The Subsurface Energy Resource Center (SERC) contributes to the knowledge of subsurface resource development and its associated environmental issues, as well as serves as a resource to policy makers.

The goal of the Subsurface Energy Resource Center is to contribute to the knowledge of subsurface resource development and its associated environmental issues.
Motivation for Reinventing SERC to CERTAIN

1. Awareness of the rapidly evolving domestic and global energy landscape involving renewables and non-renewables

2. Diversity of OSU faculty and staff interests in all forms of energy and related environmental issues

3. Opportunities presented to us by the Comprehensive Energy Management Project


5. Recognition that OSU needs a Center that can better connect faculty and staff in support of research program development, curricula development and outreach
Ohio State will utilize a public-private partnership to become an international leader in sustainability and provide new resources to advance teaching, learning and research.

The overview page details how the Comprehensive Energy Management Project will provide benefits to the university in four areas:

- **Conservation**: Reduce energy use
- **Supply**: Secure the best rates
- **Operations**: Provide great service
- **Academics**: Enhance resources

The Comprehensive Energy Management Project will modernize the university’s 485-building Columbus campus, create substantial academic benefits and establish a major center for energy research and technology commercialization.
Elements of Academic Collaboration

- Scholarships: $25 million
  - $12.5 million for undergraduates
  - $12.5 million for graduates/professional students
- Faculty Endowments: $9.5 million
  - Five endowed positions
- Sustainability Endowment: $15 million
- Sustainability Curriculum and Staff Endowment: $5 million
- Philanthropic Support: $810,000 annually for 50 years
- Internships: $100,000 per year paid directly to interns (10 per year)
- Visionary Project: $50 million (Energy Advancement Innovation Ctr)
  - Building: $35 million
  - Operating for five years: $7.5 million
  - Research: $7.5 million

from Kate Bartter
SRE – OEE Merger (OSUS)

Highlights of Draft Strategic Plan
Ohio State University Sustainability

Become a premier land grant institution of sustainability science, technology and policy

- Recruit faculty leads, provide resources & support for interdisciplinary teams in key research areas
- Partner with existing research centers & academic units, provide platform for cross-unit collaborations

from Elena Irwin
**Vision:** Establish a premier center known worldwide for conducting research, education and outreach that promotes environmentally responsible, economically feasible and sustainable best practices for developing and managing renewable (RE) and non-renewable energy resources (NRE).

**Mission:** Catalyze transformative research, education and outreach that addresses society’s grand challenges related to both meeting rapidly growing global energy demands in an environmentally responsible and sustainable manner and balancing the importance of robust economic growth and resiliency.

**Technical Goals:** Become Ohio State’s STEM-focused loci of technically-sound, data-driven energy-and environmental science that leads to:

- knowledge generation, dissemination, and public outreach;
- technical innovation related to all forms of energy (renewables, fossil fuels, nuclear, and CO$_2$ management)
- decision-making geared toward responsibly developing, managing, and transforming the future of energy resource utilization from carbon-intensive fossil fuels (coal) to lower carbon-emitting fuels (nuclear, natural oil and gas) or renewables (wind, geothermal, solar, biofuels)
- guidelines for industry best practices
Center for Energy Research, Training, And Innovation: **CERTAIN**

Interim Director: D. R. Cole  
Assoc. Directors: T. Darrah; R. Lanno

CERTAIN Fellows:  
J. Jacquet – FAES  
I. El-Monier - Eng  
S. Prakash - Eng

External Advisory Committee  
Faculty Advisory Committee

Program Coordinator:  
M. Kositzke

Data Analytics:  
G. Allen

External Funding:  
DoE  
NSF  
NIH  
DOD  
BIA  
ARPA-E  
Industry

Topics and Issues

Natural & Physical Sciences  
Social, Behavioral & Economic  
Policy & Regulatory

Research: T. Darrah, lead  
Training/curriculum: R. Lanno, lead  
Engagement/outreach: K. Martin, lead

Cross Cutting

Office of Research  
College of Engineering  
College of Arts and Sciences  
College of Food, Ag, Environ Sci

financial support
CERTAIN Management Team

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Roman Lanno, Associate Director CERTAIN, lanno.1@osu.edu
Tom Darrah, Associate Director CERTAIN, darrah.24@osu.edu
Ken Martin, OSU Extension, martin.1540@osu.edu
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Mike Kositzke, Program Coordinator kositzke.2@osu.edu
Gerald Allen, Data Analytics, allen.694@osu.edu

CERTAIN Faculty Advisory Committee (CFAC)

1. Katherine Jenkins, Knowlton School of Architecture, jenkins.1060@osu.edu
2. Ilham El-Monier*, Chemical and Biomolecular Engineering, el-monier.1@osu.edu
3. Chris Penrose, OSU Extension – co-leader Shale Energy Work Group, penrose.1@osu.edu
4. Shaurya Prakash*, CFAC Chair, Mechanical & Aerospace Engineering, prakash.31@osu.edu
5. Michael Bisesi, College of Public Health - Environmental Health Science, bisesi.12@osu.edu
6. Ken Martin, OSU Extension, martin.1540@osu.edu
7. Jeffrey Jacquet*, School of Environment and Natural Resources, jacquet.8@osu.edu
8. Anne Co, Chemistry and Biochemistry, co.5@osu.edu (pending)
9. Sudhir Sastry, Food, Ag and Biological Engineering, sastry.2@osu.edu

* CERTAIN Fellow
CERTAIN includes a diverse suite of globally recognized technical experts in not only fossil fuel extraction, but also other forms of energy and energy-related disciplines and the environment.

- Bridge Fuels (natural gas, nuclear)
- Renewables (solar, wind, geothermal)
- Renewable Critical Resources (Li, REEs, helium)
- Energy Storage (batteries, fuels cells, subsurface)
- Waste Storage (CO₂, brine, radioactive waste)
- Water resource acquisition and management
- Environmental impacts of Energy Extraction
- Policy, Economics & Law
- Public Health
- Extension/outreach
**CERTAIN will expand its role in** Science & Technology:

- Support team building for program development in renewables, energy storage, water use – i.e., sustainability science
- Lead or co-lead new proposal efforts to build programs in renewables, non-renewables, energy storage, environmental impact and risk assessment

**Curriculum Development:**

- Add Energy track to Environmental Sciences Graduate Program
- Explore STEM-based Energy and Environment course development, new certificate programs, tracks, minors, and majors
- Revitalize and Expand the Professional Masters program in SES
- Participate in and contribute to OSUS Education initiative

**Outreach & Engagement:**

- Provide fact-based information on technical aspects of renewables and energy storage to OSU Extension
- Assist Extension with development of new RE specialize course materials required to educate extension field agents
- Support engagement workshops and town halls
Data Analytics: The nature of the opportunity and challenge

- **Big Data**
  - Containers and Feeds of Heterogeneous Data
  - Access to Structured and Unstructured Data

- **Processing**
  - Data Prepared for Analysis
  - Indexed, Organized and Optimized Data

- **Reporting**
  - Identification of Patterns and Relationships
  - An Evaluation of What Happened in the Past

- **Analytics**
  - Prescription Analytics
  - Automatically Prescribe and Take Action
  - Predictive Analytics
  - Sets of Potential Future Scenarios

Increasing Value
Data Analytics Example: Carbon Network Geometry
**Recent Examples of Research Program Development**

<table>
<thead>
<tr>
<th>Department of Energy:</th>
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<tbody>
<tr>
<td>Basic Energy Sciences:</td>
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<tr>
<td>“Nanosphere Energy and Water Research (NEWR-EFRC) – Wash U. - D. Giammar PI (4 years - $16 million; OSU part - $1.1 million)</td>
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<table>
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<tr>
<th>Office of Fossil Energy/ NETL:</th>
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<tr>
<td>“Integrated Chemical, Physical, and Biological Methods for the Evaluating Fracture Related Fluid Migration in Shales” OSU – T. Darrah PI (2 years, $1,812,005)</td>
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<th>National Science Foundation:</th>
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<tr>
<td>“Collaborative Research: Tectonic and glacial controls on the source, pathways and dynamics of fluid movement through sedimentary basins to the Critical Zone” OSU T. Darrah – PI (2 year, $685,831)</td>
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<th>Major Research Instrumentation (MRI)</th>
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<tr>
<td>“Acquisition of a Laser Ablation Multicollector Inductively Coupled Plasma Mass Spectrometer for Geoscience Research and Education at Ohio State University L. Griffith PI ($792,904)</td>
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<tr>
<th>Ohio Coal Research and Development Program:</th>
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<tbody>
<tr>
<td>“Sequestration of CO₂ and Co-Contaminants into Geological Formations in Ohio” D. Cole – PI (2 year, $160,000)</td>
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</tbody>
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A More CERTAIN Future

J.D. Rockefeller

Edward Orton, Jr.