



Pacific Northwest
NATIONAL LABORATORY

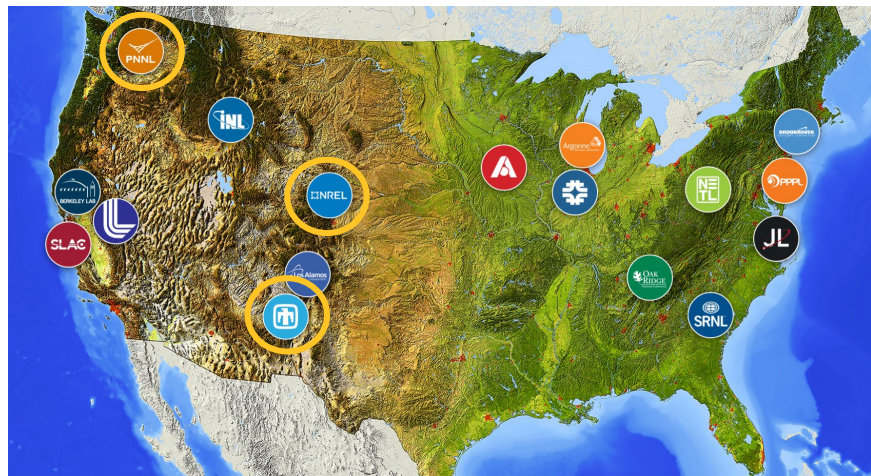


Marine Energy Career Panel

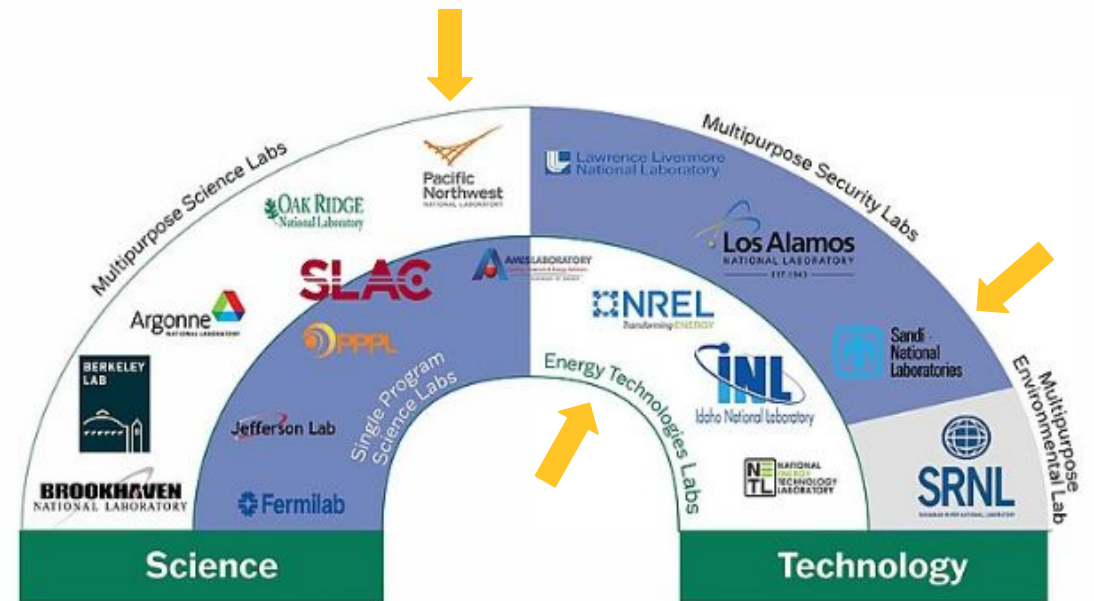
February 7, 2024

Overview of National Laboratories

- The US Department of Energy's (DOE) 17 national laboratories tackle critical scientific challenges
- **Goal:** conduct R&D addressing national priorities such as energy and climate, the environment, etc.



DOE EXECUTES ITS MISSIONS THROUGH DIVERSE NATIONAL LABS



Pacific Northwest National Laboratory (PNNL)



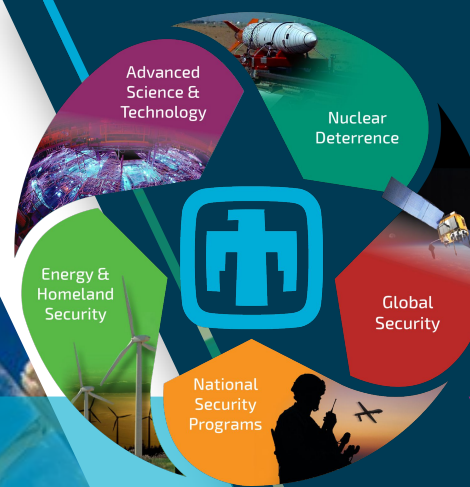
PNNL - ~6,000 researchers and support staff, based in WA

Coastal Sciences Division - conducts research related to coastal science, including marine energy

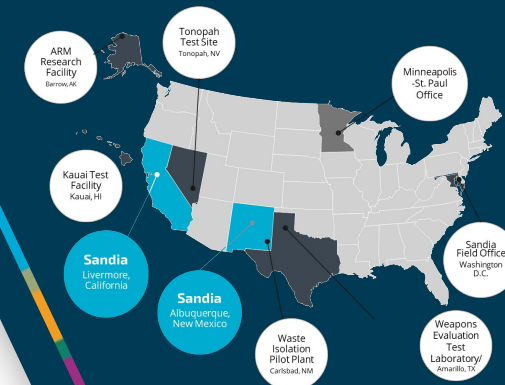
- PNNL-Sequim - DOE's only marine research laboratory
 - *Mission:* promote adaptation to climate change and enable sustainable marine energy production
- OES-Environmental and Triton projects - focus on environmental effects of marine energy



Sandia National Laboratories



Exceptional service in the national interest





NREL Water Power

Driving innovation in the design and use of next-generation **marine energy** and **hydropower/pumped storage** systems through foundational research, tool development, and laboratory and in-water optimization.

Photo by Joe DelNero, NREL, 70307

What's Next

- Improving performance, reliability, and cost-effectiveness of wave, tidal, ocean, and river energy systems
- Identifying energy and non-energy opportunities of hydropower and pumped-storage energy systems

Successes

- Deployed NREL-designed, marine-powered desalination research platform, HERO WEC, in real ocean waters
- Published “An Examination of the Hydropower Licensing and Federal Authorization Process” report, which is helping decision-makers streamline the hydropower regulatory process without cutting environmental protection

NREL at a Glance:

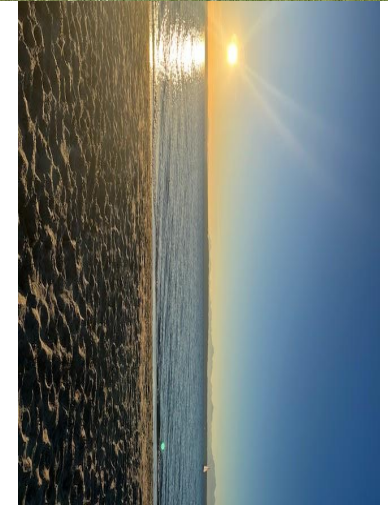
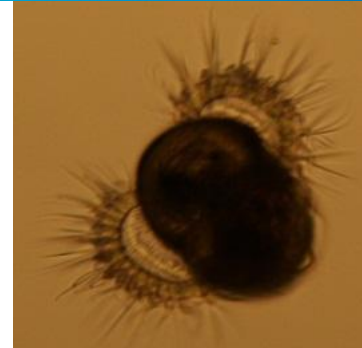
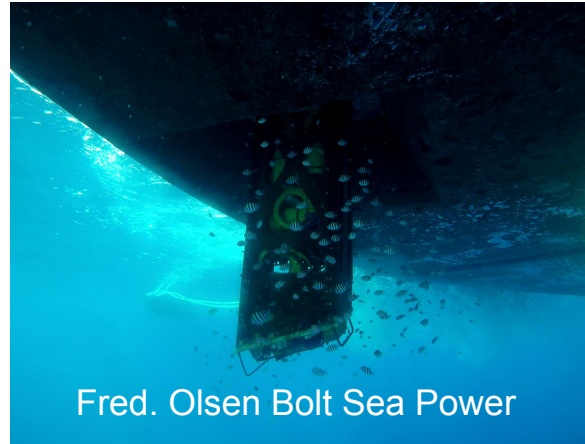
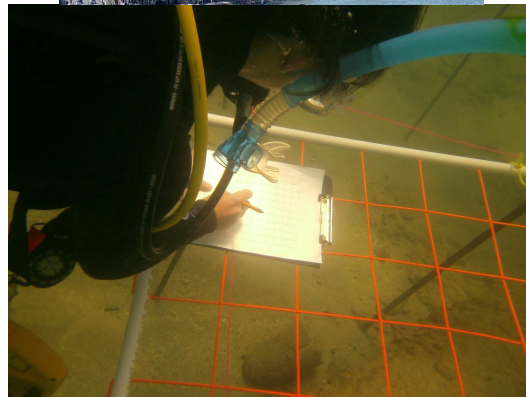
- 3,675 workforce, including
- World-class research expertise in:
 - Renewable Energy
 - Sustainable Transportation & Fuels
 - Buildings and Industry
 - Energy Systems Integration
- Partnerships with:
 - Industry
 - Academia
 - Government
- 4 Campuses operate as living laboratories

Panel Introductions



Images courtesy of Orbital, CalWave, and PNNL

Lysel Garavelli – Research Scientist, PNNL



Education

- 2008: BS Marine Environment – University Aix-Marseille II, France
- 2010: MS Oceanography – University Aix-Marseille II
- 2013: PhD Biological Oceanography – University Paris VI, France

Career

- 2014-2017: Postdoctoral Research Associate at Florida Atlantic University
- Joined PNNL in 2017 as Postdoctoral Research Associate
- Coastal Sciences Division

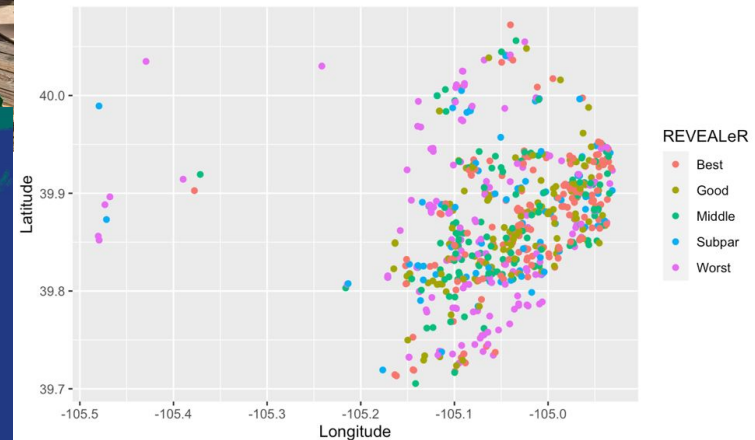
Focus

- Environmental effects of marine energy (OES-Environmental)
- Co-location aquaculture and marine energy
- Interactions offshore wind and fisheries
- Larval dispersal modeling

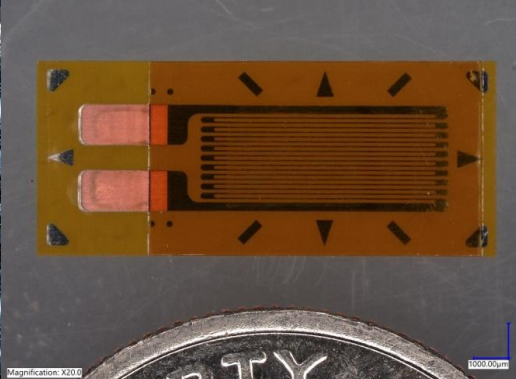
Andrew Simms – Researcher – Data Science, NREL



Classes of Residences Recommended by REVEALeR
Deal/CPSF Heavy (2.0, 0.5, 0.0, 0.5, 1.0)
Denver Metro Area Residences



Data Source: Zillow.com, 10/10/2022



Education

- 2005 - 2010: B.S Business Administration – University of Colorado Boulder
- 2021 - Present: M.S Data Science – University of Colorado Boulder

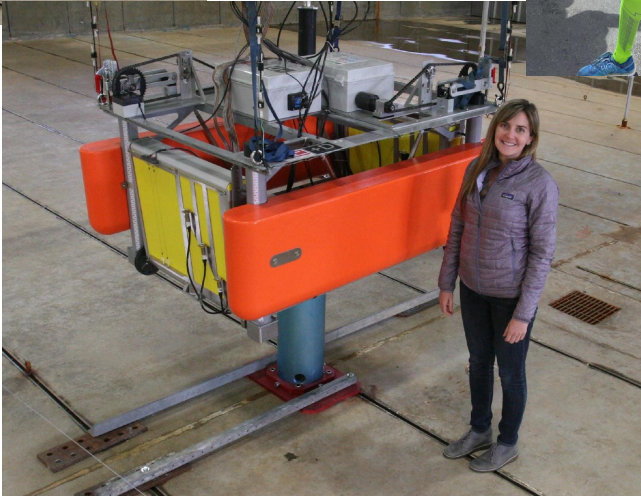
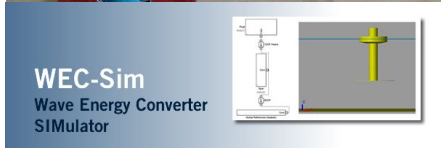
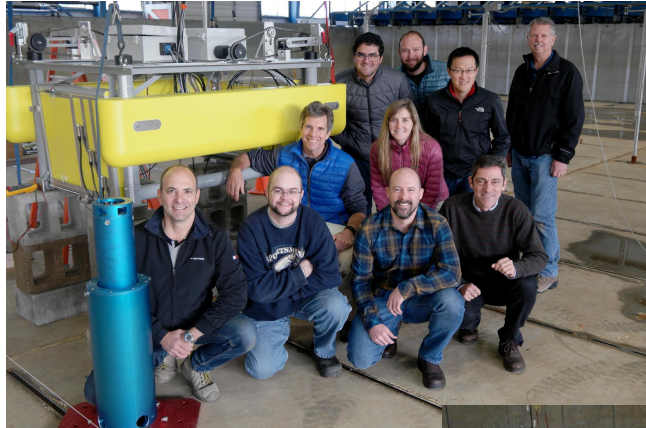
Career

- Web Developer, App Developer
- Joined NREL in 2019 as Research Technician in Wind Energy
- Water Power Technology Validation – Data Science for marine energy

Focus

- MHKiT-MATLAB, MHKiT Python
- Cloud Computing
- Machine Learning
- Time Series Analysis

Kelley Ruehl – R&D Mechanical Engineer, Sandia



Education

- 2009: BS Mechanical Engineering, minor German – Rose-Hulman Institute of Technology
- 2011: MS Mechanical Engineering, minor Ocean Engineering – Oregon State University



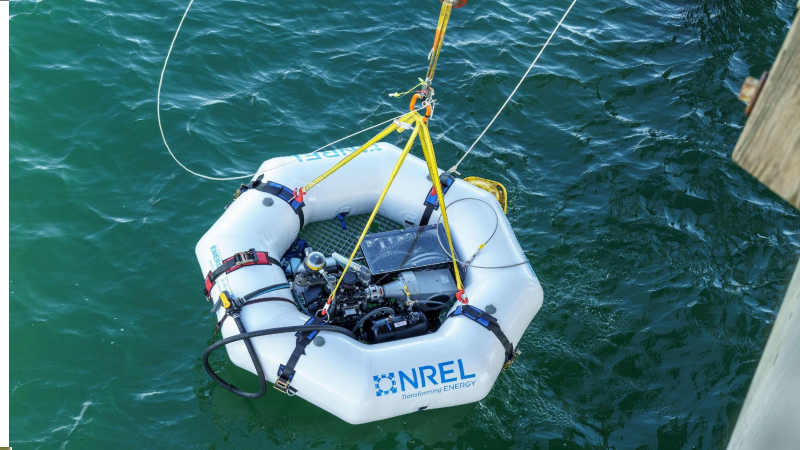
Career

- Joined Sandia in 2011 as Member of Technical Staff, currently Principal Member of Technical Staff
- Sandia's Climate Center

Focus

- Numerical modeling and analysis
- Open source software development
- Design and testing of marine energy converters
- Desalination for remote coastal communities
- Co-located wind and wave farms and hybrid systems

Justin Panzarella – Mechanical Engineering Intern, NREL



Education

- 2024: M.S. Mechanical Engineering – Colorado School of Mines
- 2021: B.S. Mechanical Engineering – Grove City College

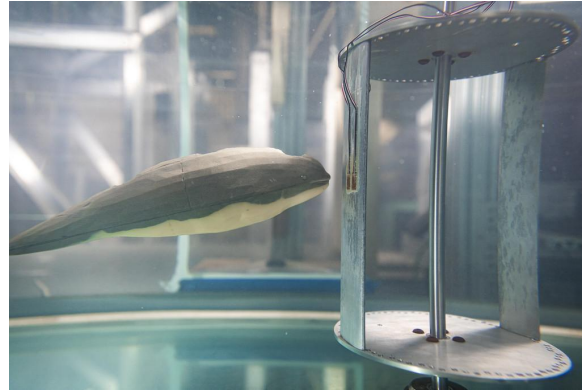
Career

- Previous engineering internships:
 - A&P Hydraulics
 - Nevada Automotive Test Center
- Joined NREL in 2023 as a Mechanical Engineering Intern
- Water Power Technology Validation Group

Focus

- WEC design
- Lab testing of HERO WEC
- Data processing and analysis

Molly Grear – Research Engineer, PNNL



Education

- 2018: PhD in Civil Engineering – University of Washington
- 2016: Masters in Civil Engineering – University of Washington
- 2011: Bachelors in Environmental Engineering – Dartmouth College

Career

- 2019: Ocean Policy Specialist at the National Science Foundation
- 2018: Adjunct Professor at Seattle University
- Joined PNNL in 2012 as Post Bachelors Research Associate, then left in 2014 to pursue grad school and other opportunities, but eventually decided to come back!

Focus

- Coastal community energy transitions
- Marine energy for small scale applications, like aquaculture and ocean observing
- Community assessment of marine energy feasibility
- Risk of marine mammal collision with tidal turbines

Panel Discussion



Images courtesy of Andritz, CorPower, and PNNL

Get involved! The U.S. Department of Energy's Water Power Technologies Office (WPTO) is investing in the next generation of hydropower and marine energy experts. WPTO provides a variety of educational resources and programs to help develop the water power workforce needed to make the clean energy future a reality.

WPTO Collegiate Competitions

- Year-long competitions running the academic calendar (autumn-spring) with applications due the previous spring.
- Competitors meet and learn from experts and gain real-world experience to prepare for future careers in marine energy or hydropower.
- Open to undergraduate and graduate students.

ORISE Marine Energy Graduate Student Research Program

- Open to doctoral candidates and master's students.
- Minimum six-month placement with an eligible host facility.

Sea Grant Knauss Fellowship

- Open to graduate students with an interest in marine science.
- Year-long placement in Washington, D.C.

AAAS Science and Technology Policy Fellowship

- Open to post-docs as well as experienced professionals with a master's in engineering.
- Year-long placement in Washington, D.C.

Yearly Student Opportunities with WPTO

FALL

September: Applications open for the ORISE Marine Energy Graduate Student Research Program.

Fall: Applications open for the Sea Grant Knauss Fellowship.

SUMMER

June: Applications open for the AAAS Science and Technology Policy Fellowship.

Summer: Finalists notified for the Sea Grant Knauss Fellowship.



WINTER

December: Applications close for the ORISE Marine Energy Graduate Student Research Program.

February: Applications due to State Sea Grant Programs for the Sea Grant Knauss Fellowship.

SPRING

March: Applications open for the Marine Energy and Hydropower Collegiate Competitions.

April: Applications close for the Collegiate Competitions.

Spring: Applications close for the Sea Grant Knauss Fellowship.

DOE Office of Science Internship / Exchange Opportunities

Science Undergraduate Laboratory Internships (SULI)

- Encourages undergraduate students and recent graduates (up to 2 years after completing undergraduate)
- Interns can apply to work at one of the 17 participating DOE laboratories/facilities - suggest reaching out to labs
- Interns perform research, under guidance of laboratory staff on projects supporting DOE missions

Approximate Start Dates

Fall term: Third Monday in August for 16 weeks

Spring term: Third Monday in January, for 16 weeks

Summer term: First Monday in June, for 10 weeks

Informational Links:

- <https://science.osti.gov/wdts/suli>
- <https://www.nrel.gov/careers/suli.html>
- <https://www.pnnl.gov/suli-internships>



DOE Office of Science Visiting Faculty Program (VFP)

- Faculty members collaborate with DOE laboratory research staff on a project of mutual interest
- Solicited annually for a Summer Term (10 weeks)
- For more information: <https://science.osti.gov/wdts/vfp>

Additional Graduate Student Opportunities

The Office of Science Graduate Student Research (SCGSR) Program

For more information:

<https://science.osti.gov/wdts/scgsr>

National Consortium for Graduate Degrees for Minorities in Engineering, Science, Inc. (GEM)

- Network of leading corporations, laboratories, universities, and top research institutions
- Enables qualified students from underrepresented communities to pursue graduate education in applied science and engineering

For more information:

<https://www.gemfellowship.org/>

NREL Director's Postdoctoral Fellowship Applications accepted for two rounds per year.

<https://www.nrel.gov/careers/directors-fellowship.html>

PNNL's Postdoctoral Fellowship

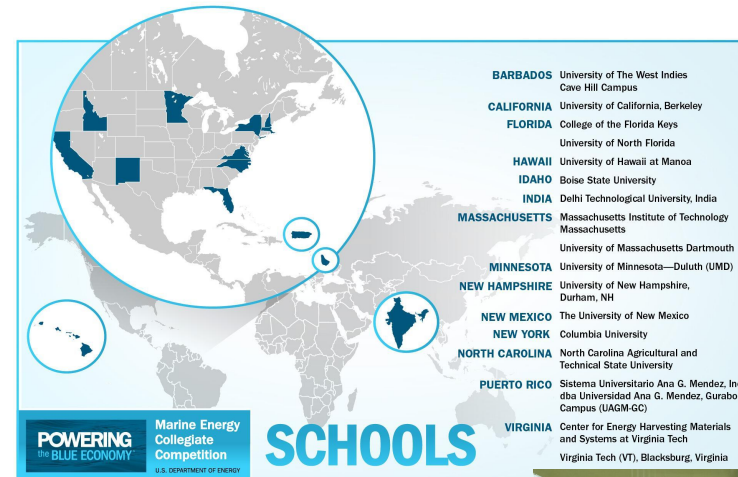
<https://www.pnnl.gov/projects/linus-pauling-distinguished-postdoctoral-fellowship>

Sandia's Postdoctoral Fellowships

<https://www.sandia.gov/working-with-sandia/academic-partnerships/postdoctoral-research-and-fellowship-programs/>

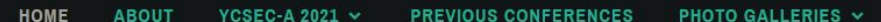
Marine Energy Collegiate Competition (MECC)

- Established in 2020
- Teams of students:
 - **Develop** business plan and detailed technical design of a system to address power needs for the blue economy
 - **Build and test** a device to achieve energy production
 - **Pitch** their plan to a panel of judges and hypothetical investors
 - **Engage** with their community through outreach and educational activities
- Applications for the 2025 MECC will open in March: <https://www.herox.com/marine-energy-collegiate-competition>



Marine Energy Professional Organizations

Students interested in a career in marine energy: consider joining a young professional societies such as INORE, SNAME, POES, and YCSECA.



Stay Connected

Thank you for joining!

If you'd like to stay connected and learn more about the careers and research discussed today, check out the following links:

- **OES-Environmental:** tethys.pnnl.gov/about-oes-environmental
 - Sign up for Tethys Blasts: tethys.pnnl.gov/tethys-blasts
 - Sign up for PRIMRE Blasts: <https://tethys-engineering.pnnl.gov/primre-blasts>
- **PRIMRE STEM Portal:** <https://openei.org/wiki/PRIMRE/STEM>
- **Triton:** pnnl.gov/projects/triton
 - Sign up for the Triton newsletter: bit.ly/Triton-Newsletter
- **Stay up-to-date on marine energy at:**
 - **NREL:** nrel.gov/water/marine-energy
 - **PNNL:** <https://www.pnnl.gov/marine-energy>
 - **Sandia:** <https://energy.sandia.gov/programs/renewable-energy/water-power/>