

Caitlyn E. Clark

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Ambitious, results-oriented leader passionate about advancing renewable energy and grid modernization through education and research. Demonstrated ability in forming research programs and leading large, multi-institutional and transdisciplinary projects and teams. Motivated by building cross-organizational, lasting, national, and global networks. Strategic, highly motivated, detail-oriented, and decisive about empowering team members for maximum individual and team growth and success.

Professional Experience

National Renewable Energy Laboratory, Golden, CO – January 2020 - Present

- Senior Researcher
 - Founding member of the Hybrids Institute (coming 2023) and Hybrid Energy Systems Research Group
 - Development Lead, Hybrid Operations and Maintenance Platform (HOMP), Seed Lab Directed R&D (\$175k, 7 staff), now a programmatic effort (\$300k/year, 5 staff); model effect of plant design and operation on degradation and performance
 - Coordinate with developers, OEMs, and operators to understand and solve design and operational challenges of hybrid energy systems, and business cases for large-scale energy, heat, and green H₂ systems for industrial decarbonization
 - Recruit and mentor team members, interns, and visiting researchers/faculty (NREL Exceptional Mentor Award 2020)
 - Main contributor to national analysis and futures study for on- and offshore H₂ production by hybrid energy systems
 - Main contributor to H₂OPP, leading to \$1 million in programmatic funding to develop a national strategy for green H₂
 - Lead PI of the Microgrids, Infrastructure Resilience, and Advanced Controls Launchpad (MIRACL) (\$8 mil, 4 years, 4 labs)
 - Thrust Lead, Transformational Lab Directed R&D project on Human Dimensions of Energy Systems (\$3.6 mil, 3 years, 7 staff)
 - Technical Lead, Energy Clusters Offshore Lab Directed R&D project, optimal design of offshore wind plants for industrial loads (i.e., desalination, H₂ production, and data center operation).
 - Lead major auto manufacturer and fuel stop entity partnership to analyze V2G capabilities for heavy-duty fleet conversion
 - Lead and convene the Offshore Wind Workforce Network, co-author of the Offshore Wind Workforce Roadmap
 - Contributor to Alaska's Renewable Portfolio Standard in 2022
 - Key contributor to 4 software, granted software records: HOPP, RBLO (participated in Department of Energy's I-Corps technology commercialization program), HOMP, and Human Behavior in Autonomous Energy Systems
 - Member of IEA Wind Task Groups 37 - Systems Engineering, 41 – Distributed Wind, 43 - Digitalization, and 50 – Hybrid Plants.
- Postdoctoral Researcher: Postdoctoral Researcher of the Quarter (2020)

Technical Committee Expert Member, International Electrotechnical Commission (January 2020 – Present)

- Expert on standards development committee for resource assessment and uncertainty quantification for wave energy converters, special team for design load case definition; represent committees in the Advisory Group
- Founding member of the Young and Emerging Professionals Committee under the US National Committee, special committee leader for DEI and Mentorship Programs

Director, International Network on Offshore Renewable Energy (July 2015– August 2020)

- Lead an international non-profit (UK-registered Charity) to support, empower, and advocate for early-career professionals in offshore renewable energy (1400+ global members and alumni network)
- Defined strategy that aligns with our organizational mission, involved in legal and financial proceedings
- Organized and hosted networking, professional, and technical training events (on every continent); ran scholarship program
- Coordinated with professional organizations and governments; advocate or group interests at workshops, conferences, etc.
- Participated as an advisory representative in EU educational programs (Step4Wind, ENCORE)

Fulbright Scholar, Civil Engineering, Aalborg University, Aalborg, Denmark (September 2017 - July 2018)

- Designed and collaborated on multiple research projects on risk and reliability of offshore renewable energy systems
- Developed open-source Matlab and Python code with high-fidelity simulation software
- Trained and networked with world class experts in reliability and risk analysis and modeling in structural systems (Numerical and Experimental Modeling and Control of Wave Energy Converters; Joint Committee on Structural Safety guidelines; Generation and Analysis of Waves in Physical Models; Advanced Systems Risk Modeling and Analysis in Engineering Decision Makings)

Graduate Researcher, National Science Foundation National Research Traineeship in Risk and Uncertainty in the Marine Sciences (June 2016 - August 2017)

- Worked in a transdisciplinary team to explore the feasibility of deployable wave energy devices for emergency relief
 - Developed a machine-learning method to predict storm-related transmission outages in Oregon's coastal counties
 - Developed a novel cost model for the cost of investment and deployment of the wave energy devices
- Completed curriculum in transdisciplinary collaboration: effective communication, group facilitation, stakeholder engagement, project organization and management

Environmental Engineering Intern, Anchor QEA, LLC, Tigard, Oregon (February - September 2015)

- Technical experience supporting projects in water resources, dredging and capping, DTS cable applications and data acquisition, wetland restoration design, groundwater monitoring, and environmental forensics
- Worked with dynamic, heavily regulated conditions with extensive stakeholder engagement efforts; gained exposure to communication, regulation, and permitting in Superfund sites, industrial areas, as well as urban, residential, and rural sites with diverse stakeholder interests and constraints

Education

Oregon State University

Ph.D., Mechanical Engineering (2015 - 2019)

- Graduate Researcher at the National Renewable Energy Laboratory, Boulder, Colorado (Aug 2018-Dec 2019)
- Fulbright Scholar at Aalborg University, Aalborg, Denmark (Sep 2017-July 2018)
- National Science Foundation Risk and Uncertainty in the Marine Sciences Research Trainee (Sept 2016- Dec 2019)
- **Graduate Certificate in College and University Teaching** (June 2019)
- Thesis: "Risk- and Reliability-Based Design Optimization in Offshore Renewable Energy Systems," 2019.
- **Initiative for Strategic Excellence Award: designed and taught curriculum for a new course (ME 499: Risk and Reliability)**

M.S., Mechanical Engineering (2015 - 2017)

- AVANGRID Graduate Fellow (2016-2017), School of Mechanical, Industrial, and Manufacturing Engineering Fellow (2015-2016)
- Thesis: "Offshore Renewable Energy: An Exploration of Techno-Economic Feasibility and Reliability through a Computational Optimization Perspective," 2017.

B.S., Ecological Engineering (2010 - 2014)

- Merit scholarships: University President's (2010-2014), College of Engineering Dean's (2010-2012), and Honors Experience (2012)
- NSF Research Experience for Students, Oregon Institute for Marine Biology/University College Cork, Cork, Ireland (2012)
- Research Experience for Undergraduates, Newport, OR (2011); Student Exchange Award, Townsville, AU (2013)
- Honors Thesis: "Baseline Characterization of the Oregon State University Ocean Sentinel Site: Characteristics of five flatfish species on the central Oregon coast," 2014.

Languages: English (5-fluent), French (2), Danish (1-beginner)

Selected Publications

A full list of articles can be found at <https://scholar.google.com/citations?hl=en&user=gQWLFdkAAAAJ>

1. "U.S. Offshore Wind Workforce Assessment," Stefek, Constant, Christol, Tinnesand, Clark, NREL Technical Report, 2022.
2. "Hybrid Distributed Wind and Battery Energy Storage Systems," Reilly, Poudel, Krishnan, Anderson, Rane, Baring-Gould, Clark. NREL Technical Report, 2022.
3. Clark, C. A. & Clark, C. E. Employing Bayesian Quadrature to Improve Fitting of Surrogate Models to Wind Turbine Loads. J. Phys. Conf. Ser. 2265, 042045 (2022).
4. "Wind and Solar Hybrid Power Plants for Energy Resilience," Clark, Barker, King, Reilly. NREL Technical Report, 2022.
5. Clark, DuPont. Reliability-Based Design Optimization in Offshore Renewable Energy Systems. Renewable & Sustainable Energy Reviews, 2021.
6. Clark, Barter, Shaler, DuPont. Reliability-based Layout Optimization in Wind Energy Systems. Wind Energy, 2022.
7. Garcia-Teruel, Clark. Reliability-Based Hull Geometry Optimisation of a Point-Absorber Wave Energy Converter with Power Take-Off Structural Reliability Objectives. IET Renewable Power Generation, 2021.
8. Clark, Miller, DuPont. An Analytical Cost Model for Co-Located Floating Wind-Wave Energy Arrays. Renewable Energy, 2018.
9. Clark, Velarde, Sønderkær Nielsen. Fatigue Load Reductions in Co-Located Wind-Wave Arrays. International Offshore Wind Technology Conference, Nov. 4-7, 2018.
10. Clark, Moura Paredes. Effects of Co-Located Wind-Wave Systems on Fatigue of Floating Offshore Wind Turbine Mooring Cables. International Offshore Wind Technology Conference, Nov. 4-7, 2018.

11. Clark, DuPont. Comparing Machine Learning Regression Techniques for Transmission-Related Storm Outages. International Design Engineering Technical Conferences, Accepted, Aug. 26-29, 2018.
12. Sharp, Clark, Miller, Ferrero, Bentivoglio, Ebrahimi, DuPont. "Characterizing the Use of Heuristic Optimization Methods for Renewable Energy Systems Design." 2018 AIAA Information Systems-AIAA Infotech@ Aerospace. Jan 8-12, 2018. Kissamee, FL.
13. Clark, Miller, DuPont. "Analytical Cost Modeling for Co-Located Wind- Wave Energy Arrays." Proceedings of the 12th European Wave and Tidal Energy Conference. Aug 27 - Sept 1, 2017. Cork, Ireland.

Pending

14. TC114, MT101: Wave Energy Resource Assessment and Characterization Design Technical Standard. *Accepted*.
15. Clark, Barker, Bay, Bhaskar, Brunik, Grant, King, Roberts, Stanley. Opportunities for Hydrogen Production with Land-based Wind in the U.S. *Submitted to Energy Conversion and Management*.
16. Koritarov, V, Meadows, R, Kwon, J, Heimiller, D, Balducci, P, Clark, C, Stout, S, Desai, J, DeGeorge, E, Ingram, M, Esterly, S, Stark, G, Rosenlieb, E. *The Prospects for Pumped Storage Hydropower in Alaska*. Argonne Nat. Lab. Technical Report. Submitted.
17. "Modeling Human Behavior in Autonomous Energy Systems for Enhanced Resilience and Control," Clark, Vaidhyanathan, King, Romero-Lanko, Bernstein. *In Preparation*.
18. Clark, Barker, Sheng. Hybrid Energy System Degradation, Reliability, and Maintenance: A Review. *In Preparation*.
19. Clark, C, Guo, Y, Sheng, S. *Effects of Bearing Clearance, Oil Viscosity, and Oil Temperature on Bearing Axial Cracking in Wind Turbine Gearboxes*. *In Preparation*.
20. Grant, E, Clark, C, "A Monte Carlo Framework for Resilient-Optimal Hybrid Power Plants," *In Preparation*.
21. Barker, A, Bay, C, Bhaskar, P, Brunik, K, Clark, Duffy, P, C, King, J, Kotarbinski, M, Riccobono, N, Starke, G, "Opportunities for Green Hydrogen Production with Offshore Wind in the U.S." *In Preparation*.
22. Clark, C, Rodrigues, R, Riva, R, Barter, G, Dykes, K. "Load Surrogate Modeling in Wind Energy Applications," *In Preparation*.
23. Rodrigues, R, Feng, J, Clark, C, Thomas, J. "A systematic review of wind farm design optimization: state of the art and future perspectives." *In Preparation*.
24. Koleva, M, Clark, C, Thomas, J, Kotarbinski, M, Hagerman, G, Constant, C, "Offshore Energy Clusters: A Roadmap," *In Preparation*.