



George Mason University  
<http://cesp.gmu.edu>

### The Critical Nexus: Energy Science and Energy Policy

Twenty-first-century energy challenges are complex. Solutions to these challenges require scientific research and technological innovations. Energy challenges do not exist in a vacuum; food, climate, health, water and national security interact with energy. Translating scientific breakthroughs into evidence-based policy frameworks will build strong foundations for energy security and sustainability.

Recognizing the role of both science and policy in addressing complex energy challenges, George Mason University (GMU) established the Center for Energy Science and Policy (CESP). As a joint-initiative of the Schar School of Policy and Government and the College of Science with significant involvement from the Volgenau School of Engineering and the School of Business, CESP is a university-wide center focused on delivering scientific innovations and policy recommendations for energy security, sustainability and resilience. Thoughtful analysis and integration of science and policy are essential to meet local, state, federal and international needs – whether in minimizing water demands, enhancing efficiency, exploring technological and energy policy alternatives or addressing resiliency and security issues.

The Center's research and analysis integrate high-performance computer simulation and visualization, hands-on, laboratory-intensive research, in-depth qualitative studies, and statistical and economic analyses. In addition to energy research, the Center also offers innovative educational opportunities through interactive workshops, engaging practitioners and academicians, and traditional academic offerings. Such multidisciplinary approaches foster the critically important intersection between energy science and policy.

Vision: Translate innovations in energy science into policy recommendations regarding energy security, sustainability and resilience. This requires exploring energy's critical nexuses with health, water, climate, food, transportation, national security and conflict resolution.

Mission: Build a vibrant interdisciplinary energy science and policy hub that develops integrative applied science and policy solutions for the energy security, sustainability and resilience challenges of Virginia and beyond.

Central Themes: CESP is structured around three central themes: energy security, sustainability, and resilience. These themes encompass:

**Supply:** Innovations for energy supply security, transitions and sustainability to ensure a vibrant future.

**Demand:** Innovations for energy demand efficiency and conservation to produce a smart and resilient society.

**Connected Systems:** Innovations for connected energy infrastructure and policies to nurture energy resilience.

### Accomplishments

CESP is acting decisively to implement its vision and mission. CESP is:

- *Coordinating with energy science and policy research organizations* to develop fundraising opportunities and secure resources for CESP activities. For example, CESP submitted numerous proposals to federal, state and private research organizations including a large Food-Energy-Water Nexus proposal to the National Science Foundation. In 2016, CESP has raised over \$1M in donations, contributions and grants.
- *Consulting for private sector partners* in applying cutting-edge scientific research and policy approaches to operational energy challenges.

- Partnering with Virginia’s electric cooperatives and municipal public power companies to develop strategies to improve demand-side management (DSM) programs through optimization and modeling of new hardware with historic usage profiles.
- *Collaborating across GMU’s campuses*, including other GMU Centers and Institutes, and engaging with regional and international partnerships in energy science and policy innovation to promote multi-disciplinary studies. Examples include the biannual CESP associates workshops, as well as outreach to the business, engineering, and conflict resolution schools. Among CESP’s international collaboration includes an MOU with the Bundeswehr University in Munich for faculty exchanges.
- *Organizing targeted workshops* to enhance cooperation, generate policy recommendations and visibility; e.g., the April 2015 “Global Energy Policy Conference,” and the February 2016 Energy and Sustainability Conference co-sponsored with Leaders in Energy and the Association of Energy Engineers, featuring Sen. (D-VA) Tim Kaine as the keynote speaker. CESP has also co-sponsored a Center for Science and Technology/CESP Brown Bag series of outside speakers on renewable energy issues. CESP leadership has also made presentations to university, government, community and think-tank audiences.
- *Integrating research with educational activities*, including executive education. For example, CESP has developed several energy-focused courses and teaching modules. These include the ENCORE Learning of Arlington County for adult education on foreign policy and energy security, as well as a graduate-level geopolitics of energy security course for the Schar School, and undergraduate and graduate energy policy courses for the College of Science’s Department of Environmental Science and Policy and Akita International University in Japan.
- Providing membership and representation to other energy research and policy institutes, including council membership at the National Capitol Area Chapter of the U.S. Association for Energy Economics (NCAC-USAEE). Also, CESP is an Academic Member of the Virginia Energy Efficiency Council (VAEEC).

Supporting these activities, CESP has undertaken a sustained communications outreach program that includes writing op-eds and contributing to international energy publications on energy security issues concerning Europe and Russian-European energy relations, LNG exports, and domestic energy security infrastructure. CESP has also developed its webpage, Facebook profile and energy blogs.

### **Near-term Goals**

Building upon these accomplishments, CESP has identified the following near-term goals:

- Establish routine energy security assessments for Virginia and beyond. Integrate energy planning into the analysis of the Washington Region’s economic future.
- Establish an annual “*Mason Energy Symposium*” as a venue to showcase faculty and student innovations, enhance university, government, and industry collaborations, and develop new initiatives and proposals.
- Organize symposia on grid (and other energy infrastructure) security, local energy and sustainability practices, energy system transitions, and the energy-water security nexus.
- Train, educate and undertake work-force and expertise development by instituting intra-college/school academic/certificate programs with a specific “energy science and policy” focus.
- Establish CESP as a center for energy science and policy collaboration, team building, and problem-solving.
- Employ a robust communications approach, using both new and traditional media, to project GMU’s thought leadership to, and share results with policy-makers, researchers, and civil society.
- Establish collaboration with key global institutions in the greater metropolitan area, and beyond, including the World Bank, Inter-American Development Bank, EBRD, ADB, Asian Infrastructure Investment Bank and other bodies that can contribute to the students’ development and operationalize CESP’s recommendations.

## **Support**

George Mason University and CESP, with its tradition of innovation and vision for the future, can advance an evidence-based energy policy agenda. The focus is on academic and executive education programs, and meaningful research. CESP excels at producing innovative solutions and equipping young and rising leaders for the energy challenges of today and tomorrow. CESP fosters faculty and student involvement to develop a unique GMU energy identity with international credibility.

CESP is well-positioned to engage interested parties and stakeholders dialogue, identifying constraints and opportunities for collaboration, sharing information, and building trust. Specifically, CESP provides a unique forum for academicians and public/private energy sector professionals to improve transparency across groups that are often isolated from each other. CESP's combination of credible capabilities in science and policy enables us to plan, execute and sustain this program. GMU's existing core courses in environment and climate change, energy policymaking, and the geopolitics of energy security have created a broader interest in energy issues among existing and potential students. Possible outside clients such as the Departments of Energy, State, and Defense, and major consulting and international energy companies recognize this capability

Supporters' gifts will sponsor conferences, graduate research fellows, educational initiatives, and dynamic leadership that builds CESP as a vibrant energy science and policy hub that develops integrative solutions for the energy security, sustainability and resilience challenges. An endowment of \$20,000 or more toward a research fellowship will entitle the benefactor to name the fellowship, as appropriate. Our policy is to publicly acknowledge benefactors; however, anonymity will be respected if requested.

As a multidisciplinary energy and science hub, CESP can conduct an independent analysis, verification and research support corporate requirements on a case-by-case basis. Fees for such projects will be based on highly-competitive hourly rates for faculty and graduate student researchers. Consequently, CESP could provide a cost-effective approach for many private sector and nonprofit organization needs.

### **CESP donations, contributions and grants**

CESP Strategic Initiative Grant, GMU College of Science, \$50k, 2015-2016.

CESP Strategic Initiative Grant, Schar School of Policy and Government and Volgenau School of Engineering, \$25k, 2015-2016.

CESP Strategic Initiative Grant, GMU College of Science, \$50k, 2016-2017.

Optimal Precipitation Estimation for Land Surface Modeling, NOAA, \$240k 2015-2017.

Hyper-Resolution Hydrologic Modeling Enabled by SMAP Observations, NASA, \$280k, 2016-2019.

High Mountain Asia Land Data Assimilation System (HMA-LDAS), NASA, \$640k, 2016-2019.

Green For Good (G4G) - Designing Sustainability at Mason, Dominion Resources, \$20k, 2017.

Mason Green Roof, Patriot Green Fund, \$20k, 2017.

Next-Generation Large-Scale Fractional Freeze/Thaw Analysis, \$700k, NASA, 2017-2021.

## Leadership

### **Ambassador (ret.) Richard D. Kauzlarich, *Co-Director***



A.A. from Black Hawk College, B.A. from Valparaiso University, and M.A.s from Indiana University and the University of Michigan. Served as National Intelligence Officer for Europe at the National Intelligence Council, Director of the Special Initiative on the Muslim World at the United States Institute of Peace, United States Ambassador to Bosnia and Herzegovina in 1997-99 and to Azerbaijan in 1994-97, and Senior Deputy to the Secretary of State's and the President's Special Representative to the Newly Independent States (NIS) in 1993-94. He is a co-author of "Aid During Conflict: Interaction Between Military and Civilian Assistance Providers in Afghanistan, September 2001-June 2002," published by RAND in 2004.

### **Professor Paul R. Houser, *Co-Director***



B.S. and Ph.D. degrees in Hydrology and Water Resources from the University of Arizona. Served as Chief of the NASA-GSFC Hydrological Sciences Lab, manager of NASA's Terrestrial Hydrology Program, Science Advisor for the Bureau of Reclamation, and Director of Hydrometeorology at Geovesi. Scientific contributions include the Land Data Assimilation System (LDAS), the Hydrospheric States Mission (Hydros/SMAP), the Land Information System (LIS), the NASA Energy and Water cycle Study (NEWS), and the Water Cycle Solutions Network (WaterNet). As co-director Dr. Houser's research focuses on integrating energy and water research across traditional disciplines that transitions research to education and application.

### **Dr. Jennifer Sklarew, *Senior Fellow (Energy Policy)***



Ph.D. in public policy from George Mason University, M.A. in Japan studies and international economics from Johns Hopkins, B.A. in English from the University of Pennsylvania. Served as an international trade specialist in the U.S. Department of Commerce, A Mike Mansfield Fellow in Japanese government agencies including the Ministry of Economy, Trade and Industry, and as a policy analyst for the Japan Nuclear Cycle Development Institute. Building on her 20 years of energy policy experience, Dr. Sklarew has focused her research on how institutional changes and external shocks drive energy policymaking and change in energy and interrelated systems.

### **Joel Hicks, *Ph.D. Student, Graduate Research Assistant***



M.S. Electrical Engineering, Naval Postgraduate School, M.A. National Security and Strategic Studies, Naval War College, M.A. International Science and Technology Policy, The George Washington University, B.S. Electrical Engineering, The George Washington University. Served as a U.S. Naval Officer in the nuclear submarine community as well as completing multiple assignments in DoD space systems engineering and operational areas. Mr. Hicks' research interests are in domestic and international energy-related issues, including the science of and adaptation to global climate change and environmental behavior, demand side management (DSM) of the electricity sector and applied behavioral economics.