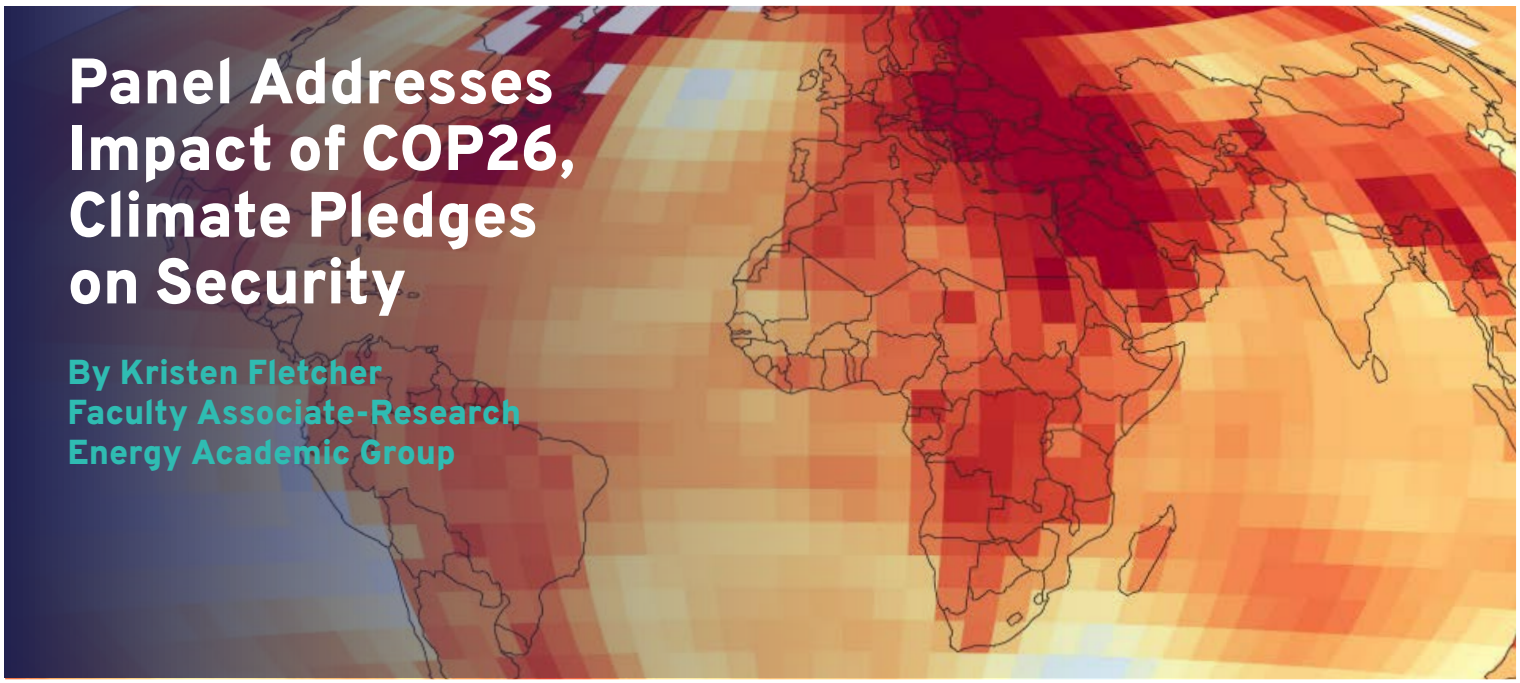
ENERGY ACADEMIC GROUP
NAVAL POSTGRADUATE SCHOOL

SURGE

ENERGY ACADEMIC GROUP QUARTERLY NEWSLETTER WINTER 2022

Highlights



Panel Addresses Impact of COP26, Climate Pledges on Security

By Kristen Fletcher
Faculty Associate-Research
Energy Academic Group

The UN Climate Change Conference —the Conference of the Parties or COP26—brought parties together for the first two weeks of November to accelerate action towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change. Countries were asked to come forward with ambitious 2030 emissions reductions targets—known as Nationally Determined Contributions or NDCs—that align with reaching net zero emissions of greenhouse gases by 2050.

On 17 November, the Climate and Security Network hosted a panel to hear perspectives on what was accomplished at COP26 and what it means for the work of DoD and the Navy. Jennifer DeCesaro, Director for Climate Security and Resilience at the National Security Council and Erin Sikorsky, Director of the Center for Climate and Security were joined by NPS faculty Nick Dew, Tom Murphree and Kristen Fletcher to discuss the outcomes of COP26 from pledges about coal, methane, deforestation and finance to the announcement of PREPARE, the President's Emergency Plan for Adaptation and Resilience.

Discussion focused on the impact these outcomes will have on climate security going forward. Key outcomes included the importance of tackling climate change as a problem today as well as in the future through both mitigation of emissions and adaptation to climate change. The panel agreed that the security community must better understand the impacts to other countries, especially developing nations, and what is driving their actions related to climate and security. There is also opportunity: DoD and the U.S. can lead by example through reduced emissions and increased technological innovation. In addition, federal agencies can integrate climate change science and understanding into security strategies, curriculum and training in order to stabilize these efforts and create a climate-literate force.

LEARN MORE

Join the Climate and Security Network at: **nps.edu/climate**

Contact: Kristen Fletcher at **kristen.fletcher@nps.edu**

View the CSN COP26 Resource at: **nps.edu/documents/105500366/0/CSN+COP26+Resources.pdf/ffb4fd53-48f6-0e8a-2bec-5b1f-58938bc3?t=1637175813230**

PREPARE is available at: **www.whitehouse.gov/wp-content/uploads/2021/10/Full-PREPARE-Plan.pdf**

FROM THE CHAIR

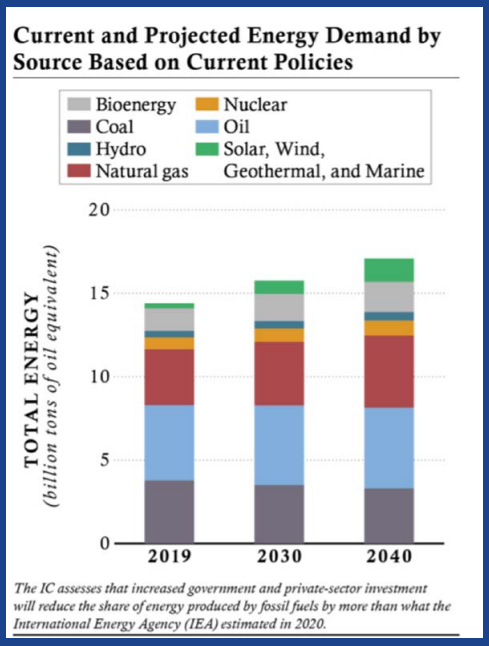
Dan Nussbaum, Chair of the Energy Academic Group

As always, there is much going on, and in this article I want to highlight some of the current activities by faculty members within the Naval Postgraduate School (NPS).

1 On October 26th, the Energy Academic Group (EAG) collaborated with the Atlantic Council's Global Energy Center to co-host a panel on "Europe's Energy Crisis and the Path Forward." The panel discussed the factors that have led to the current energy crisis in Europe, assessed the geopolitical implications of the crisis, and examined if a similar crisis is likely to emerge in the United States. The panel included NPS EAG faculty, Dr. Daniel Nussbaum and Dr. Brenda Shaffer. Ambassador Richard L. Morningstar, former U.S. Ambassador to the European Union and to Azerbaijan, chaired the panel. You can see the **full presentation on the Atlantic Council's website (atlanticcouncil.org)**.

2 NPS EAG's Dr. Brenda Shaffer joined Dr. Michael Doran & Marshall Kosloff of the Hudson Institute on a podcast to discuss "The Geopolitics of Energy", including the state of global energy markets, U.S. energy policy's impact on geopolitics, and anticipated trends in U.S. energy security. You can listen to the **full podcast on the Hudson Institue's website (hudson.org)**.

3 The U.S. Intelligence Community (IC) has released a National Intelligence Estimate (NIE) entitled "Climate Change and International Responses: Increasing Challenges to U.S. National Security Through 2040", with the key takeaway that "...climate change will increasingly exacerbate risks to U.S. national security interests as the physical impacts increase and geopolitical tensions mount about how to respond to the challenge...". EAG co-hosted a classified briefing on the report on December 8, 2021. You can read the **full unclassified report on the Office of the Director of National Intelligence's website (dni.gov)**. An interesting implication of the report is the continued reliance on fossil fuels, as portrayed below:



The IC assesses that increased government and private-sector investment will reduce the share of energy produced by fossil fuels by more than what the International Energy Agency (IEA) estimated in 2020.

4 Congratulations to a team of 10 United States Naval Reserve officers from the Office of Naval Research joined by EAG team members Alan Howard and Larry Walzer as well as NPS faculty members Bob Garza, Dr. Ryan Maness, Rebecca Lorentz, CDR Chad Bollmann, PhD, and a group of NPS students for their support to two NATO Coherent Resilience Tabletop Exercises. The team served as the Evaluation Group to the national and regional level exercise which focused on hybrid threats and energy security in Odesa, Ukraine and Vilnius, Lithuania. Support also included personnel from Argonne National Laboratory, SHAPE HQ, and JFC-Brunssum. The EAG team partnered with the NATO Energy Security Centre of Excellence and supported exercise design, development, and execution.

5 U.S. Ambassador Lee Litzenberger gave a public thank you to NPS and the EAG team for their support and in-person delivery of a Regional Energy Security Symposium – Caucasus in Baku, Azerbaijan. NPS EAG personnel included Dr. Brenda Shaffer, Larry Walzer, Dr. Arnold C. Dupuy, Alan Howard, and Tahmina Karimova, as well as Dr. Britta Hale (NPS Computer Sciences Department) and Dr. Dan Eisenberg (Center for Infrastructure Defense). Portions of the team executed a follow-on Critical Energy Infrastructure Protection Analysis Workshop in Baku.

6 The Naval Enterprise Energy Education and Training (NE3T) team, led by NPS' Dr. Arnold C. Dupuy, held a successful In-progress Review with their OPNAV and SECNAV sponsors. The NE3T program will develop future generations of U.S Navy and Marine Corps officers and NCOs who understand how Operational Energy (OE) drives all aspects of warfare from the acquisition process through combat execution. Ultimately, NE3T will train and educate technically proficient officers versed in OE, capable of responding with innovative solutions to dominate in this rapidly-evolving field of combat. During the IPR, the NE3T Team identified program accomplishments and mapped the way forward in this important area of energy security.

If you're interested in any of these topics, please do not hesitate to reach out to me. The work in all aspects of the energy domain continues, and I am honored to work with outstanding colleagues at EAG and throughout NPS.

CONTACT
DR. DAN NUSSBAUM
Email **danussba@nps.edu**
or call 831-656-2387

NPS STUDENT RESEARCH

Measuring Military Microgrid Resilience

By Douglas Van Bossuyt, PhD
Assistant Professor
NPS Systems Engineering Department

An article titled "Analyzing Mission Impact of Military Installations Microgrid for Resilience" was recently published in the MDPI Systems Journal that develops a method to model, analyze, and design military microgrids with the objective to improve their resilience in the face of disconnections from the larger electrical grid. The work is part of Christopher Peterson's master's thesis, an NPS student who graduated in 2019 from the Naval Postgraduate School's (NPS) Systems Engineering (SE) master's program. Chris is currently a Lead Systems Engineer at Naval Facilities Engineering Systems Command (NAVFAC) and is located at Joint Base Ventura.

Many tools and methods for microgrid design and assessment do not adequately address resilience in terms of accomplishing mission objectives, and instead primarily focus on economic outcomes. In many civilian microgrid cases, the value of resilience can be defined in terms of real dollars such as in industrial applications where the loss of production or material in process due to a power loss can be determined. For military microgrids, the "product" is national defense, which does not have an easily defined value. Chris's article proposes a novel metric (expected electrical disruption mission impact (EEDMI)) to quantify microgrid resilience in terms of its ability to minimize the impact of power disruption on missions supported by the microgrid. EEDMI is used in a design method to ensure a military microgrid that has been islanded from the civilian grid through a disruptive event is able to continue mission critical operations through two weeks of no off-site power.

Chris worked with Dr. Douglas L. Van Bossuyt and Dr. Ron Giachetti (NPS Systems Engineering Department) and Dr. Giovanna Oriti (NPS Electrical Engineering Department) as part of his master's thesis to develop his novel approach to measuring military microgrid resilience. His work has been used by multiple NPS students to develop their own theses and capstone reports analyzing a variety of naval facilities. The work has influenced discussions with NAVFAC EXWC and other elements of the Navy and the DoD in better understanding what makes military microgrids resilient in order to improve base energy security and mission sustainment.

LEARN MORE

The full article is available at:
https://doi.org/10.3390/systems9030069mwa

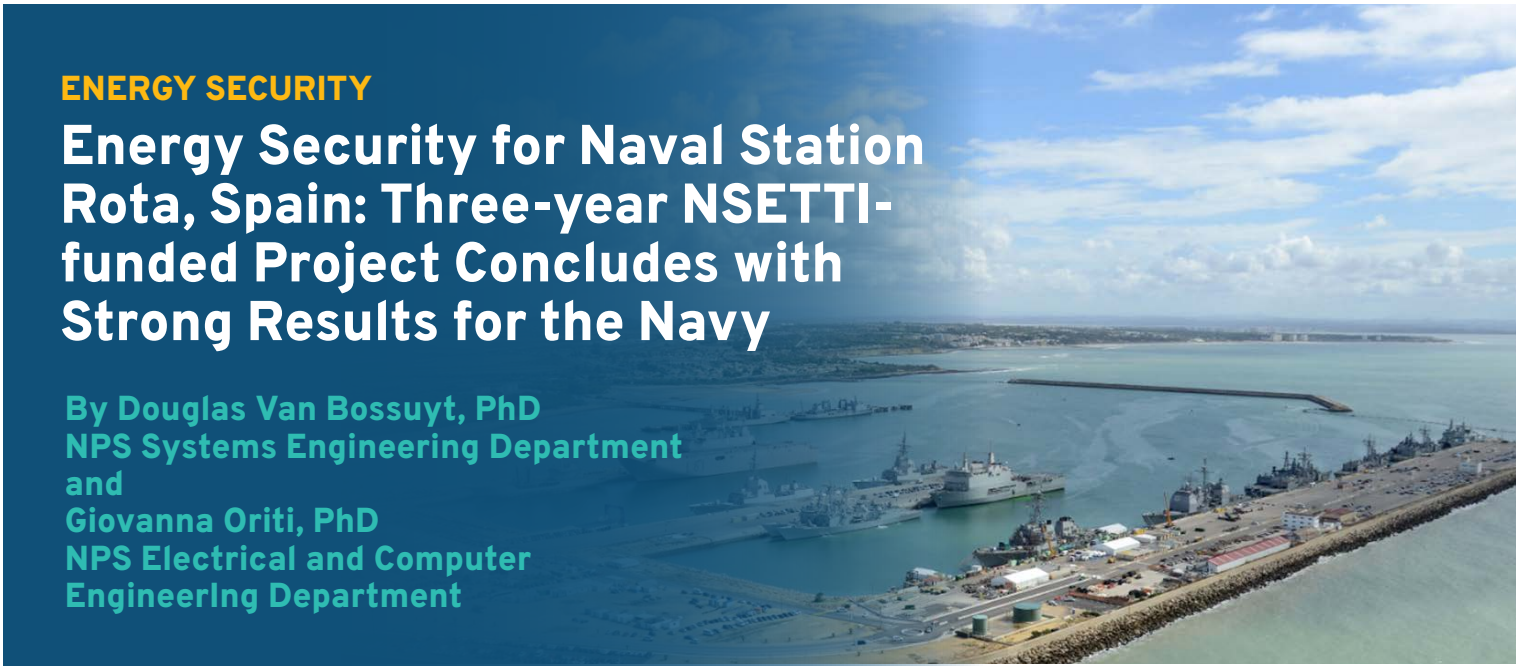
Interested in Energy-related Thesis Research?

Since 2013, NPS and the EAG supported a plethora of student thesis research in the area of energy. Publicly viewable student theses can be searched from the Resources page of the EAG website at **nps.edu/web/eag/resources**. The EAG's extensive resources, intellectual capital, and connections with multi-disciplinary faculty and energy professionals provide students enhanced support for energy-related research. If interested in energy research, please reach out to the EAG team!

ENERGY SECURITY

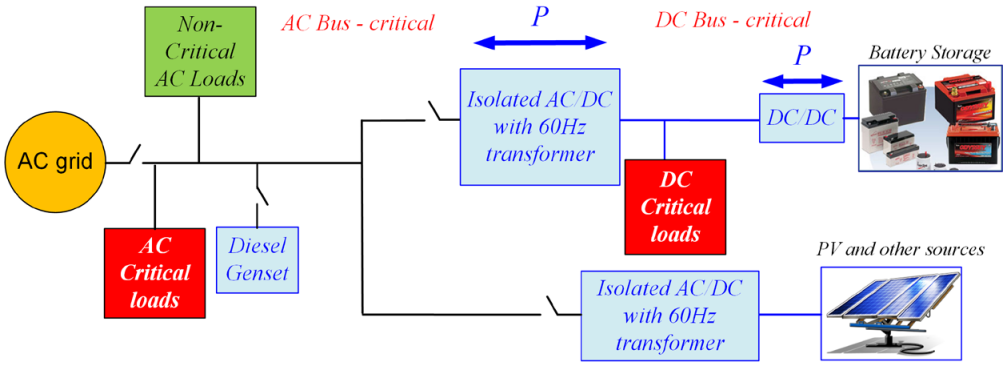
Energy Security for Naval Station Rota, Spain: Three-year NSETTI-funded Project Concludes with Strong Results for the Navy

By Douglas Van Bossuyt, PhD
NPS Systems Engineering Department
and
Giovanna Oriti, PhD
NPS Electrical and Computer Engineering Department



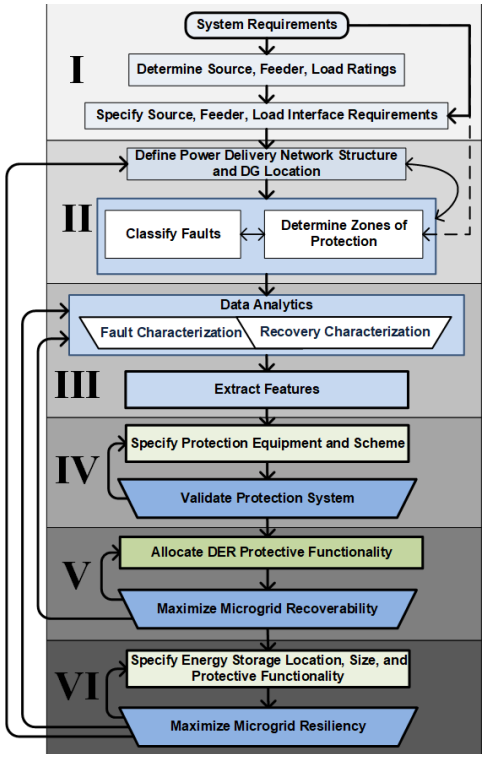
Three years ago, a multi-disciplinary team at the Naval Postgraduate School (NPS) including Dr. Giovanna Oriti, Electrical and Computer Engineering Department; Dr. Douglas L. Van Bossuyt, Dr. Ron Giachetti, and Dr. Andy Hernandez, Systems Engineering Department; Dr. Dan Nussbaum, Chair, Energy Academic Group; Dr. Daniel Reich, Graduate School of Defense Management; and Dr. Anthony Gannon, Mechanical and Aerospace Engineering Department embarked on a Navy Shore Energy Technology Transition and Integration (NSETTI)-funded project with colleagues at the Naval Facilities Engineering and Expeditionary Warfare Center (NAVFAC EXWC), Port Hueneme, CA; Naval Station Rota (NS Rota), Spain; and Naval Air Station Sigonella, Italy. The original mandate was to investigate appropriate energy storage system (ESS) design to operate with the new photovoltaic farm that is coming online at the Rota base, with the goal to make the naval base more resilient to electric power disruptions. The results of the three-year effort included determining ESS sizing plus many other developments to support NAVFAC energy security efforts at NS Rota and across the Navy.

The close and ongoing relationship between NPS and NAVFAC EXWC has increased the capacity and talent of both groups to better address Navy facility energy security needs in the coming years. A unique aspect of NAVFAC EXWC working with NPS is that several personnel at NAVFAC EXWC have benefited from completing certificates, master's degrees, and PhDs with NPS in a variety of relevant fields. For instance, Dr. William Anderson earned his doctorate in systems engineering last year and contributed to the NS Rota project both as a doctoral student and as an employee of NAVFAC EXWC. Many other students including uniformed naval officers and civilian Navy employees participated in the project and have taken their newfound understanding of energy security and microgrids back to their Navy commands.



NPS augmented available skillsets through a unique collaboration with an electrical engineering group at the University of Wisconsin Milwaukee (UWM) headed by Dr. Rob Cuzner who brought to the project his 24 years of industry experience developing power generation and power conversion systems for the Navy's new shipboard power distribution systems. The UWM team, particularly graduate student Mark Vygoder, developed models and simulated parts of Rota's power system to evaluate the performance of candidate distribution architectures and provided recommendations for protection equipment.

Working with NS Rota has been a fruitful partnership where energy managers David Barbosa and Bryan Long have provided a wealth of knowledge on how a Navy facility operates today and where the NPS-led team has conducted targeted analysis of various parts of the NS Rota microgrid to identify areas for further



resilience improvement. The NPS-led team has thoroughly answered NS Rota's need to identify appropriate ESS sizing for their microgrid. This includes detailed analysis of the current power system configuration and valuable recommendations for new protection equipment settings which will help to improve NS Rota's energy security over the next several years. Further, the work has resulted in a variety of tools and procedures that NAVFAC EXWC and individual base energy managers have begun to use to analyze energy security across the Navy's bases globally. Some of the tools are available at **https://microgrid.nsetti.nps.edu**, and further information is available upon request on all of the work that has been performed.

The team was selected for a new NSETTI-funded project starting in FY22 which will enhance Naval Air Station Sigonella's energy security through microgrid design and deployment for critical load support.

LEARN MORE
Other bases that are interested in working with the NPS-led team should contact Dr. Giovanna Oriti at **goriti@nps.edu** or Dr. Douglas L. Van Bossuyt at **douglas.vanbossuyt@nps.edu** for more information.

Enrollment Open for Defense Energy Certificate Program

The Naval Postgraduate School's (NPS) Energy Academic Group is pleased to announce the fifth offering of its Defense Energy Certificate program. This offering (cohort) will begin 28 March 2022. The certificate program is free to all students, but applications must be submitted, transcripts received, and a Participation Agreement signed before NPS can process the application.

FOR MORE INFORMATION OR TO APPLY
Email Kevin Maher at or call 831-656-2691. Detailed instructions are also posted on the EAG website at **nps.edu/web/eag/defense-energy-certificate-program**

NPS Collaboration Keeps NATO Up To Speed in Cyber Security

By MC2 Lenny Weston, NPS Public Affairs Office

The Naval Postgraduate School (NPS) and the North Atlantic Treaty Organization (NATO) initiated a relationship in 2004, with NPS serving as a United States' Partnership for Peace Training and Education Center. Since then, the university has developed a strong connection with the NATO School Oberammergau (NSO), launching the NPS-NSO Cyber Security Program, and later the Cyber Security Professional Program, to address the rising need for cyber awareness within NATO members and partners.

The NPS-NSO partnership goes beyond the Cyber Security Program, and when the partnership initially started it offered different courses in the fields of maritime security, energy security and cybersecurity. The cybersecurity program has been the most sought-after of the courses provided due to its rising need. To date, the program has successfully graduated over 1,200 students who together strengthen the organization.

Deciding who can instruct, as well as deliver, these courses is determined during an annual conference through NATO to identify its members and partners' educational needs and priorities. With NPS being a leader in cyber security and having programs already in place, the choice was obvious for NATO on who will teach these highly-valuable courses.

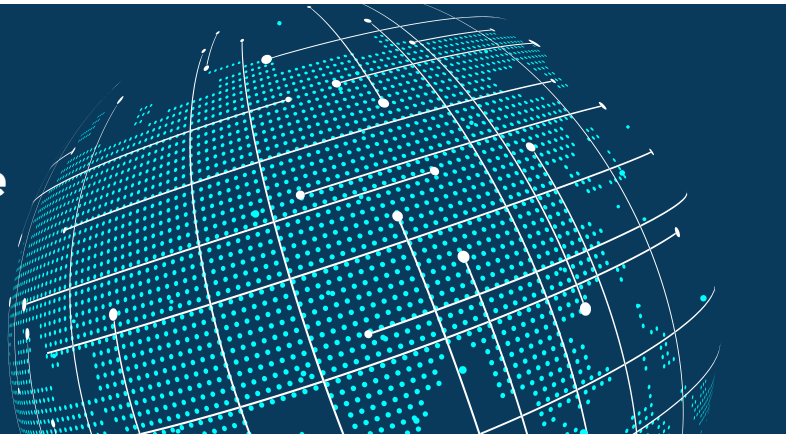
The NPS-NSO relationship began with a conversation between Alan Howard, who now serves as NPS Energy Academic Group (EAG) Associate Chair, and, at the time, NSO's Commandant U.S. Army Col. Mark Baines, who were determining how to align education and training throughout NATO.

READ THE FULL ARTICLE
To read the full article online, go to **nps.edu/-/nps-collaboration-keeps-nato-up-to-speed-in-cyber-security**

OUTREACH

EAG Co-delivers a Regional Energy Security Course with the NATO School Oberammergau

By Tahmina Karimova
Faculty Associates-Research
Energy Academic Group



From 10–14 October 2021, the Naval Postgraduate School's Energy Academic Group (EAG) partnered with the NATO School Oberammergau (NSO) to execute the Critical Energy Infrastructure Protection (CEIP) and Resilience Course for Kuwait and neighboring countries.

Due to continuous COVID-19 pandemic restrictions, the course was executed virtually with an excellent participation turnaround. The course brought together 19 students from various governmental and military organizations representing Kuwait, Bahrain, Oman, and the United Arab Emirates. The course aimed to raise awareness of the criticality of energy's role in national and regional security as well as the fragility and vulnerabilities of critical energy infrastructure through a series of lectures, case studies, and syndicate work. Featured lectures included NATO's role in energy security, global and regional energy developments, maritime dimensions of energy security, operational energy, CEIP and resilience, threats and hazards to infrastructure, climate security, and best practices on improving resilience in the energy domain.

The NPS-NSO partnership initially started back in 2004 and has strengthened over the years to develop tailored curricula on cyber security, maritime security, energy security, and critical energy infrastructure protection and resilience. EAG has been playing an active role in collaboratively designing and expanding course offerings in these critical subject areas to NATO members and partners. Collaboration as such is instrumental in strengthening international partnerships, while concurrently meeting NPS' core mission of naval education, research, and outreach.

LEARN MORE
Email Tahmina Karimova at **ttkarimo@nps.edu**

ENERGY POLICY

It's Time to Be Honest About Fossil Fuels' Role in Energy Transition

By Brenda Shaffer, PhD
Faculty Associate-Research
Energy Academic Group

As soaring fuel inflation turns into a political risk, Biden needs a smarter energy policy fast.

The global energy crisis has hit U.S. shores: Fuel prices are rising, and a global supply shortage of natural gas is driving up the cost of heat and electricity as winter approaches. The Biden administration, worried that rising energy prices could cost votes and kneecap its ability to implement policies, has begged OPEC to pump more oil and Russia to step up gas supplies to Europe. At the same time, the Republicans have no useful energy policy alternative on offer. The United States needs a fundamentally new energy policy that will deliver reliable energy supplies at affordable prices with low impact on the environment and climate.

Any energy policy will have to start by considering several inconvenient but incontrovertible facts.

CONTINUED ONLINE
Read the full article at **https://foreignpolicy.com/2021/11/15/fuel-inflation-oil-gas-energy-transition-climate-change-biden/**

OUTREACH

EAG Executes Two Energy Security and Resilience Events in Baku, Azerbaijan

By Tahmina Karimova and Larry Walzer
Faculty Associates-Research
Energy Academic Group

ADA University campus in Baku, Azerbaijan

The Naval Postgraduate School's (NPS) Energy Academic Group (EAG) successfully executed two events in Baku, Azerbaijan: the Advanced Regional Energy Security Symposium (ARESS) and the Critical Energy Infrastructure Protection (CEIP) Analysis Workshop.

The ARESS was conducted on the ADA University campus in Baku, Azerbaijan 6–10 September 2021. This symposium was carried out in partnership with the NATO Energy Security Center of Excellence (Vilnius, Lithuania) and ADA University (Baku, Azerbaijan). The State Oil Company of the Azerbaijan Republic (SOCAR) and British Petroleum (BP) also supported the symposium with speakers and participants. Several ministries participated and presented on topics related to emergency preparedness, civil defense and resilience, energy security, and industry. The engagement included information exchanges, presentations, panel discussions, and case studies regarding multiple topics related to energy security such as cyber security, critical energy infrastructure protection/resilience, threats to energy infrastructure, and cases studies, and included group breakout sessions and briefings. A notable highlight of the program was a panel discussion between senior representatives including Earle D. Litzenberger, U.S. Ambassador to Azerbaijan, and Dr. Alparslan Bayraktar, Deputy Minister of Energy and Natural Resources of Turkey, who provided a virtual keynote presentation.

The symposium serves as an ongoing collaboration effort led by the NPS EAG and partners. There is a shared desire to expand the program as a future offering and to include greater regional participation from Turkey, Georgia, Kazakhstan, and Turkmenistan.

LEARN MORE

Email Tahmina Karimova at **ttkarimo@nps.edu** or Larry Walzer at **lmwalzer1@nps.edu**

Join the Energy Team

EAG is looking for smart, motivated people to join our team to work on the energy challenges affecting the U.S. military and national security. We are looking for varying levels of experience and education—minimum requirement is a Bachelor's degree. Areas of interest include cyber/energy nexus, supply chain/logistics, critical infrastructure protection/resilience, engineering, policy/geopolitics of energy, environment/climate. Military experience is desired but not required.

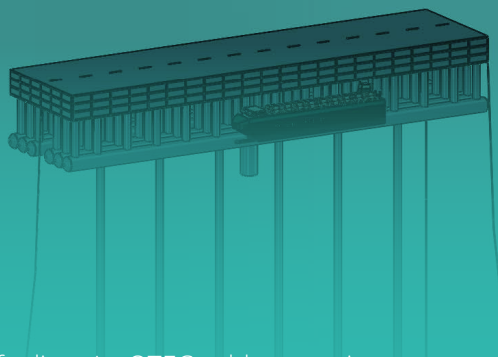
LEARN MORE

Contact Alan Howard **arhoward@nps.edu** to learn more.

INNOVATION

A Vision for Renewable Energy Powered Hydrogen Production on the Seafloor

By Eric Hahn
Faculty Associate-Research
Energy Academic Group



Mr. Ben Wilcox, a Naval Facilities Engineering and Expeditionary Warfare Center engineer, has a vision for an open-source virtual environment for education and planning for a maritime hydrogen fueling station powered by an ocean thermal energy conversion (OTEC) plant ship.

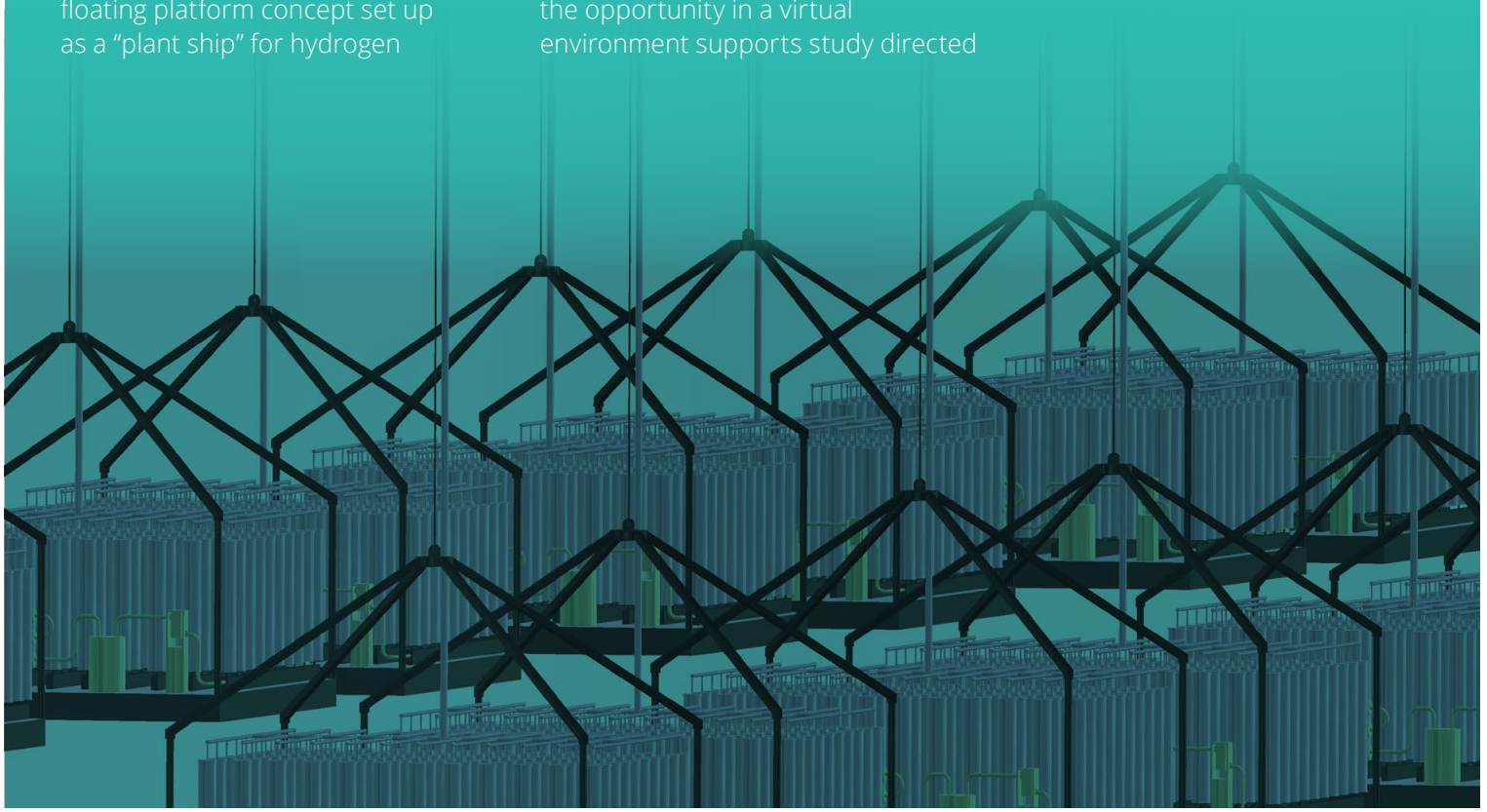
Ben's existing virtual model depicts an envisioned OTEC system of six 100 megawatt plants that power hydrogen electrolysis on the seafloor at 3400m. The plants are integrated into a Mobile Offshore Base floating platform concept set up as a "plant ship" for hydrogen refueling. An OTEC cold water pipe (CWP) extends 1000m below it.

OTEC power is available in equatorial ocean regions between 20° north and 20° south latitudes. 3400m is the average depth in these locales. Given the ambient pressure at this depth, hydrogen can be produced at 350 bar or 5000 psi, which is a standard pressure for larger hydrogen gas cylinders (as for example in fuel cell buses).

An opportunity for innovation exists to pair renewable power with seafloor hydrogen production. This production concept avoids significant hydrogen compression and storage requirements. Exploring the opportunity in a virtual environment supports study directed towards maritime hydrogen fuel production for future ships that have an integrated power system and electrical architecture that can be adapted to fuel cells.

Future Navy ships, adapted to operate on hydrogen that can be produced in ocean locales closer to the tactical edge, will reduce dependence on petroleum fuel lines of communication.

LEARN MORE
Email Eric Hahn at
ehahn1@nps.edu



HYBRID WARFARE AND ENERGY SECURITY

Is Europe's Energy Crisis a Preview of America's?

By Brenda Shaffer, PhD
Faculty Associate-Research
Energy Academic Group

Europe has itself to blame for shortages and spiking prices, but Washington is copying many of its policies.

An energy crisis is affecting almost every part of the globe, marked by record-high energy prices, tight supplies, and power blackouts. Some of the world's richest countries and U.S. states such as California have been struggling to keep their electricity systems stable.

The first energy crisis in decades has come as a shock to many, who seem to have forgotten how energy insecurity reverberates onto every major sphere of public life: the economy, national security, the environment, and public health. As the world's most traded good, energy is involved in everything we buy and consume, so energy prices and shortages significantly impact economic growth. Because energy is the most important input in manufacturing, stable prices and supplies are key to economic competitiveness. Electricity and fuels for heating, cooking, and transport are major items in every household budget, and price increases disproportionally affect the poor. Similarly, government institutions and infrastructure need stable and affordable energy supplies to function, putting public safety and health at risk when electricity supplies aren't steady. Energy security has to be treated like national security, and governments need to ensure it.

The current energy crisis is particularly acute in Europe. Prices for natural gas, coal, and electricity have exploded, leading to protests over household power bills in Spain, 1970s-style gasoline shortages in Britain, and worryingly low supplies of natural gas across much of the continent as a possibly very cold winter is fast approaching.

Europe's example can be especially instructive for other countries. No other place has invested so much money and made such policy efforts to reconstruct its energy markets. Yet nowhere have the failures been as great. How did Europe create its energy crisis, and what are the lessons for others?

CONTINUED ONLINE
Read the full article at **https://foreignpolicy.com/2021/10/05/energy-crisis-europe-electricity-gas-renewable-us/**

HYBRID WARFARE AND ENERGY SECURITY

Combating Terrorism Exchange (CTX) Journal Special Issue

The Naval Postgraduate School's Energy Academic Group and Center for Countering Hybrid Threats are collaborating with the Defense Analysis Department's Global ECCO team to publish a special issue of its journal, *Combating Terrorism Exchange (CTX)*, that will focus on the nexus of energy security, hybrid warfare, and irregular warfare. The team is currently working with diverse subject matter experts to develop and edit content for inclusion in this special issue. Contributions from around the world include: an article on Operational Energy; a case study of Ukraine's energy sector and Russian hybrid and irregular warfare; the status of India's energy sector under threat from terrorism; the Colonial Pipeline ransomware incident; and a discussion of the roles that special forces can play in assisting cyber operations. These are only a few of the topics that will be covered in the special issue, which is expected to appear early in 2022. The next issue of *Surge* will include details about the actual publication.

LEARN MORE
Email Tahmina Karimova at **ttkarimo@nps.edu**

HYBRID WARFARE AND ENERGY SECURITY

EAG Supports NATO Coherent Resilience Tabletop Exercises Ukraine and Lithuania

Larry Walzer
Faculty Associate-Research
Energy Academic Group

From 13–17 September 2021, the Energy Academic Group (EAG) supported the NATO Coherent Resilience 20 (CORE 20) Tabletop Exercise (TTX) on hybrid threats and energy security in the Black Sea Region that was hosted at the Odesa Port Authority in Ukraine. The exercise focused on the Black Sea region to further capabilities of Ukrainian national and local authorities in crisis response and in enhancing resilience in light of hybrid threats to critical infrastructure and energy systems through effective inter-agency coordination, civil-military coordination, planning, preparedness and public-private cooperation. The TTX was sponsored by the NATO HQ and the NATO Energy Security Centre of Excellence. Over 150 participants from 15 countries took part in CORE20.

The EAG also provided the Evaluation Groups for NATO's Coherent Resilience 21 Baltic (CORE 21B) TTX was conducted 20-24 September 2021 in Vilnius, Lithuania that focused on the resiliency of the Baltic States consumers' (civilian and military) electricity supply against hybrid attacks during the planning, integration and synchronization of the electricity infrastructure into Continental Europe's electricity grid. The purpose was to exercise and evaluate the effectiveness of plans, policies, and procedures used to mitigate disruptions in case of unforeseen hybrid attacks or natural disasters. CORE 21B was also sponsored by the NATO Energy Security Centre of Excellence, as well as the European Commission's Joint Research Centre. The TTX had over 100 participants representing 35 organizations from 12 countries.

To establish the two CORE Evaluation Groups, EAG leveraged the Naval Postgraduate School's Center for Combating Hybrid Threats to include faculty and students from cyber security and information warfare programs. The team also developed a support agreement with the Department of Energy's Argonne National Laboratory that enabled electrical grid and critical infrastructure crisis response experts to join the initiative. Further, the Office of Naval Research provided ten Reserve officers to support the exercise evaluation teams. Finally, the Evaluation Group was rounded out with representatives from NATO SHAPE Infrastructure & Engineering Division and JFC Brunssum's JENG Intel Section.

The EAG's continued support to the CORE TTX series further strengthens our NATO alliance and support to partners during the current era of Great Power Competition, where Russia seeks to divide the NATO alliance, disrupt the international order, and expand its own sphere of influence.

There is planning underway to execute a national level CORE TTX in Tbilisi, Georgia, in 2022 as well as a regional CORE TTX in Versailles, France where allies will assess aspects of the Central European Pipeline System.

LEARN MORE
Email Larry Walzer at
lmwalzer1@nps.edu

‹ *EAG Chair, Dr. Daniel Nussbaum, as the NATO Coherent Resilience 21 – Baltics TTX Evaluation Group Director presented during the Distinguished Visitor and exercise "Hot Wash" hosted at the Lithuanian Presidential Palace.*

The Strategic Communications Syndicate discuss exercise inject responses during NATO Coherent Resilience 20 - Black Sea TTX in Odesa, Ukraine. ›

HYBRID WARFARE AND ENERGY SECURITY

Krasno Global Events Series

Energy security, climate change, pipeline diplomacy, cyber security and hybrid warfare are among some of the most important issues of our times. Dr. Dan Nussbaum, Chair of the Energy Academic Group at the Naval Postgraduate School, joined two other outstanding experts to discuss the situation in the November 13 installment of the Krasno Global Events Series: David Dorondo (Western Carolina University) and Margarita Assenova (Jamestown Foundation, Washington, DC). The session was Introduced and moderated by Dr. Klaus Larres, the Richard M. Krasno Distinguished Professor of History & International Affairs at the University of North Carolina-Chapel Hill. To view the video, please visit **https://youtu.be/iK0ToLElRZ8**.

LEARN MORE
For more videos in the Krasno Events Series, please check out: **https://www.youtube.com/user/KrasnoUNC/**

GLOBAL ENERGY WATCH

EAG Co-hosts Panel with the Atlantic Council's Global Energy Center on Europe's Energy Crisis

By Brenda Shaffer, PhD, Faculty Associate-Research, Energy Academic Group

On 26 October 2021 the Energy Academic Group (EAG) co-hosted, with the Atlantic Council's Global Energy Center, a panel on "Europe's Energy Crisis and The Path Forward." The panel discussed the factors that have led to the current energy crisis in Europe, assessed the geopolitical implications of the crisis, and examined if a similar crisis is likely to emerge in the United States. The panel included members of the Naval Postgraduate School's EAG faculty, Dr. Daniel Nussbaum and Dr. Brenda Shaffer. Ambassador Richard L. Morningstar, former U.S. Ambassador to the European Union and to Azerbaijan, chaired the panel. You can see the full presentation on the Atlantic Council's website.

WATCH VIDEO
https://www.atlanticcouncil.org/event/europes-energy-crisis-and-the-path-forward/

Calendar of Events

JAN

24 – 26 January
Energy Security Symposium
Monterey, California

FEB

2 February
Joint Address on Climate, Environment and Energy
Featured Speaker: Dr. J. Marshall Shepherd
Virtual

MAR

14 – 18 March
Operational Level Energy Security Course
Tartu, Estonia
Visit the Baltic Defence College - Operational Level Energy Security Course website to learn more **baltdefcol.org**

APR

14 – 18 March
Coherent Resilience 22 – Georgia TTX
Tbilisi, Georgia

Upcoming

Spring 2022 Defense Energy Seminar Series

EAG is pleased to have resumed in-person presentations for its Defense Energy Seminar lecture series. Watch for upcoming dates and full event details as they become available on the EAG website at **https://nps.edu/web/eag/seminars**

ENERGY ACADEMIC GROUP
NAVAL POSTGRADUATE SCHOOL

Connect with the Energy Academic Group

The Energy Academic Group is located in Room 101A, Spanagel Hall on the NPS campus in Monterey, California. A wide range of NPS faculty are affiliated with the energy program, actively participate in energy graduate education, energy executive education, and energy research. For questions, please contact one of the principal EAG faculty members:

CHAIR
Dr. Daniel Nussbaum
danussba@nps.edu
M: 831-324-3228

ASSOCIATE CHAIR
Alan Howard
arhoward@nps.edu

FACULTY
Kristen Fletcher
kristen.fletcher@nps.edu
831-920-1090

LCDR USN (Ret) Eric Hahn
ehahn1@nps.edu

Tahmina Karimova
ttkarimo@nps.edu

Brandon Naylor
blnaylor@nps.edu
831-656-1986
M: 317-755-7987

CDR USN (Ret) Kevin Maher
kjmaher@nps.edu
831-656-2691

Dr. Brenda Shaffer
eag_poc@nps.edu

LtCol USMC (Ret) Lawrence Walzer
lmwalzer1@nps.edu
831-656-3777
M: 831-200-6047

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If you would like to contribute an article or have your research/work published in the *Surge* newsletter, please contact Lois Hazard via email at lkhazard@nps.edu.

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Lois Hazard
Editor-In-Chief

Frank Chezem
Art Direction and Graphic Design

EAG WEBSITE
nps.edu/energy

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