

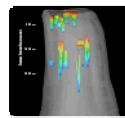
History of Sandia Energy Programs



Sandia was born as a nuclear weapons engineering laboratory with deep science and engineering competencies

Energy crisis of the 1970s spawned the beginning of significant energy work

Strategic Petroleum Reserve -geologically characterizing salt domes to host oil storage caverns



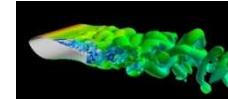
DOE's Tech Transfer Initiative was established by Congress in 1991



Energy Policy Act of 2005



Joint BioEnergy Institute



Water Power Program

1950

1960

1970

1980

1990

2000

2010

Our core NW competencies enabled us to take on additional large national security challenges



Vertical-axis Wind Turbine

NRC cask certification studies & core melt studies



Solar Tower opens

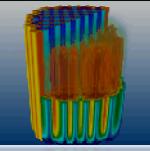
Combustion Research Facility (CRF) opens to researchers



Power grid reliability study



Sunshine to Petrol Pilot Test



Consortium for Advanced Simulation of Light Water Reactors (CASL)



Climate study uncertainties to economies



Distributed Energy Technology Laboratory (DETL) to integrate emerging energy technologies



Large-scale pool fire tests of liquefied natural gas (LNG) on water



Combustion Research Computation and Visualization (CRCV) opens

Energy, Climate, & Infrastructure Security (ECIS) SMU

Program Areas

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Efficiency

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Water Security

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International Assurance

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ECIS objectives specify key pathways through which Sandia impacts the nation



Objective 1
Anticipate & Enable Policy & Regulatory Decisions



Objective 2
Accelerate Solutions



Objective 3
Steward Competencies



Objective 4
Support International Engagement

Anticipate and Enable sound government policy and regulatory decisions by providing timely and objective technology assessments and systems analyses.

Accelerate U.S. industries' innovation, development, and successful deployment of solutions to the nation's most challenging energy, climate, and infrastructure problems to meet U.S. policy objectives.

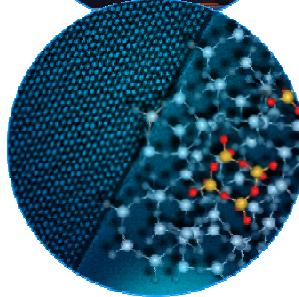
Create and steward enduring science, systems, and security competencies to support inherently government functions and services and anticipate national security challenges.

Support U.S. leadership in global energy, climate, and infrastructure challenges through strategic international engagement.



U.S. – China Clean Energy Research Center

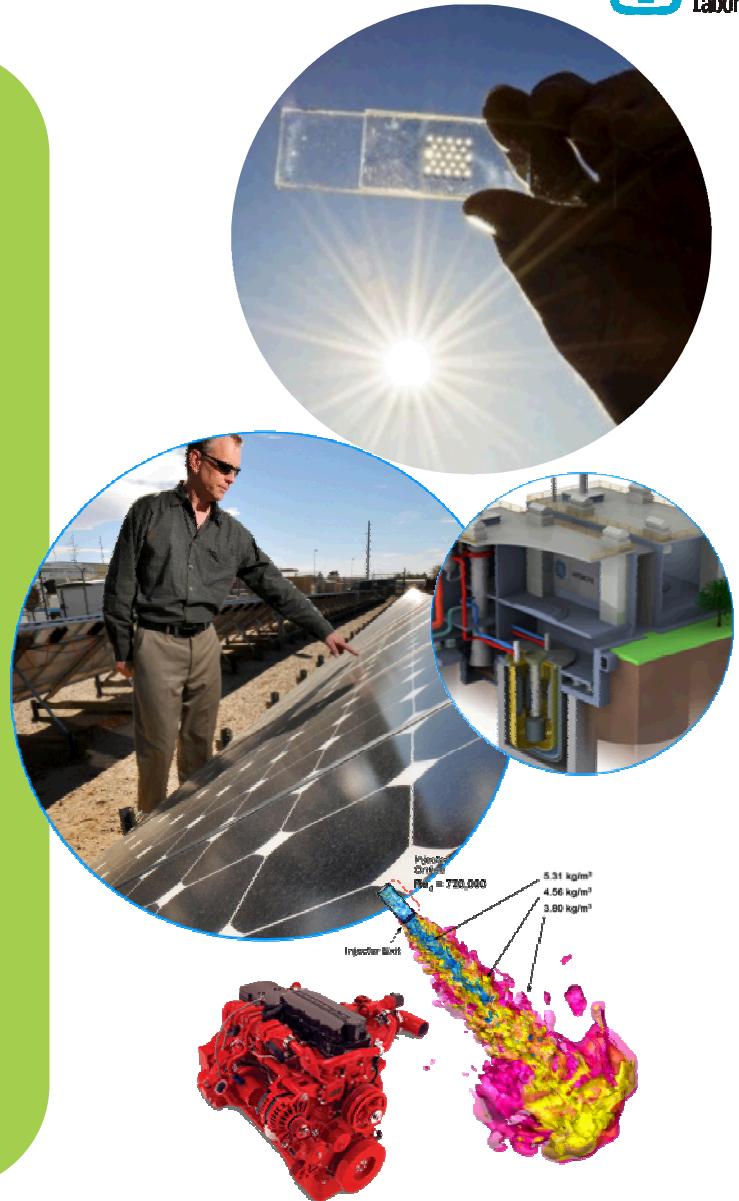
Sandia strategy targets national security challenges for the content of our work



- *Reduce our dependence on foreign oil*
- *Increase deployment of low carbon stationary power generation*
- *Understand risks and enable mitigation of climate change impacts*
- *Increase security and resiliency of critical infrastructures*
- *Strengthen the nation's S&T base in energy, climate, and infrastructure*

Energy Program Area Goals

- Provide new design tools necessary for industry to reduce CO₂ and petroleum footprint of the transportation sector by 25%.
- Demonstrate 12.5% sunlight to syngas as a critical step towards the longer-term goal of > 10% lifecycle sunlight to fuel. Demonstrate an ionic liquid base approach to sugar production from biomass with 90% C5 and C6 sugar yields at 1/10th the enzyme loading required by dilute acid.
- Develop advanced solar technologies to allow a domestic solar industry to deliver at less than 10 cents per KW/hr.
- Develop nuclear reactor designs for the deployment of Small Modular Reactors at DoD installations by 2021.
- Provide policy, programmatic and technical leadership in repository systems, with a key demonstration of deep borehole disposal concepts, to respond to the recommendations of the Blue Ribbon Commission and anticipated congressional action.



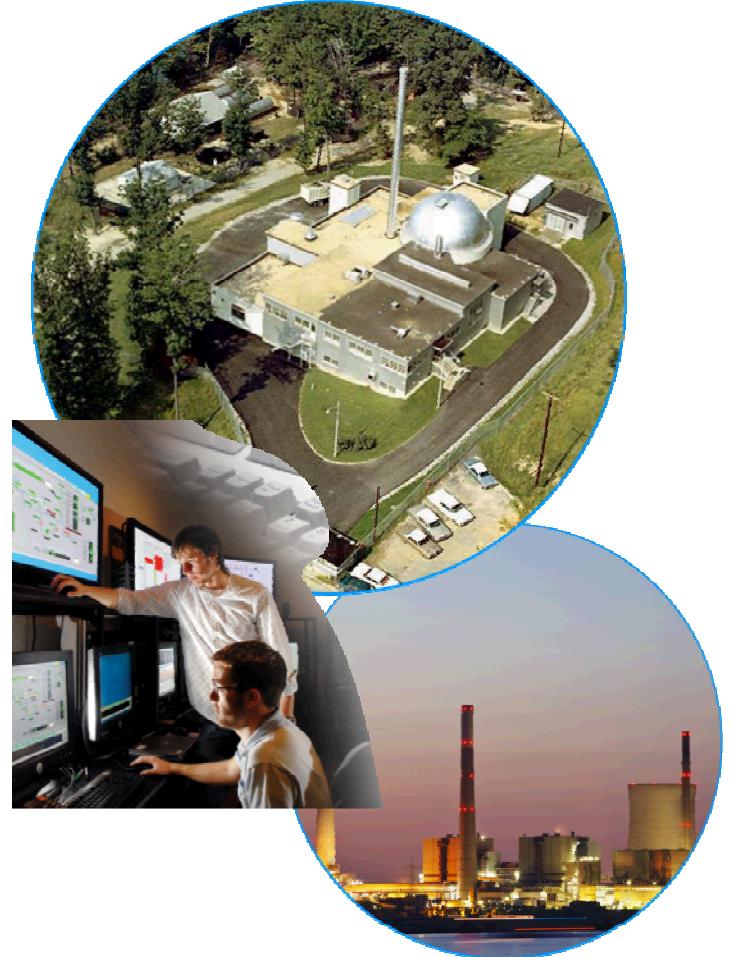
Climate Program Area Goals

- Assess U.S. prosperity and security impact risks by modeling climate and human response at the regional level with quantified uncertainty.
- Design data-gathering and analysis systems to enable the U.S. to sign a global climate treaty.
- Develop a credible technical path for achieving DOE's 2015 goal of an industrial scale demonstration of carbon capture and sequestration (10MT/yr).
- Enable a viable transition from fossil fuels to environmentally sustainable energy sources.
- Deploy technology solutions that make government & private sector a success in water safety, security and sustainability, both domestically and globally.



Infrastructure Program Area Goals

- Increase resilience of US critical infrastructure system by providing increased understanding of interdependencies and risk.
- Grow critical cyber security capabilities within DHS with Sandia as the enduring development partner.
- Design and demonstrate 30% Renewable Energy Penetration into an energy surety microgrid.
- Reduce the risk of energy supply disruptions from globally strategic sources to the US and to key national security installations.



Enabling Capabilities Program Area Goals

- Nurture discovery science for fundamental breakthroughs and deepen our competencies in key strategic areas that enable ECIS mission objectives and goals.
- Develop a strong systems analysis capability that incorporates not only technical analysis but also complex adaptive systems science, applied behavioral science, and techno-economic and policy analysis to inform the nation's energy strategy.
- Accelerate industry development of transformational energy technologies through ARPA-E
- Pioneer advanced electrical energy storage technologies and develop new technologies for enhanced battery safety and reliability, through scientific research in materials and chemistry, and innovative architectures and cell designs.



Webpage: energy.sandia.gov



Energy, Climate, & Infrastructure Security

To enhance the nation's security and prosperity through sustainable, transformative approaches to our most challenging energy, climate, and infrastructure problems.

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 **PV Value™ Tool**

 **Wind Reliability Benchmark Report**