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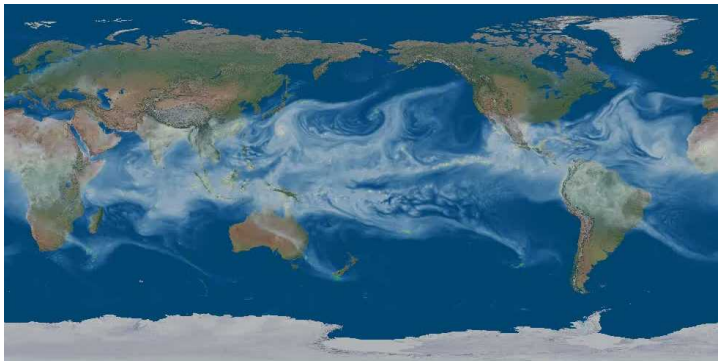


Climate & Engineered Earth Systems

Sandia National Laboratories is a multi-mission laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND NO. 2016-XXXXP

Energy & Climate Program

Sandia National Laboratories

Renewable Systems & Energy Infrastructure

PAD: Carol Adkins
Deputy: Charles Hanley

- **Renewable Energy** — Amy Halloran
- **Energy Efficiency** — Jeff Nelson
- **Grid Modernization** — Charles Hanley

Climate & Engineered Earth Systems

PAD: Peter Davies
Deputy: Sylvia Saltzstein

- **Climate Modeling & Measurement** — Scott Collis
- **Energy & Water** — Stephanie Kuzio
- **Fossil Energy Management** — Erik Webb
- **Biofuels** — Anup Singh
- **Back End of the Fuel Cycle** — Tito Bonano
- **DOE Managed Nuclear Waste** — Paul Shoemaker

Nuclear Energy & Fuel Cycle Programs

PAD: Susan Pickering
Deputy: Patrick Mattie

- **Commercial Nuclear Power Generation** — Tito Bonano
- **Nuclear Energy Safety & Security** — Richard Griffith

Transportation Energy & Systems

PAD: Bob Hwang
Deputy: Sarah Allendorf

- **Vehicle Technologies** — Paul Miles
- **Biomass Technology** — Ben Wu
- **Fuel Cells/Hydrogen Technology** — Chris San Marchi

Energy Research

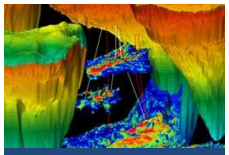
PAD: Grant Heffelfinger
Deputy: Wahid Hermina

- **ARPA-E** — Wahid Hermina
- **SC BES CHEMSCIENCE** — Dave Chandler
- **SC ASCR** — Scott Collis
- **SC BES CINT** — Sean Hearne (Acting)
- **SC BES GEO** — Moo Lee
- **SC BES MATERIALS SCIENCES** — Jeff Nelson

Fossil Energy Capability Summary

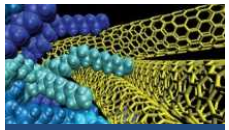
Sandia National Laboratories

Leverage Research Foundations


Geoscienc


Engineering


Nanodevices & Microsystems


Materials


Computing & Information

Fossil Energy Themes

- Unconventional Shale Science
- Combustion & Natural Gas Risk
- Micro & Induced Seismicity
- Subsurface Integrity
- Environment & Networks
- Downhole Tools
- HPC & Numerical Approaches

Geoscience Capabilities

- GEOMECHANICS & DRILLING
- GEOPHYSICS
- GEOLOGY, GEOCHEMISTRY, GEOHYDROLOGY
- ATMOSPHERIC SCIENCES

Mid-Stream Safety and Risk

Capability

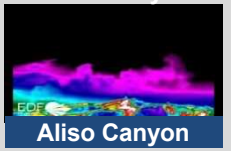
- Natural gas transport and network tools for surveillance, optimization, resilience, safety, and decision support
- Large scale burn testing
- Small pool fires (small LNG spills)
- Fireball testing (LNG vapor cloud)

Application

- LNG storage risk
- Safety assessment and surveillance
- Natural gas storage and pipeline requirements for electric power sector
- Emerging issues in road, rail, and marine transport

Example projects

Thermal Test Facility



Aliso Canyon

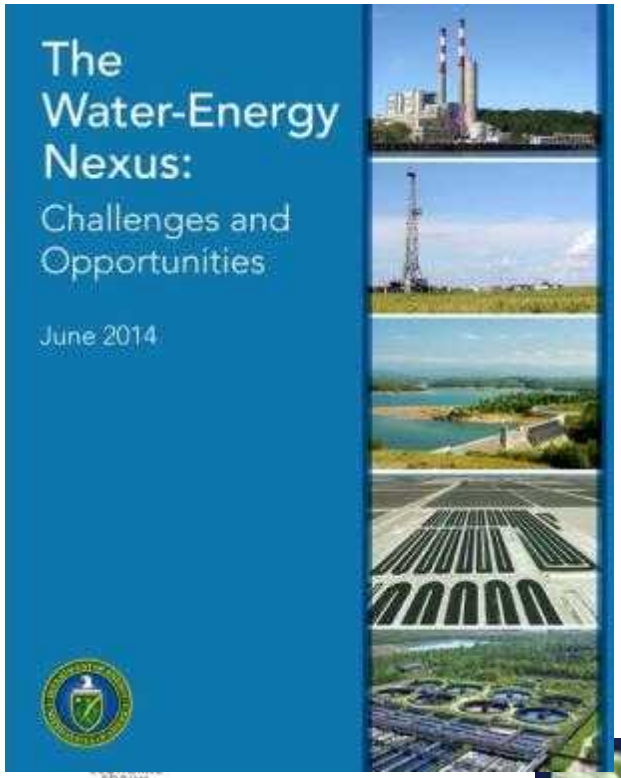
Evaluate LPG Spills

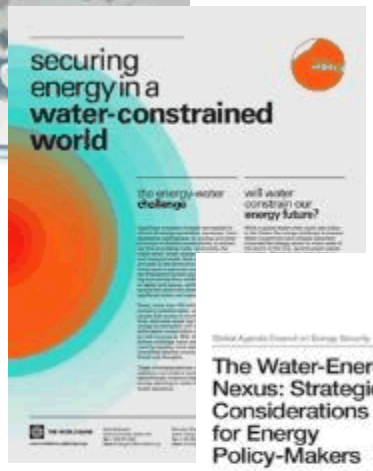
Crude Oil Project

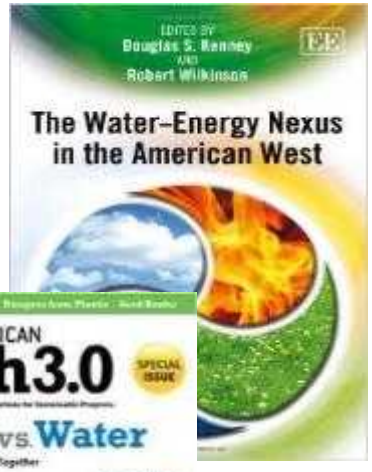
[1] Ronald P. Koopman Ph.D. P.E. Formerly Liquefied Gaseous Fuels Program Leader Lawrence Livermore National Laboratory

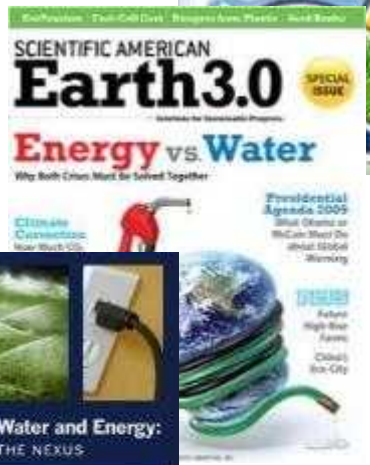
Energy and Water

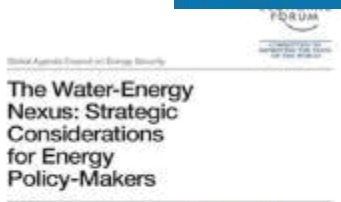
Water Treatment &
Decision Modeling / Planning

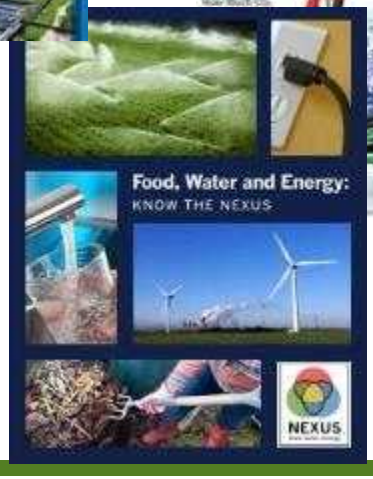












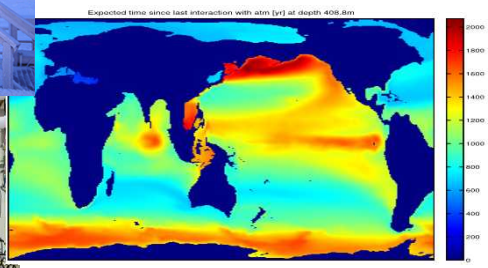
Backup

Sandia National Laboratories

Sandia Research for the Office of Science

Biological & Environment Research

Atmospheric Radiation Measurement ($6.7M)

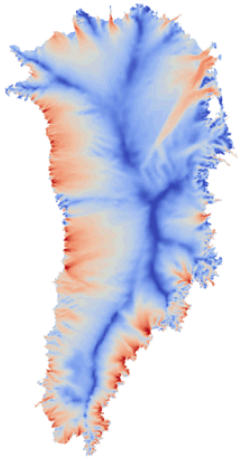


Accelerated Climate Modeling for Energy ($1.9M)

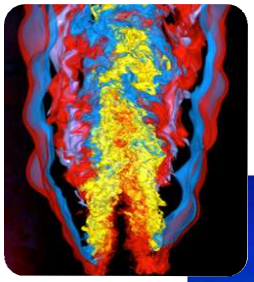
Biological Systems Science
Joint BioEnergy Institute
($5.1M)

Advanced Scientific Computing Research

($15.1M)



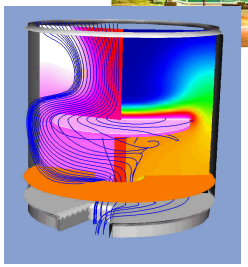
Basic Energy Sciences

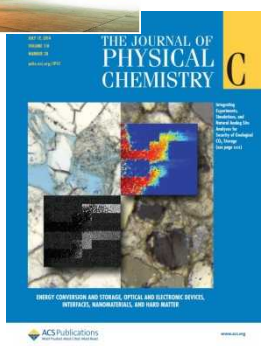


Chemical Sciences
Combustion Research Facility
($12.2M)

Center for Integrated Nanotechnologies
($11.6M)

Material Sciences
($9.9M)



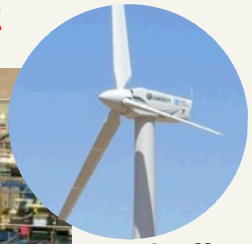


Geosciences
Biosciences
($2.8M)

Secure & Sustainable Energy Future Mission Area

Strategy Elements

STATIONARY POWER

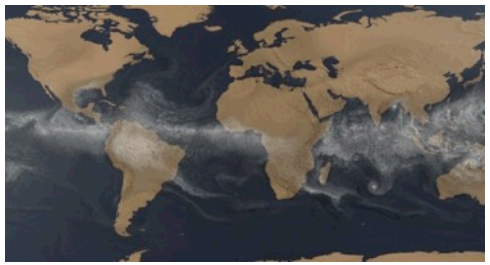


High Efficiency Conversion to Electricity

Safety, Security, & Resilience of the Energy Infrastructure

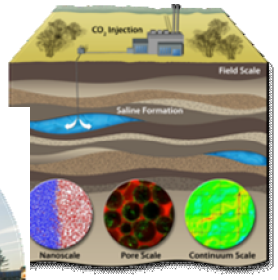
Back End of the Nuclear Fuel Cycle

CLIMATE & EARTH SYSTEMS



Climate Measurements & Modeling

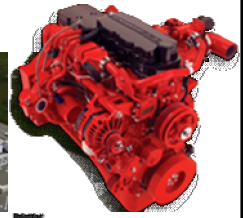
Sustainable Subsurface Energy Development

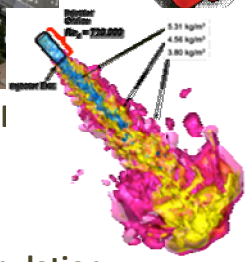


Water/Energy Nexus

TRANSPORTATION ENERGY

Convergence of Biofuel & Powertrains





Predictive Simulation of Engines

Enabling a Hydrogen Infrastructure

Safe & Reliable Electrical Storage & Components

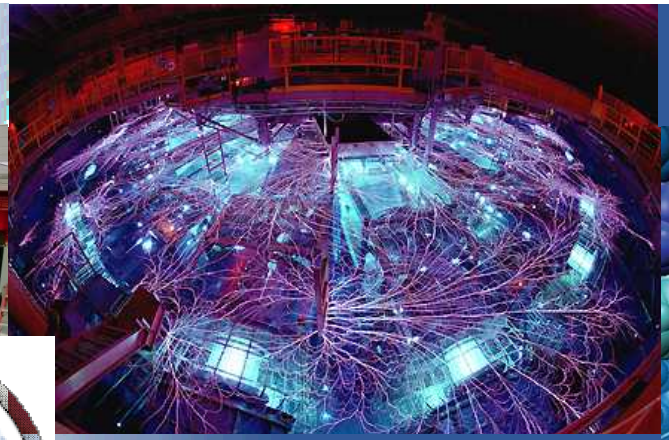
Sandia Research Framework

Strong research foundations play a differentiating role in our mission delivery

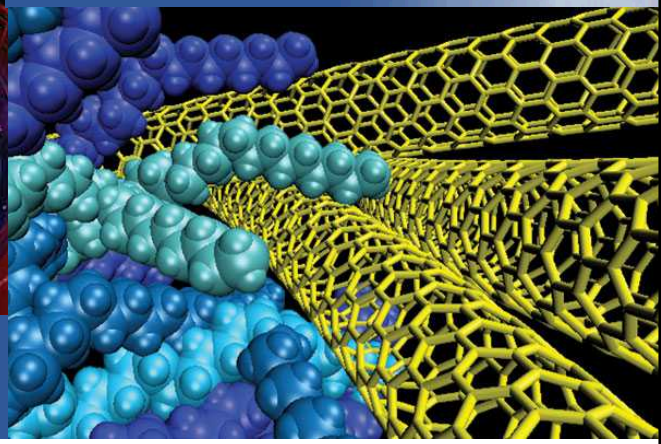
Sandia National Laboratories

Computing & Information Sciences

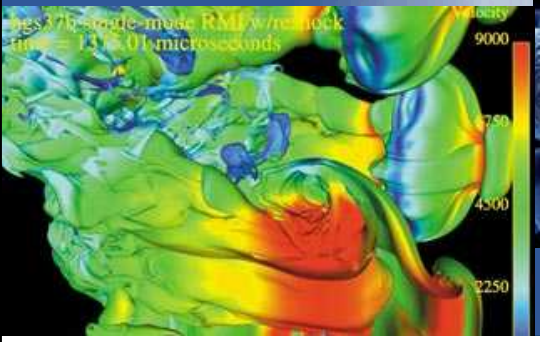
Radiation Effects & High Energy Density Science



Materials Sciences

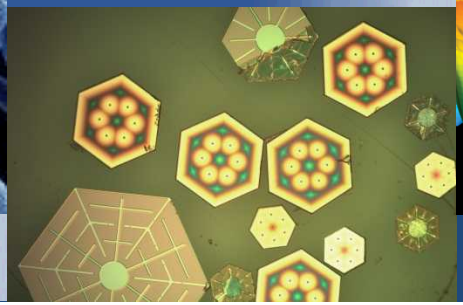


Engineering Sciences

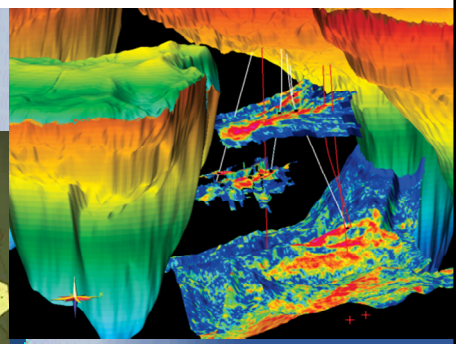


Bioscience

Nanodevices & Microsystems

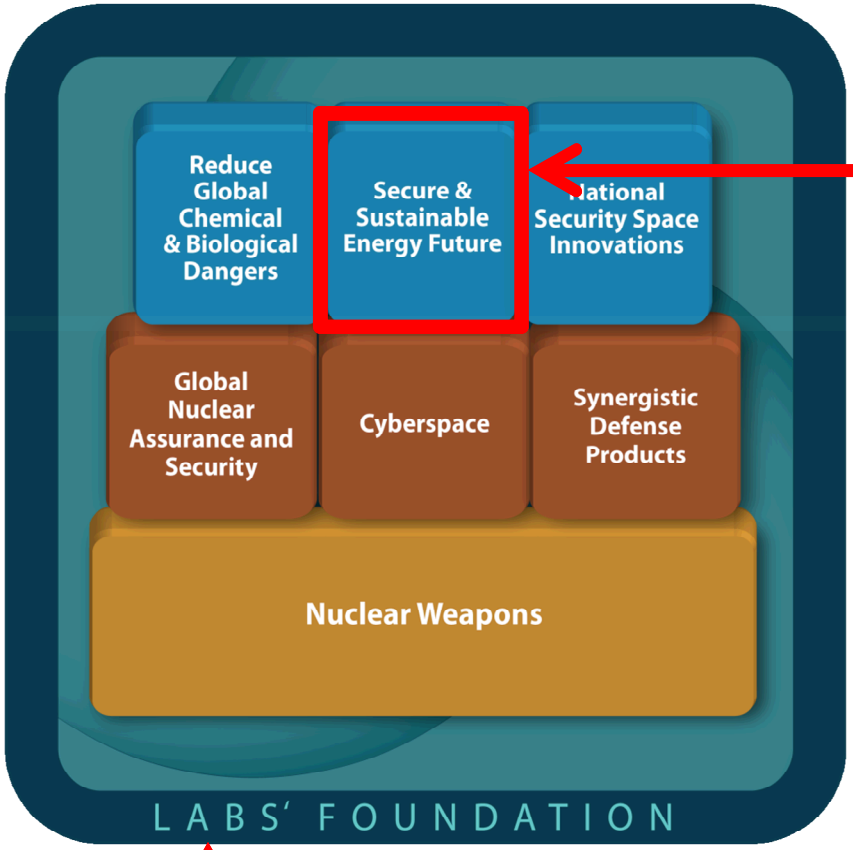


Geoscience

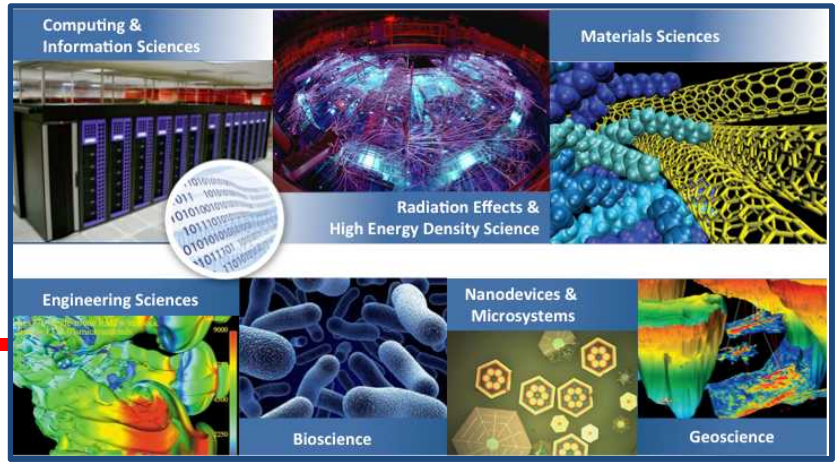


Sandia Mission Framework

Seven Mission Areas draw from and contribute to Lab's Foundation



Secure & Sustainable Energy Future **-- science-based understanding of the complex interdependencies between energy and climate**



Lab's Foundation includes LDRD, Office of Science Research and major computational and experimental capabilities