors for power electronics. The lab's experience in advanced manufacturing supports VT propulsion and lightweight materials efforts by developing techniques and instrumentation for forging, heat-treatment, coating, welding, and other factory processes.

Federal Energy Management Program

SNL develops guidelines and provides expert advice on renewable technologies for military applications and on distributed generation.

Weatherization and Intergovernmental Activities

SNL provides technical assistance on energy efficiency and renewable energy options available to Tribal governments.

Program Support

SNL provides analytical support for crosscutting issues such as market and benefit analyses.

Savannah River National Laboratory

Introduction

Savannah River National Laboratory is located in Aiken, South Carolina. It is a multidisciplinary research laboratory that provides support to Hydrogen Technology.

Hydrogen Technology

Savannah River leverages its history and expertise in understanding the properties of hydrogen and its effects on materials, to support DOE's metal hydride hydrogen storage research program and the Metal Hydride Center of Excellence. Savannah River is capable of producing metal hydride materials for use in research and validation projects. Another key capability involves understanding material reactivity properties related to hydrogen storage. Savannah River leads an international project in this area and is a key player in developing test protocols for determining storage material properties.