

**EXH. JBK-2  
DOCKETS UE-220066/UG-220067  
2022 PSE GENERAL RATE CASE  
WITNESS: JOSH B. KEELING**

**BEFORE THE  
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**WASHINGTON UTILITIES AND  
TRANSPORTATION COMMISSION,**

**Complainant,**

**v.**

**PUGET SOUND ENERGY,**

**Respondent.**

**Docket UE-220066  
Docket UG-220067**

**FIRST EXHIBIT (PROFESSIONAL QUALIFICATIONS) TO  
THE PREFILED RESPONSE TESTIMONY OF**

**JOSH B. KEELING**

**ON BEHALF OF NW ENERGY COALITION, FRONT AND CENTERED, AND  
SIERRA CLUB**

**JULY 14, 2022**

# Josh Keeling



## Director

### Professional Experience

- Director at Cadeo Group (2020 – present)
- Senior Product Manager, LO3 Energy (2019 – 2020)
- Manager, Distribution Resource Planning/Customer Energy Solutions, Portland General Electric (2014 – 2019)
- Associate, Cadmus Group (2009 – 2014)

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### Education

B.S., Economics  
Portland State University

M.S., Systems Science  
Portland State University

Ph.D., ABD Systems Science  
Portland State University

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### Bio

Josh Keeling brings over a decade of experience in planning, developing, and deploying distributed energy resources to his role as a Director at Cadeo. He has a deep understanding of distribution system planning, regulatory strategy, product development, DER integration, electrification, and non-wires alternatives. Prior to joining Cadeo, Josh was Senior Product Manager at LO3 Energy, where he designed transactive energy solutions. While at Portland General Electric, Josh held leadership roles in distribution resource planning and customer energy solutions, deploying a suite of demand response, pricing, transportation, and resilience programs. Josh is a voting member of the Regional Technical Forum, faculty for the Rocky Mountain Institute's eLab Accelerator program, a board member of Grid Forward, and has been recognized multiple times by the Peak Load Management Alliance for programs developed in dynamic rates and virtual power plants.

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### Recent Project Experience

#### Distributed Energy Resource and Flexible Loads Potential Study

##### Portland General Electric

Cadeo, the prime contractor for a team including Brattle Group, Lighthouse Consulting and Ethan Goldman, is quantifying the amount of technical, economic, and achievable potential for over thirty DER technologies and programmatic measures that include solar PV, energy storage, smart thermostat demand response, large C&I curtailment, electric vehicle charging, and building electrification. Cadeo has developed a model that quantifies the potentials associated with each measure and that produces hourly supply curve for use in PGE's integrated resource plan (IRP). To support this model, Cadeo is conducting an extensive measure characterization to determine demand savings, measure costs, measure benefits, and hourly load impacts.

Cadeo is developing an open codebase that will be transferred to PGE at the end of the project. Throughout, we are integrating and configuring the national labs' suite of tools including EnergyPlus, REOpt Lite, EVI-Pro Lite, DGEN, Cambium, and the Electrification Futures Study database.

The modeling conducted for PGE is a critical component of their distribution system planning work and will serve to inform bottom-up forecasting, scoping of non-wires alternatives, and hosting capacity analysis. All analysis is being conducted at the site level and calibrated against substation and system forecasts of load. The final product for PGE will allow the utility and its

stakeholders to explore varying scenarios and how they propagate overtime at each level of the distribution system.

**US Open Networks Initiative  
Energy System Integration  
Group**

In response to FERC Order 2222, ESIG has engaged Cadeo staff as a part of a consortium of consultants supporting their DER Task Force to provide context on the state of DER integration in the US, open networks work in the UK and Australia, and develop a roadmap for a US open networks initiative. Cadeo is providing context on the state of the market for aggregators, utility administrators, controls systems, solutions providers, and regulation that support the aggregation of mixed-asset DERs into the wholesale market. We are providing context to ESIG and collaborating with EPRI to ensure that we can provide recommendations that can have the greatest impact for the highest value use cases across the broadest range of regulatory/market contexts.

**Regulatory Sandbox  
Framework**

Josh is working with Strategen to help PURA develop a regulatory framework and evaluation process for innovative pilot proposals from stakeholders as a part of their grid modernization docket. Josh is leading the development of product lifecycle stage-gating, metrics for assessing pilot success, and roadmap for integrating new technologies and business models.

**CT Public Utilities Regulatory  
Authority**

**Alberta Distribution System  
Inquiry**

As a part of the Alberta Utilities Commission Distribution System Inquiry, Josh provided a report and responded to Commission information requests for Pembina on best practices in distribution system planning, non-wires alternatives, dynamic rates, AMI deployment, third party engagement, DER integration, and utility business model innovation.

**Pembina Institute for  
Appropriate Development**

**Non-Wires Alternatives  
Evaluation**

As a subcontractor to Nexant, Cadeo has been selected to be the master evaluation contractor for BC Hydro's DER portfolio. Cadeo serves as the technical lead for non-wires alternatives, providing oversight of quantification of grid impacts of targeted aggregations of DERs to defer transmission and distribution investments.

**BC Hydro**

Cadeo is currently evaluating a C&I peak time rebate pilot to defer upgrading a highly loaded substation transformer. The team is conducting impact and process review of the program, benchmarking against substation loadings, and analyzing the program's leveled cost of capacity. This analysis is examining impacts under a variety of conditions to understand the likely long-term reductions in substation loading for different customer segments and seasons.

Cadeo is also conducting an engineering and economic analysis of solar + storage, automated demand response, thermal storage, and production efficiency measures for each eligible site to size and cost alternatives on the substation. These estimates are being used to develop business cases and designs for subsequent phases of the demonstration.

**Electrification Technology  
Roadmap**

Cadeo led the development of an Electrification Technology Roadmap for the City of Seattle's Lighting Design Lab (LDL). LDL has historically provided technical outreach, design assistance, and education on commercial lighting efficiency and controls to market actors in the Northwest. As the nonresidential lighting market transforms and Seattle shifts its focus to electrification, LDL is looking to understand where best to focus its efforts. They engaged Cadeo to help them understand the market context for building and transportation electrification technologies, how they map to current market actors, how well each technology

**Seattle City Light**

aligns to LDL's strengths, and what stakeholders are involved in the value chain. Cadeo synthesized and recommended technology areas that the Lighting Design Lab can consider supporting programming in future years, supporting city and regional goals while encouraging a transition to clean electrification technologies. Focus areas included commercial HVAC and water heating and multifamily EV charging with recommended strategies for support that included workforce development, general customer education, installer training, and broad stakeholder engagement.

**Residential DERMS  
Competitive Assessment**  
Venture Capital Firm

To support due diligence, Cadeo provided a market assessment of residential distributed energy resource management system (DERMS) providers. This assessment included a detailed segmentation and scoring of capabilities over dozens of vendors as well, assessment of utility purchasing criteria, and value propositions for each provider segment and utility segment combination.

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**Roles and Positions**

**Senior Product Manager**  
LO3 Energy

At LO3 Energy, Josh was responsible for product roadmap and development of offers related to transactive energy, customer engagement, flexibility, rate design and modeling, virtual power plant, and grid optimization.

**Manager, Distribution  
Resource Strategy**  
Portland General Electric

In this role at PGE, Josh developed roadmap and sourcing strategy for newly formed Distribution Resource Planning group at PGE. His team oversaw the development of short- and long-term plans for implementation of wires and non-wires solution on the distribution grid.; streamlining of the interconnection process; development of hosting capacity analysis and tools; strategy for PGE's virtual power plant.

**Manager, Customer Energy  
Solutions**  
Portland General Electric

Josh oversaw product management and development for demand response, pricing, electric vehicle, storage, resiliency, and other customer programs at PGE. He managed business case development, program design, planning and deployment of pilots and programs, as well as providing technical and regularly review of new customer products and offerings.

**Smart Grid Analytics Lead**  
Portland General Electric

In his initial role at PGE, Josh supported strategy around customer-focused smart grid investments, including demand response, behavioral feedback, control systems, IoT, storage, distributed generation, and electric vehicles.

**Associate**  
The Cadmus Group

Manager of Statistical Analysis team within Cadmus' Energy Services Division. Josh managed analysis across a diverse set of projects including impact and process evaluations, forecasting studies, baseline studies, and strategic planning. Represented Cadmus in the development of national standards in energy efficiency evaluation, both as part of DOE's Uniform Methods Project and on the American National Standards Institute's collaborate on energy efficiency.

**Selected Publications and Press**

**Data Models for DER Integration and FERC 2222**  
Grid Forward Annual Conference (2022)

**State Implementation Considerations for FERC 2222**

NARUC Webinar (2022)

**Rethinking Resource Adequacy in a Decarbonized World**

Grid Forward Decarbonization Summit (2021)

**Challenges on the Road to 100% Clean Energy**

Oregon Energy Future Conference (2019)

**The Virtual Power Plant: A New Era of Energy Flexibility**

[T&D World](#) (2019)

**DER Planning at PGE: Building a Foundation for Deep Decarbonization**

Western Energy Board Resource Planners Forum (2018)

**Decarbonization and Distributed Flexibility**

Association of Energy Service Professionals NW Annual Meeting (2018)

**In search of the perfect rate: Portland General tests 12 pilots on DR rate design**

[Utility Dive](#) (2017)