



2018–19 REPORT ON THE REVERS CENTER FOR ENERGY

DIRECTOR'S WELCOME

The Revers Center for Energy once again hit record numbers in student participation in the Center-led Energy@Tuck club, expanded co-curricular programming, and welcomed our largest cohort of fellows to date. With approximately 40% of the first-year class belonging to Energy@Tuck, we were proud to offer new and exciting programming to Tuck's engaged, receptive student body. These programs included the inaugural Energy Project Finance 201 student workshop—led by alumni Jon Fouts T'92, Managing Director of Power and Utilities at Morgan Stanley's New York office—and the launch of Power-Up Thursdays, a student-led technology series incorporating favorite topics from past years (Drilling 101 and Nuclear 101) and piloting Smart Cities 101 and Electric Vehicles 101, which were geared toward those newer to energy. Finally, we hosted the Center's inaugural Energy Project Forum in conjunction with our annual year-end dinner, showcasing the breadth and depth of energy projects undertaken by our fellows this year. Elyse Allan D'79 T'84, CEO of GE Canada and chair of Tuck's Board of Advisors, was our keynote speaker and helped us welcome the newest cohort of 17 fellows, our largest yet!

Expanding support to departments across Tuck, we were thrilled to partner with Tuck Executive Education on the launch of the inaugural Energy Industry Leaders Program with our industry partner, the New England Fuel Institute. As a continued partner of the Dartmouth Energy Collaborative (DEC), we worked with the broader Dartmouth community—including the Arthur L. Irving Institute for Energy and Society, Dartmouth Sustainability Office, and Thayer School of Engineering—to expand campus-wide energy programming. Events ranged from Lunch & Learns to the community Energy 101 series, building stronger linkages across student energy clubs at Thayer School of Engineering and Dartmouth College.

April M. Salas, Executive Director

MISSION AND VISION

The mission of the Revers Center for Energy is to inspire and shape tomorrow's leaders in energy while engaging today's energy community of scholars, students, alumni, and executives. The vision for the Center is to establish Tuck as the preeminent business school for learning practical leadership in the energy industry. The Center supports students with a network of global business leaders, leadership in research and academics, and a distinctive blend of courses and programs that support student exploration of complex, multidisciplinary issues across the energy industry.

CURRICULAR CONNECTIONS

The Center provides a learning platform for students interested in energy, the environment, and sustainability horizons in industry. Our team engages students to develop practical leadership skills through a combination of in-class training, exposure to outside resources, and experiential learning. We focus on preparing wise leaders by fostering both top-tier leadership skills that are valuable within the C-suite of an organization and development of essential skills that MBA graduates can employ immediately. This rapidly evolving field is diverse and highly complex in its structure and economics, requiring knowledge across a broad spectrum including:

- General energy and sectoral knowledge
- Economics: navigating complex energy markets
- Finance: managing the deployment and operation of capital-intensive resources
- Strategy: understanding the competitive landscape and key drivers for success
- Technology: operating and innovating sophisticated technology
- Policy: managing critical government stakeholder relationships

In addition to the rigorous general management MBA curriculum, Tuck offers the following elective courses exploring discrete energy challenges, from sustainability to economics of the energy market.

SUSTAINABLE BUSINESS

Professor Andrew King

The purpose of this course was to introduce sustainability and effective strategies for advancing it, as well as the role and tools for advancing business. This included consideration of unilateral, technological, and multilateral strategies for advancing sustainability. The course provided a working knowledge of important economic and social trends, including an impartial view of potential responses to climate change. Students analyzed the extent to which different technologies (wind, solar, gas, coal, and nuclear) and business-led strategic responses may be part of the solution. There was a focus on general skills useful for all managers, and helping managers recognize the source of these problems and frameworks to address them. Guest lecturers included Merritt Patridge T'13, Director of External Relations, The Lyme Timber Company; Marret Arfsten T'13, Strategic Marketing Leader, AmbriCargill Cocoa & Chocolate; and Rick Peyser, Lutheran World Relief's Senior Relationship Manager, Coffee & Cocoa.

ENERGY ECONOMICS

Professor Erin Mansur

This course introduced students to energy markets, including structure, competition, investment, and regulation, as well as, strategy and policy. Students began by exploring questions such as, what units are used to measure energy, what are the main sources of energy, how do we use energy and how has energy intensity changed over time. They ended the course with a deeper understanding of economic determinants of industry structure, the evolution of competition, drivers of supply and demand in various markets, the roles of storage and transportation, market power and antitrust concerns, and the rationales for economic and environmental regulations. Oil, natural gas, energy commodities, LNG, power, renewable technologies, nuclear power, and environmental regulation were covered. The panel of guest lecturers included Scott Fisher T'98 of The Northbridge Group.

INDEPENDENT STUDY PROJECTS

The Center sponsored eight independent study projects focused on energy this year, including new projects with Dartmouth College. Independent studies allow Tuck students to craft their experience and conduct in-depth research to prepare for careers in the industries they plan to join.

- New Energy Capital: Impact report project on greenhouse gas with a local private equity firm
- Breakthrough Energy Ventures: GHG reduction and energy innovation in the built environment project for a venture capital firm
- Dartmouth Fleet Electrification Transition Study: Inventory and proposal for the College to switch to electric vehicles and a roll-



out of charging infrastructure

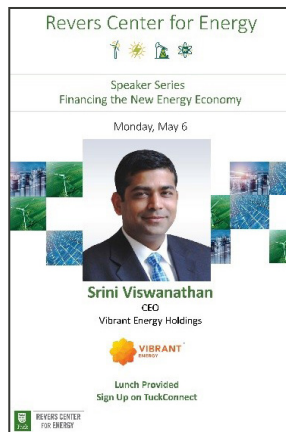
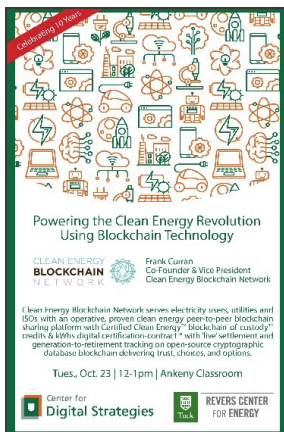
- Dartmouth College Energy Transformation Study: Dartmouth College campus biomass plant review
- 3 Degrees: Assessing opportunities for blockchain in clean energy projects
- Quantifying Energy: Building Efficiency Project
- Solar Yield: Analyzing Market Performance of Solar Energy Yield Companies
- Municipal Solar: Town of Hanover Phase 2 Study

VISITING INDUSTRY LEADERS

SPEAKER SERIES

The Center hosted two speaker series, with special offerings for Revers Center for Energy Fellows and selected Energy Club members as part of the Fellows Energy Leaders Program. The Center hosted the Financing the New Energy Economy speaker series, and co-sponsored with the Center for Digital Strategies a series around digital transformation in energy. Visiting executives ranged across industries to include the National Wildlife Federation, US Department of Energy, and Nalco, a subsidiary of Ecolab. Other highlights included:

- A B-Corp Panel with Kristin Carlson from Green Mountain Power, co-sponsored with Tuck Center for Business, Government and Society and the Tuck Net Impact Club
- Srinivasan (Srini) Viswanathan T'07, CEO, Vibrant Energy Holdings on “Investing in Emerging Markets Renewables”
- Trends in Energy Project Finance with Jon Fouts T'92, Managing Director, Global Power and Utility Group at Morgan Stanley
- Frank Curran, Co-Founder and Vice President of Clean Energy Blockchain Network on “Powering the Clean Energy Revolution Using Blockchain Technology”
- Adam Golodner, Senior Counsel, Global Cybersecurity and Privacy Practice Group on “IoT, Energy and Russia: An Overview of Global Cybersecurity Threats in the Digital Age”



EXECUTIVE EDUCATION

Offered in partnership with the New England Fuel Institute, this program was built around a thought-provoking curriculum that fueled discussion and encouraged participants to work collaboratively. The schedule brought together faculty from Tuck and Thayer School of Engineering, staff and student fellows from the Revers Center for Energy, and created relevant industry discussions with Dan Revers T'89, co-founder of ArcLight, and Arthur, Sandra, and Sarah Irving T'14 of Irving Oil.

CO-CURRICULAR OPPORTUNITIES

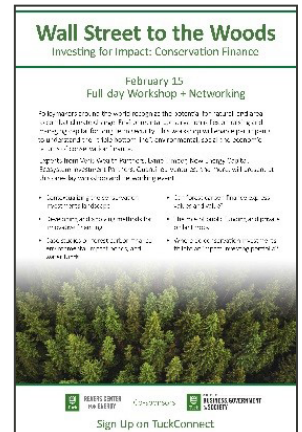
INTRODUCTORY PROGRAMMING

The Center offers several regular and topical workshops aimed at facilitating practical learning opportunities outside the



classroom and to prepare students for a successful transition into energy careers. These workshops are led by outside industry experts and range from introductory (101s) to advanced (201s) topics. The following workshops, including several open to the greater Dartmouth energy community, are opened to all Tuck students.

- **Energy 101 Power and Gas:** The Revers Center for Energy hosts this one-day seminar at the start of each academic year. The seminar utilizes several case studies from the power and gas industries, and topics include what natural gas and electricity are and how they work, how regulation works and how it affects various market participants, and the future of US gas and electricity. This is an in-depth introduction to future seminars and experiential learning opportunities hosted by the Center. It's also useful for Tuck students preparing for the fall term recruitment cycle.
- **Early Stage Impact Investing 101:** Students interested in early stage technologies and investing learned about deal sourcing, evaluating investment opportunities, measuring and evaluating impact, due diligence, and capital sources. Sponsored by the Center for Entrepreneurship and the Center for Private Equity and Venture Capital.
- **Clean Energy Blockchain 101:** 30 students gathered for an in-depth introduction to blockchain and its applications for the clean energy sector. Co-sponsored with the Center for Digital Strategy.
- **Wall Street to the Woods:** A one-day land conservation finance workshop which brought together experts and alumni in conjunction with the Conservation Finance Network to discuss environmental, social and economic returns of conservation finance. Co-sponsored with the Center for Business, Government, and Society.
- **Energy Project Finance 201:** John Fouts T'92, Managing Director, Global Power and Utility Group, Investment Banking Division, Morgan Stanley led this half-day seminar on energy finance
- **Renewable Energy 201:** Wind and Solar Project Development: Alumni Jim Maret T'10 Swift Current Energy, Alex Figueroa T'10, and Will Herchel, CEO of Verogy led this one-day workshop on wind and solar project finance and development, markets overview and the business case for each, structuring power purchase agreements, and what it means to sell renewable electricity.



EXCELLENCE AT CASE COMPETITIONS

The Center supports a fellows-led program for the development and preparation of Tuck teams to compete at high impact case competitions. This year, the Center teams placed third in two competitions. Tuck teams also participated in the Duke Energy Emerging Markets Case Competition, University of Toronto Rotman Design Challenge in Toronto, Canada, and the first Northwestern University Kellogg Energy/Strategy Case Competition.

3rd Place at McCombs National Energy Finance Case Challenge

T'20s (pictured above left to right) Matt Weems, Manuel Alegre, Ilexa Gales, Junyang Ke, and Max Pinto evaluated upstream, midstream, and downstream opportunities for a hypothetical integrated oil and gas company to enter Mexico's newly-opened oil and gas industry.



3rd Place at Renewable Energy Case Competition

T'20s (left to right) Greg Koch, Gavin Loudfoot, Pete Cahill, and Ryan Ganong competed at the Ross School of Business competition, which is uniquely focused on renewable energy. This year's case focused on the California energy market, as the state recently mandated that 100 percent of its electricity come from clean energy sources by 2045. Teams identified a company active in the California energy market that could help the state achieve its renewable energy goals, and then analyzed potential returns on an investment in the company.

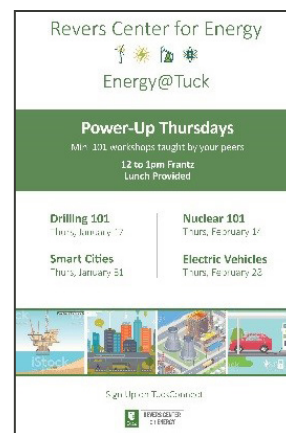


LAUNCH OF POWER-UP THURSDAYS

This student-led technology series incorporated topics MBA students were most interested in, included Drilling 101, Nuclear 101, Electric Vehicles 101, and Smart Cities 101, which was hosted by Thayer PhD student Wester Schoonenburg of the Laboratory for Intelligent Integrated Networks of Engineering Systems.

TUCK SOCIAL VENTURE FUND INVESTMENT

Collaborating across Tuck, the Revers Center for Energy advised and supported a group of students who invested in Brightfield Transportation Solutions through the Tuck Social Venture Fund (TSVF). The start-up built a partnership with Associated Energy Developers which would support the installation of charging stations in New England. The Center supported a formal role for a Revers Fellow, James Giampietro T'19, who liaised between the Center and TSVF students and contributed to the diligence process for clean technology companies.



CONFERENCES

The Center supported student participation at industry conferences on campus and beyond:

- **COP 24:** United Nations Framework Convention on Climate Change (COP 24) in Katowice, Poland. RCE co-sponsored with the Center for Business, Government, and Society, sent four Tuck students and Center staff in support of student interest in sustainability, trade, and clean energy development globally
- **Tuck Private Equity Conference (pictured):** RCE co-sponsored the energy panel with Andrew Brannan, Arlight Capital Partners; Pat Fox T'07, New Energy Capital; Gautam Kakodkar D'97 TH'98 T'06, Occom Ridge Capital; Chelsea Williamson T'16, Riverstone Holdings; Eddy Zervigon T'97, Occom Ridge Capital
- **Harvard Energy Symposium:** Three T'19s attended.
- **MIT Energy Conference:** Ten T'19 Center Fellows attended the conference.
- **CERAWeek (Houston, TX):** Two T'19 Revers Energy Fellows attend this premier annual international gathering of energy executives and met with alumni working across the industry leaders, experts, technology innovators, and policymakers.
- **Value in the Classic Car Market (VCCM):** The Center co-hosted a conference featuring Wolfgang Warnecke, Chief Scientist Mobility, Shell Global on Future Fuels.



EXPERIENTIAL LEARNING

Using Tuck as our basecamp for learning, the Center hosted ten energy treks, ranging from industry deep dives to career exploration, and numerous TuckGO energy projects:

OFF CAMPUS

The Center coordinated industry deep dives domestically and internationally to explore various energy topics:

- **San Francisco & Silicon Valley Energy/Entrepreneurship Ecosystem Deep Dive:** RCE and Center for Entrepreneurship hosted 35 primarily incoming first year students in SF/SV for a pre-term deep dive into the energy entrepreneurial ecosystem visiting companies such as New Resource Bank, 3Degrees, Powerhouse Ventures, Nest, Bloom Energy, and Cypress Creek Renewables.
- **ISO-New England:** RCE led a 20+ student visit to the regional grid operator for New England, ISO-NE, located in Holyoke, MA, to learn about US electricity markets, load management, and how renewables are integrated into “the grid”.



- **Puerto Rico Fellows Trek (pictured):** On the one year anniversary of Hurricane Maria's devastating impact to Puerto Rico, the RCE staff and ten Revers Energy Fellows traveled to Puerto Rico for a five-day trek to study the factors that contributed to the prolonged power outage, why it took so long for the island to rebuild its electrical grid, and what policies, regulations and commercial investment might support a more resilient and clean energy system over the long term. The team (pictured) presented the initial results to the Dartmouth Energy Collaborative and via virtual programming to Tuck alumni in collaboration with the Alumni Engagement Office.

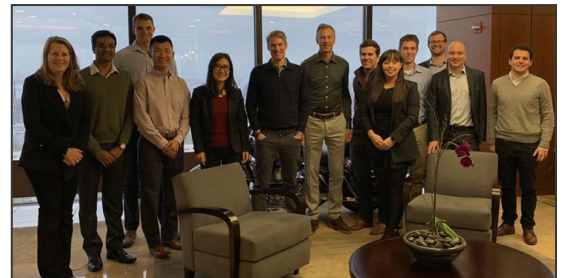


- **Dartmouth Energy Collaborative:** Along with the Arthur L. Irving Institute for Energy and Society (IIES) and Dartmouth Sustainability Office, RCE sent students to site visits throughout the region including a tour of Dartmouth's heating/electricity cogeneration plant, Casella's Zero-Sort Facility, and Middlebury College's wood biomass gasification heating plant.
- **Irving Oil:** Kevin Griffith T'19 and his mentor Sarah Irving T'14, as a part of the Center's Energy Leadership Mentorship Program, organized a weekend visit to St. John, New Brunswick, Canada, for five T'19 Revers Fellows and staff to tour Irving Oil's new headquarters, refinery, LNG processing facility, storage terminal and retail sites.

CAREER EXPLORATION

In support of student exploration of careers in energy, the Center coordinated various career treks throughout the year:

- **Career Industry Panel:** partnering with Career Services, RCE brings alumni and T'19's together to discuss energy career pathways for incoming T'20s.
- **Boston Career Trek (pictured):** Revers Fellows organized our second annual Boston Career Trek, visiting companies such as, IHS Markit, Arclight Capital (pictured with Dan Revers T'89), and Swift Current Energy to learn about industry roles and to meet with energy alumni.
- **Lunch and Learn Energy Consulting and Energy Banking:** Revers Fellows returning from internships in energy focused investment banking and consulting roles present the 'how-to's' of navigating the recruiting process, networking, and a day-in-the-life-of for students interested in these areas.
- **Houston Career Trek:** On the heels of the UT Austin Energy Finance Challenge Case Competition, RCE sends a student team to compete in the case competition and to visit Houston to explore energy focused investment banking and financial services company roles, and to meet with alumni.



TUCKGO COLLABORATION

First Year Projects: Collaboration on projects this year included Clean Marine Energy, Clean Energy Blockchain Network, Swift Current Energy, InMotion, Patagonia, and Irving Oil.

Oceana Energy Global OnSite Consulting Project: This project focused on tidal energy markets in England and Scotland and a strategy for testing and collecting data on a full-scale model of the U.K-based company's tidal turbine.

Perth Global OnSite Consulting Project: Serving an oil and gas industry client in Perth, Australia, six second year students focused on a key business question related to global liquefied natural gas (LNG) markets.



Global Insight Expedition (GIX) to Morocco (pictured):

Dartmouth Professor Dirk J. Vandewalle and Center Executive Director April Salas co-lead the course (photo at right), which focused on energy innovation in frontier economies. The ten day, six city expedition exposed students to a society with deep social and cultural traditions and explored how a society adapts to its transitioning clean energy economy. Morocco is home to one of the world’s largest solar fields, and has deployed utility scale storage cost-competitively.



ENERGY STUDENT PROGRAM

We believe energy and the environment are among the world’s most relevant industries in transition. The Revers Center for Energy exists to provide opportunities for students to engage both broadly and deeply, depending on their learning journey. As such, we have Center affiliated programs for students to explore the industry, enhance their general education and awareness on key topics, and to prepare to enter a career in energy, the environment, or sustainability.

ENERGY@TUCK CLUB

The Revers Center for Energy administers and runs programming for the Energy@Tuck student club as a means to providing flexible, relevant, and timely co-curricular learning primarily for first year students, but open to all of Tuck. Students have the opportunity to explore the energy, environment, and sustainability industries before deciding if and where to dive deeper. The club, led by Revers Energy Staff and Fellows, hosts treks, workshops, conferences, and dinners with guest speakers. This year we hit record membership with 40% of the first year MBA class joining the club, as well as, students from Thayer School of Engineering and Dartmouth college undergraduates.

REVERS ENERGY FELLOWS

Revers Center fellows are the hallmark of our programming. These 2nd year MBAs work with Center leadership and Tuck faculty, staff, and alumni to customize their MBA experience towards future careers across the energy industry, both inside and outside of the classroom. Key programs include an Energy Leaders Program, a Mentorship Program, and an independent study or energy project with a company.



Fellows Energy Leaders Program Highlights:

- Industry trends breakfast discussion with GE Canada CEO Elyse Allan D’79 T’84
- Occom Ridge Capital Co-Founder and Managing Partner Eddy Zervignon T’97 hosted a private equity roundtable discussion about energy and his involvement with Bloom Energy
- Visiting Professor Tom Lawton presented on non-market strategies in the Ugandan electricity sector
- Professor Ing Cheng presented on financialization of commodity markets

ENERGY LEADERSHIP MENTORS

Since 2016, this hallmark program has paired Revers Energy Fellows with successful energy industry leaders. The objective of this program is to cultivate a strong network and community of Tuck “energy” alumni. This program facilitates a transfer of knowledge, wisdom, resources, and life experiences. The program is designed to create lasting, meaningful mentorship relationships through two-way dialogue that extends far beyond the duration of the program.

The 2018-19 mentors were:

- Siemens retired President and CEO Eric Spiegel T'87
- New Energy Capital CEO Scott Brown D'78
- ArcLight Capital Head of Commodity Markets Bob McGaughey
- Blue Earth Capital/Kenmont Capital Partners, LP CEO and Managing Director Don Kendall T'76
- GE Canada President and CEO Elyse Allan D'79 T'84
- Cleantech CEO and Venture Advisor Mike Miskovsky T'90
- Apache Offshore Investment Partnership board member Chansoo Joung T'87
- Calpine CEO Thad Hill T'95
- Ambri CEO and President Phil Guidice T'85
- SemGroup Corporation Director Sarah Barpoulis T'91
- Infra-Energy Capital Advisors Managing Partner Grant Davis T'85
- Spruce Finance Co-Chairman and CEO Christian Fong T'05
- Irving Oil Executive VP and Chief Brand Officer Sarah Irving D'10 T'14

ENERGY PROJECT FORUM

In conjunction with our annual end-of-year dinner, the Center hosted its inaugural Energy Project Forum, highlighting three Center Fellows projects in an interactive way to the broader Dartmouth energy community. The projects were titled Historical Performance of Solar YieldCo's, Validating Greenhouse Gas Emission Accounting, and Dartmouth Transport Fleet EV Transition Study. The forum brought together faculty from Tuck, Thayer and Dartmouth, current Fellows and past Fellows, alumni, and energy industry experts.

LEADERSHIP AT DARTMOUTH AND BEYOND

Energy at Dartmouth is a growing community of experts, scholars, and students. In addition to energy leadership at Tuck, the Center also supports energy across Dartmouth and in the larger community.

AT DARTMOUTH

- April Salas was a guest lecturer in three Dartmouth courses- Energy and the Environment on electricity 101 and consumer behavior; Energy and Society in the Middle East and North Africa; Crisis and Strategy in American Foreign Policy.
- This spring, April and Professor Elizabeth Wilson, IIES Director were keynote speakers at Dartmouth's CarniVail (a Dartmouth alumni event), focusing on Energy and Innovation in the Dartmouth Ecosystem. April was a panel speaker at Empowering Energy Innovation in NH: Moving from Theory to Reality with Tom Burak D'82, Former Commissioner, NH Department of Environmental Services, and Henry Herndon, Director Local Energy Solutions, Clean Energy NH. This solutions-focused presentation and discussion with energy experts provided federal, state, and local perspectives.
- The Revers Center for Energy proudly co-sponsored Paul Dabbar, Under Secretary for Science, US Department of Energy on "The Future of Energy in the U.S.". The presentation and discussion on creative solutions to energy challenges was introduced by Laura Ray, Thayer School Interim Dean, and was moderated by April Salas and Elizabeth Wilson.
- The Center worked with the IIES to host workshops on the Future of Arctic Energy and Energy Resilience and Security. The Center also hosted the energy panel of The John Sloan Dickey Center for International Understanding's annual Straus Seminar entitled The Future of the US Relationship with the Arab Monarchies of the Gulf.
- Energy 101 Series open to Dartmouth students, staff and community members, providing an introduction to all aspects of energy from public health to international economics to technological innovation



- As part of the Dartmouth Energy Collaborative, the Center assisted with 14 events including:
 - Modeling Risk from Cascading Blackouts** with Maggie Eppstein, Professor Computer Science (UVM) and Donna Rizzo, Professor Civil/Environmental Engineering (UVM)
 - Towards a Sustainable Energy Future in Iceland** with University of Iceland faculty Brynhildur Davidsdottir: A discussion with Dr. Paulina Jaramillo, the keynote speaker at the 2019 Wetterhahn Symposium, about pressing issues facing renewable energy deployment, education and training in East Africa
 - New England's Evolving Electricity Landscape:** Professor Amro Farid, Dartmouth Professor of Engineering presented on a renewable energy integration study in the context of New England's evolving electricity landscape.

IN THE COMMUNITY

April Salas remains involved with key New England regional initiatives focused on energy and climate.

New Hampshire

- Joined the Board of Directors of Clean Energy NH, the states leading non-profit whose mission is to promote clean energy and technologies.
- Keynote speaker and panel moderator at NH Energy Week facilitating a high level discussion on the emerging energy needs in NH's largest cities and modern approaches to fulfilling those needs.
- Keynote speaker on clean energy innovation at the Business Roundtable on Clean Energy in New Hampshire for the Upper Valley Energy Roundtable annual meeting.

Vermont

- Served on the Planning Committee for Renewable Energy Vermont's REV2018, the leading and largest comprehensive renewable energy event in northern New England, bringing together business leaders, scientists, policy makers, and regulators to discuss emerging technologies, business & financing models, integrating innovation & distributed energy, and more.
- Served on the VT Energy Futures Initiative Commission, a diverse, multi-sectoral group of leaders convened by the VT Energy Action Network for a year-long effort to develop ideas and advance actions that can make significant progress towards meeting Vermont's 2025 total energy and emissions reduction commitments.
- Served on the VT Energy Dashboard Advisory Committee. The Dashboard is a powerful suite of interactive tools to set goals, track progress, map actions that help to translate Vermont's goal of 90% by 2050 into achievable local action across all energy sectors - efficiency, heat, electricity and transportation.

ACROSS THE INDUSTRY

The Center helped secure a multimillion-dollar federal grant for a Dartmouth – US Army Corps of Engineers' Cold Regions Research and Engineering Laboratory (CRREL) research collaboration focused on cold climate and arctic energy systems. IIES Director and Professor Elizabeth Wilson is principal investigator for the initiative, which comprises of three component research projects led by Thayer School professors. Research teams will assess energy systems in Arctic military installations to optimize energy services, delivery, storage, and mobility.

While the immediate goals of the project are to enhance military operations and installations in the Arctic, the potential for non-military commercial applications in cold climates, such as New Hampshire, will follow. The projects will have implications for improvements in energy efficiency for smaller, local electric-grid installations, recapture of waste heat, and batteries that function in extremely cold weather. The Center has embraced its evolving role in shaping the energy sector in New England, as well as the opportunities this role creates for Tuck students and Revers Center Fellows.

