

The Energy Institute
The University of Texas at Austin
Director
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University of Texas Development Board
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The Energy Institute

The University of Texas at Austin

Terms of Reference:

The Energy Institute has been established at the University of Texas at Austin to provide the State of Texas and the Nation guidance for energy security through the pursuit of research and education programs.

The Energy Institute will:

- Work with the intellectual resources of the University of Texas at Austin to develop and obtain funding for interdisciplinary research programs addressing the most significant science, technological, legal and policy challenges for energy security.
- Work with the public and private energy sectors, and their stakeholders, to address key issues leading to sustainable energy security.
- Develop interdisciplinary certificate and degree programs in energy to educate students, professionals, policy makers and the public.
- Provide unbiased informed analysis of energy issues based on sound science, technology, policy and economics.

Example of an Energy Institute Initiative:

Department of Energy (DOE) FY 2010 Budget Request: Energy Innovation Hubs

- Most critical barriers to achieving national energy and climate goals
- Most resistant to solution by usual R&D enterprise structures (aka individual project grants)
- New structure: “AT&T Bell lablets.” Similar to the DOE Bioenergy Research Centers.
- Each “Hub” will focus on a single topic, but spanning (i) basic research through (ii) engineering development to (iii) partnering with industry in commercialization.
- Each “Hub” will bring together universities, private industry, non-profits, and government laboratories.
- Each “Hub” will develop and deliver transformational energy technologies.
- Outstanding scientific leadership team that can recruit and nurture extraordinary talent and instill high expectations.
- Each “Hub” will be funded at \$25 million/year, for a five-year term, with additional start-up funding of \$10 million for space renovation, equipment, and instrumentation.

Energy Innovation Hubs

(in order of importance to the University of Texas)

Novel Carbon Capture and Storage:

Enable fundamental advances in carbon capture/separation methods that dramatically reduce the energy and cost penalties associated with carbon capture and storage systems.

Batteries and Energy Storage:

Explore and develop new materials, geometries and other methods for radically increasing the stored energy density, the number of full charge/discharge cycles, and overall reliability of batteries, while reducing cost.

Fuels from Sunlight:

Produce liquid fuels through artificial photosynthesis by generating the fuel building blocks directly from sunlight. Develop commercially viable methods for “splitting” water into hydrogen and oxygen, followed by the synthesis of liquid fuels using atmospheric carbon dioxide. The overall goal is to invent commercially competitive methods for producing transportation fuel with greatly reduced amounts of CO₂.

Energy Innovation Hubs

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Energy Efficient Building Systems:

Develop systems-based approaches to designing commercial and residential buildings that integrate windows and lighting, natural ventilation and HVAC, thermal inertia, on-site energy generation and other factors. Develop building design software with imbedded energy analysis to assist architects and engineers in integrating new technologies for conserving energy. Develop automated operating platforms for real-time optimization of building control systems, analogous to computer optimization of automobile engine performance.

Solar Electricity:

Devise transformational approaches to solar-generated electricity (either photovoltaic or solar thermal) that will greatly reduce the overall lifecycle cost of solar generation of electricity by some mixture of lowering installed costs, higher efficiency, decreased maintenance, and/or longer service life.

Electrical Grid Systems:

Develop technologies such as new power electronics components, systems and software algorithms that can dramatically help modernize the grid, allowing the U.S. to rapidly integrate and deploy 30% renewable but variable sources of energy in a robust, reliable and secure manner.

Energy Innovation Hubs

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Nuclear Fuel Management:

Simulation and experimental validation of various used fuel management options, including interim and long-term storage, and fuel options that reduce waste volume and toxicity and increase proliferation resistance.

Modeling and Simulation for Nuclear Reactors:

Model and simulate innovative medium and large-scale Gen III+ and Gen IV nuclear reactors, including the fuel cycle associated with each design.

DOE Research Budget Implications:

- DoE budget for FY 2010 proposes \$280 million for its Energy Innovation Hubs.
- The funding is for five years, with an extension possible for another five years.
- The Hub funding is likely to displace core program funding in Hub areas for a decade!

The Energy Innovation Hubs are an intellectual opportunity for the University of Texas at Austin, with profound benefits to the University, State of Texas, and the Nation.

The Institute will determine additional areas of research and instruction in consultation with an Institute Advisory Board, faculty and staff at the University of Texas at Austin, the private energy sector, public utilities, non-governmental organizations, and the general public.

The economic future of the State of Texas, and our Nation, depends upon the viability of sustainable energy resources. The mission of the Energy Institute is to provide the transformational changes through research and instruction that are required for this State's and Nation's sustainable energy security.