Statement of Qualifications

Helping utilities and energy providers embrace distributed energy resources as a core part of their service

Sound Grid Partners, LLC
info@soundgridpartners.com
212 Broadway Ave. E. #22774, Seattle, WA 98122
Helping utilities and energy providers embrace distributed energy resources as a core part of their service

We do this by providing multi-faceted capabilities and experience developed over years of leading the expansion of DERs in the electric grid. We offer a suite of DER integration services and have earned a reputation for excellence in our support of client goals and objectives.

Sound Grid Partner’s (SGP) clients include electric utilities and energy project developers across the United States. We have deep experience in electric grid operations and design, energy storage technology, and techno-economic modeling associated with grid operations.

Together, these skills make SGP the ideal partner for utilities or developers that are seeking to deploy energy storage, microgrid, and other DER projects utilizing the most up-to-date technical and commercial capabilities.

SGP knows the energy storage market. SGP’s analytics and procurement support helped us launch our storage practice and move quickly on project opportunities.

Will Fischer, VP of Business Development, Summit Ridge Energy
Our Services

**DER Program Design**
Diverse tools to design and implement a DER program including regulatory, techno-economic analysis, engineering, and commercial support.

**Procurement Support**
Comprehensive DER supply chain and procurement expertise including DER cost analysis, competitive procurements, and contract negotiation support.

**Techno-Economic Modeling & Analysis**
Suite of advanced analytics and modeling tools and services quantifying economic and technical feasibility and optimal design of DER projects.

**DER Project Implementation & Operations**
Support throughout the DER project delivery and operations life cycle: project management, contract compliance, asset operations, and maintenance.

**Project Engineering**
DER engineering services including technical studies, drawings, specifications, and engineering process management.

**DER Expert Witness / Consultant**
Independent technical expert services supported by highly experienced, credible subject matter experts leveraging evidence-based analysis.

Our Team

Dan Sowder, P.E.
Co-Founder & Principal

Tess Williams, Ph.D.
Co-Founder & Principal

Axel Schmidt, BS
Partner

Andrew Epstein, BS
Power Systems Engineer

Marley Cross, BA
Power Systems Engineer & Analytics

Jared Silvia, Ph.D
Partner
### Featured Projects

**Market Integration and Testing**  
**Client:** Consumers Energy / **Location:** MI and MISO

SGP supported Consumers Energy in deploying the first ESS to act as a fast-ramping resource in the MISO regulating reserve market, including market registration, market integration testing, valuation analysis, performance assessment, and development of optimal bidding and control strategy.

**DER Analysis and Procurement Support**  
**Client:** Summit Ridge Energy / **Location:** NY, MA, and ISO-NE

SGP has supported Summit Ridge Energy (SRE) with a suite of services across the full span of the development cycle of a cohort of solar and storage projects. To support the conceptual design process, SGP developed technical and financial analysis tools that enabled SGP and SRE to model expected performance in multiple commercial markets and generate key metrics for use in equipment specifications and project financing documents. To efficiently procure technology, SGP created and facilitated an energy storage Request for Proposals process that enabled SRE to competitively procure ESS deployment partners, supported the technical evaluation and choice of vendors, and acted on SRE’s behalf to negotiate competitive solutions and robust contracts. SGP has contributed to interconnection filings, evaluated technology offerings for key fire safety compliance and certification requirements, and acted as SRE’s partner in support of each stage of successful development.

**Value of Solar and Storage**  
**Client:** Salt River Project / **Location:** AZ

SGP conducted a comprehensive survey of the Value of Solar and Storage at a vertically integrated utility. Working with subject matter experts at the utility, SGP facilitated a study process that efficiently surveyed all potential value streams including energy, capacity, ancillary services, transmission and distribution infrastructure deferral and grid services, and then carried out detailed analysis of high-potential value combinations. The results of the study have been used to inform future testing, procurement, and operations of solar and storage.

**Techno-Economic Analysis and Conceptual Design**  
**Client:** Solar Developer and Energy Services Provider / **Location:** Middle East

As the technical experts on an international and cross-functional team, SGP led the valuation analysis, conceptual design, economic and financial analysis, and regulatory analysis for a pilot Virtual Power Plant (VPP) in the Kingdom of Jordan. SGP quantified value streams across all sectors of the power system to inform a pilot VPP design able to create value initially and in an evolving future system. SGP also conducted a gap analysis of regulatory and policy developments required for VPPs to provide maximum potential value in Jordan and briefed key stakeholders.

**Independent Expert Services**  
**Client:** K&L Gates / **Location:** North America

SGP provided independent expert analysis and testimony related to technical and commercial energy storage matters in support of K&L Gate’s energy storage practice.
Project History

Sound Grid Partners has supported dozens of diverse utility-integrated DER projects. Below is a summary of key services recently provided to our customers.

<table>
<thead>
<tr>
<th>Year</th>
<th>Location</th>
<th>Customer</th>
<th>SGP services</th>
</tr>
</thead>
<tbody>
<tr>
<td>2022</td>
<td>USA-Southwest</td>
<td>Utility</td>
<td>Development of software and dispatch for inverter-based resources technical requirements</td>
</tr>
<tr>
<td>2022</td>
<td>USA-Southwest</td>
<td>Utility</td>
<td>Analysis of optimal combination of value streams and dispatch strategy for portfolio of 100+ MW solar + ESS and ESS projects</td>
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<tr>
<td>2022</td>
<td>USA</td>
<td>Grid Controls Technology</td>
<td>Benefit-cost analysis in support of grid-edge control technology product development and regulatory engagements</td>
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<tr>
<td>2022</td>
<td>NY</td>
<td>Developer</td>
<td>Analysis of VDER revenue potential for specific standalone ESS project located in Long Island.</td>
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<tr>
<td>2022</td>
<td>MISO</td>
<td>Developer</td>
<td>Techno-economic analysis of market revenue potential for ESS participating in MISO market services.</td>
</tr>
<tr>
<td>2022</td>
<td>USA</td>
<td>Independent Power Producer</td>
<td>Creation of an engineering standards document for ESS for use in contracting</td>
</tr>
<tr>
<td>2022</td>
<td>USA</td>
<td>Independent Power Producer</td>
<td>Development of a custom ESS dispatch analysis tool for techno-economic analysis, training and on-going support for analysis</td>
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<tr>
<td>2022</td>
<td>USA</td>
<td>Independent Power Producer</td>
<td>Support of active transactions including technical due diligence, ESS dispatch and sizing analysis and optimization, market opportunity, technical and strategic advisory</td>
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<tr>
<td>2022</td>
<td>Washington</td>
<td>Landowner</td>
<td>Supported a large land owner in evaluating a proposed renewable energy lease agreement including revenue modeling, market comparables, and strategy advice</td>
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<tr>
<td>2022</td>
<td>ISO-NE</td>
<td>Utility</td>
<td>Conceptual design and regulatory filing support for three standalone ESS located in Connecticut for use in islanding for reliability purposes.</td>
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<tr>
<td>2022</td>
<td>Massachusetts</td>
<td>Utility</td>
<td>Conceptual design, analytics, and procurement advisory in support of ESS regulatory filing</td>
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<tr>
<td>2022</td>
<td>Massachusetts</td>
<td>Utility</td>
<td>Administered competitive RFI for procurement of BESS equipment and services</td>
</tr>
<tr>
<td>2022</td>
<td>Massachusetts</td>
<td>Utility</td>
<td>Conceptual design, analytics, and procurement advisory in support of ESS regulatory filing</td>
</tr>
<tr>
<td>Year</td>
<td>Location</td>
<td>Customer</td>
<td>SGP services</td>
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<tr>
<td>2022</td>
<td>USA-Southwest</td>
<td>Utility</td>
<td>Detailed technical analysis and updates of solar and storage PPA contracts to increase utility flexibility and dispatch of assets</td>
</tr>
<tr>
<td>2022</td>
<td>USA-Southwest</td>
<td>Utility</td>
<td>Identification and specification of R&amp;D lab use cases, control hierarchy, communication protocols, and procedures</td>
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<tr>
<td>2022</td>
<td>USA-Southwest</td>
<td>Utility</td>
<td>Development of techno-economic modeling tools for utility distribution planners to evaluate BESS for distribution infrastructure deferral</td>
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<tr>
<td>2022</td>
<td>ERCOT</td>
<td>Landowner</td>
<td>Administered RFI process and engaged in negotiation of land lease terms with ESS developer</td>
</tr>
<tr>
<td>2022</td>
<td>MISO</td>
<td>Utility</td>
<td>Analysis and development of tool for estimating value of MISO market services for ESS deployed for grid services</td>
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<tr>
<td>2022</td>
<td>UT</td>
<td>Developer</td>
<td>Act as Owner's Engineer to evaluate EMS for pilot project</td>
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<tr>
<td>2022</td>
<td>USA-Southwest</td>
<td>Utility</td>
<td>Evaluation and summary of technical standards and features to improve operational flexibility and dispatch language in contract agreements</td>
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<tr>
<td>2022</td>
<td>ERCOT</td>
<td>Developer</td>
<td>Technical, commercial, and operational advisory services for ERCOT registered BESS</td>
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<tr>
<td>2022</td>
<td>USA-Southwest</td>
<td>Utility</td>
<td>Technical, analytic, and contracting advisory services for utility All Source Procurement</td>
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<tr>
<td>2022</td>
<td>USA-Southwest</td>
<td>Utility</td>
<td>Solar and storage operational readiness implementation and planning</td>
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<tr>
<td>2022</td>
<td>USA - Texas</td>
<td>Landowner</td>
<td>Analysis of renewable energy development potential for land in south Texas, including solicitation to interested developers</td>
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<tr>
<td>2022</td>
<td>USA-Southwest</td>
<td>Utility</td>
<td>Specification development and pilot planning for a mapping tool to inform the locational value of increased DER and EV penetration</td>
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<tr>
<td>2022</td>
<td>USA-South</td>
<td>Developer</td>
<td>ESS optimal sizing, PV+ESS controls, and proposal support</td>
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<tr>
<td>2022</td>
<td>USA - Southwest</td>
<td>Utility</td>
<td>Quantify costs and benefits of new ADMS-related distribution technology and create a roadmap for adoption</td>
</tr>
<tr>
<td>2021</td>
<td>USA - Southwest</td>
<td>Utility</td>
<td>Analysis of joint value of solar and storage for utility and large industrial customer (steel recycling), development of tool to calculate bill impacts of BTM solar and storage</td>
</tr>
<tr>
<td>Year</td>
<td>Location</td>
<td>Customer</td>
<td>SGP services</td>
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<tr>
<td>2021</td>
<td>NYISO</td>
<td>Developer</td>
<td>Techno-economic analysis of wholesale market opportunity, optimal sizing and design, strategic advisory</td>
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<tr>
<td>2021</td>
<td>NY</td>
<td>Developer</td>
<td>RFP administration, contract negotiation/development, strategic advising</td>
</tr>
<tr>
<td>2021</td>
<td>ERCOT</td>
<td>ESS Technology</td>
<td>Project management, product development, technical and strategic advising, commissioning/testing support</td>
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<tr>
<td>2021</td>
<td>NY</td>
<td>Developer</td>
<td>Screening analysis and training of NY VDER value drivers</td>
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<td>2021</td>
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<td>ESS Technology</td>
<td>ESS control software product advisory</td>
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<tr>
<td>2021</td>
<td>NYISO</td>
<td>Developer</td>
<td>Techno-economic analysis of wholesale market opportunity, optimal sizing and design, strategic advisory</td>
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<tr>
<td>2021</td>
<td>MA</td>
<td>Utility</td>
<td>Conceptual design, analytics, and procurement advisory in support of ESS regulatory filing</td>
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<tr>
<td>2021</td>
<td>USA - Texas</td>
<td>Landowner</td>
<td>Negotiation of land lease terms for ESS development</td>
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<tr>
<td>2021</td>
<td>USA - South</td>
<td>Developer</td>
<td>Optimal sizing and interconnection filing preparation</td>
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<tr>
<td>2021</td>
<td>USA - Southwest</td>
<td>Utility</td>
<td>ESS RFP development support, analysis of respondents, procurement strategic advisory</td>
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<tr>
<td>2021</td>
<td>USA - Southwest</td>
<td>Utility</td>
<td>Solar and storage operational readiness assessment and strategic plan development</td>
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<td>2021</td>
<td>USA - Southwest</td>
<td>Utility</td>
<td>Techno-economic analysis and tool development of utility-scale solar+storage</td>
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<tr>
<td>2021</td>
<td>USA</td>
<td>Developer</td>
<td>ESS supply chain, procurement process, and strategic advisory</td>
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<tr>
<td>2021</td>
<td>NY</td>
<td>Developer</td>
<td>ESS procurement advisory and contract negotiation</td>
</tr>
<tr>
<td>2020</td>
<td>USA - Midwest</td>
<td>Utility</td>
<td>Market integration, testing, and valuation analysis</td>
</tr>
<tr>
<td>2020</td>
<td>PJM</td>
<td>Developer</td>
<td>Techno-economic analysis of wholesale market opportunity, optimal sizing and design, strategic advisory</td>
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<tr>
<td>Year</td>
<td>Location</td>
<td>Customer</td>
<td>SGP services</td>
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<tr>
<td>2020</td>
<td>NY</td>
<td>Developer</td>
<td>Techno-economic analysis and ESS project pro forma development</td>
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<tr>
<td>2020</td>
<td>USA - Northeast</td>
<td>Developer</td>
<td>ESS optimal sizing and proposal support</td>
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<tr>
<td>2020</td>
<td>NYISO</td>
<td>Developer</td>
<td>Techno-economic analysis of wholesale market opportunity, optimal sizing and design, strategic advisory</td>
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<tr>
<td>2020</td>
<td>ISO-NE</td>
<td>Developer</td>
<td>ESS optimal sizing and proposal support</td>
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<tr>
<td>2020</td>
<td>MA</td>
<td>Developer</td>
<td>Techno-economic analysis of MA SMART opportunity, optimal sizing and design, strategic advisory</td>
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<tr>
<td>2020</td>
<td>MA</td>
<td>Developer</td>
<td>Development of tools for techno-economic analysis of MA SMART opportunities</td>
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<tr>
<td>2020</td>
<td>ISO-NE</td>
<td>Developer</td>
<td>Techno-economic analysis of wholesale market opportunity, optimal sizing and design, strategic advisory</td>
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<td>2020</td>
<td>NYISO</td>
<td>Developer</td>
<td>Wholesale market analysis, procurement advisory, support of interconnection application</td>
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<td>2020</td>
<td>USA</td>
<td>BTM Aggregator</td>
<td>Proposal support for BTM aggregation software and services</td>
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<td>2020</td>
<td>PJM</td>
<td>ESS Technology/Law Firm</td>
<td>Expert witness and technical analysis in mediation proceedings</td>
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<tr>
<td>2020</td>
<td>USA - Southwest</td>
<td>Utility</td>
<td>Comprehensive study of the value of solar and storage at a vertically integrated utility</td>
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<td>2020</td>
<td>USA</td>
<td>ESS Technology</td>
<td>ESS product advisory</td>
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<td>2020</td>
<td>USA - Midwest</td>
<td>Utility</td>
<td>ESS market opportunity analysis in support of Integrated Resource Planning</td>
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<tr>
<td>2020</td>
<td>NY</td>
<td>Developer</td>
<td>Market/policy analysis and proposal development support for solar+storage opportunity</td>
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<tr>
<td>2020</td>
<td>USA - West</td>
<td>Utility</td>
<td>Bulk system techno-economic analysis of Balancing Authority ancillary service requirements</td>
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<tr>
<td>2020</td>
<td>Middle East</td>
<td>Developer</td>
<td>Valuation analysis, conceptual design, and regulatory analysis for solar+storage Virtual Power Plant</td>
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<tr>
<td>Year</td>
<td>Location</td>
<td>Customer</td>
<td>SGP services</td>
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<td>2020</td>
<td>USA</td>
<td>Utility</td>
<td>Market survey of advanced applications of energy storage inverters</td>
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<tr>
<td>2020</td>
<td>MA</td>
<td>Utility</td>
<td>Conceptual design, analytics, and procurement advisory in support of ESS regulatory filing</td>
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<tr>
<td>2020</td>
<td>USA - West</td>
<td>Developer</td>
<td>Engineering studies for ESS project</td>
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<tr>
<td>2020</td>
<td>USA - Southwest</td>
<td>Utility</td>
<td>Techno-economic modeling and conceptual design of a microgrid to enhance resiliency at a military site</td>
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<tr>
<td>2020</td>
<td>USA - South</td>
<td>Developer</td>
<td>ESS optimal sizing and proposal support</td>
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<tr>
<td>2020</td>
<td>NY</td>
<td>Developer</td>
<td>ESS RFP development and administration; procurement strategic advisory</td>
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<td>USA - Southwest</td>
<td>Utility</td>
<td>Owner's Engineer for microgrid-related activities</td>
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<td>2020</td>
<td>USA</td>
<td>Developer</td>
<td>Energy storage technology and value training</td>
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<td>2019</td>
<td>USA - Midwest</td>
<td>Utility</td>
<td>Techno-economic analysis and optimal sizing of solar+storage for market applications and grid services</td>
</tr>
<tr>
<td>2019</td>
<td>PJM</td>
<td>Developer</td>
<td>Techno-economic analysis of wholesale market opportunity, optimal sizing and design, strategic advisory</td>
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<tr>
<td>2019</td>
<td>NY</td>
<td>Developer</td>
<td>Techno-economic analysis and tool development for NY VDER opportunities</td>
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<tr>
<td>2019</td>
<td>PJM</td>
<td>ESS technology/Law Firm</td>
<td>Expert witness and technical analysis in arbitration proceedings</td>
</tr>
<tr>
<td>2019</td>
<td>CA, NY, MA, CO</td>
<td>Energy Services Provider</td>
<td>Techno-economic analysis and tool development for BTM and FTM DER; NY VDER, CA SGIP, MA SMART</td>
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<tr>
<td>2019</td>
<td>USA - Midwest</td>
<td>Utility</td>
<td>Technical advisory for measurement and verification of Volt/VAR Optimization</td>
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<tr>
<td>2019</td>
<td>MA</td>
<td>Utility</td>
<td>Techno-economic analysis and optimal sizing of storage under MA Clean Peaks Program</td>
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<td>2019</td>
<td>MA</td>
<td>Utility</td>
<td>ESS procurement advisory and contract negotiation</td>
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<tr>
<td>Year</td>
<td>Location</td>
<td>Customer</td>
<td>SGP services</td>
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<tr>
<td>2019</td>
<td>PJM</td>
<td>Developer</td>
<td>Techno-economic analysis of wholesale market opportunity, optimal sizing and design, strategic advisory</td>
</tr>
<tr>
<td>2019</td>
<td>MA</td>
<td>Utility</td>
<td>Techno-economic analysis and conceptual design of resiliency applications of solar+storage projects</td>
</tr>
<tr>
<td>2019</td>
<td>USA</td>
<td>Developer</td>
<td>ESS procurement advisory and contract negotiation</td>
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<tr>
<td>2019</td>
<td>USA</td>
<td>Standards Body</td>
<td>Technical expert and advisory services in support of ESS communication standards synthesis</td>
</tr>
</tbody>
</table>
Dan Sowder, P.E.
Co-Founder & Principal

My engineering, business, and leadership experience has built technologies, businesses, and teams that make new technologies (particularly energy storage) a valuable part of a cleaner electric grid.

Licensed Professional Engineer (Electrical Power Systems)
North Carolina License #039270

Experience

2018-Present  
**Sound Grid Partners, LLC**  
Co-Founder & Principal (Seattle, WA)  
Provide engineering, analytics, procurement, and advisory services to enable better integration of distributed energy resources. Manage client engagement and business operations.

2016-2018  
**Doosan Gridtech**  
Vice President, Power System Integration (Seattle, WA)  
Directed project and engineering operations including ESS delivery, engineering, supply chain, and analytics. Account executive and business development lead for all major utility accounts.

- Originated EPC team, expanding team from 6 to 18 and increasing revenue by > 250%.

2014-2016  
**1Energy Systems**  
Vice President, Power System Integration (Seattle, WA)  
Founded Power System Integration team at early-stage energy storage start-up. Responsible for project delivery, engineering, and customer engagement for all projects. Acquired by Doosan.

- Delivered six utility-integrated ESSs with the development of standards and dispatch controls.

2013-2014  
**Duke Energy**  
Business Development Manager, Renewable Generation (Charlotte, NC)  
Integrated technical, economic, and policy considerations into business models that supported the deployment of distributed resources with a focus on solar, microgrids, and CHP generation.

2010-2013  
**Duke Energy**  
Senior Project Manager, Emerging Technology (Charlotte, NC)  
Led the design and integration of numerous distributed energy technologies for utility operations. Designed and installed first-of-a-kind ESS, microgrid, and solar integration projects. Awarded Project of the Year for Grid Integration of Renewable Energy. Two patents awarded.

About Dan

Dan Sowder, P.E., is a co-founder and Principal of Sound Grid Partners and leads customer engagement and business operations. Over the course of his career, he has advanced the deployment and utilization of distributed energy resources across multiple facets of the power system ecosystem while also creating new technologies and building successful business enterprises.

Education

2010  
**University of North Carolina, Chapill Hill**  
Master of Business Administration

2008  
**Old Dominion University**  
Master of Engineering Management

2005  
**U.S. Navy Nuclear Power Program**  
Nuclear Engineer Qualification

2001  
**U.S. Naval Academy**  
BS, Aerospace Engineering
Experience (continued)

2001-2008

**U.S. Navy**
Nuclear Submarine Warfare Officer  (Various Locations)
Served on U.S. Navy Europe Operations staff and onboard USS Maryland. Directed multi-national operations in Europe and Africa and at-sea operations of $2 billion/175-person nuclear submarine.

Patents

01. **Grid tied system controller including logic coupled to a photovoltaic station and an energy storage system.**
   - Control algorithm that reduces the negative grid impacts of solar PV output by coupling solar and energy storage system output.

02. **Methods for reducing solar inverter output volatility, and related nodes and solar inverters (sole inventor).**
   - Methodology and algorithm for a solar inverter to reduce the negative impacts to the electric grid caused by output intermittency. Algorithm designed to increase the grid’s solar carrying capacity through better solar integration.

03. **Managing the outflow of a solar inverter.**
   - Method for managing the outflow of a solar inverter such that a photovoltaic array becomes a more dispatchable source of energy which can be used for grid control schemes such as frequency regulation.

04. **Battery energy storage system controller systems and methods.**
   - Control methodology that enables an energy storage system to mitigate power and voltage volatility that enables the electric grid to absorb a higher penetration of solar generation.

Selected Projects for Energy Storage

**Beacon BESS – 20 MW / 10 MWh Lithium Ion**
Los Angeles Department of Water and Power (LADWP), Mojave Desert
- Deployed in the Mojave Desert with availability guarantee of 99% for 10 years.
- Utilized Samsung Li-Ion batteries and SMA power conversion systems.

**Parkview ESS – 1.0 MW / 1.0 MWh Lithium Ion**
Consumers Energy, Kalamazoo, MI
- Includes Samsung batteries and Ingeteam PCS integrated into a 12 kV utility substation.
Selected Projects for Energy Storage (continued)

**Distributed Energy Resource Optimizer – BESS Fleet Optimization Software**  
Austin Energy, Austin, TX  
- Designed and installed ESS fleet control software with seven applications that enabled Austin Energy to optimize and dispatch their ESS fleet, including participation in ERCOT markets.

**Kingsbery ESS – 1.5 MW / 3.0 MWh Lithium Ion**  
Austin Energy, Austin, TX  
- LG Chem Li-Ion and Parker-Hannifin PCS (containerized system).

**Mueller ESS – 1.5 MW / 3.0 MWh Lithium Ion**  
Austin Energy, Austin, TX  
- Consists of seven Younicos integrated battery/PCS units connected to a 12 kV utility distribution circuit.

**Distributed Energy Resource Optimizer – BESS Fleet Optimization Software**  
Snohomish Public Utilities District, Everett, WA  
- Designed and installed ESS fleet control software with four applications that enabled SnoPUD to optimize and dispatch their ESS fleet, including optimization of Bonneville Power Authority market operations.

**MESA-1 ESS – 2.0 MW / 1.0 MWh Lithium Ion**  
Snohomish Public Utilities District, Everett, WA  
- Includes LG Chem and GS Yuasa batteries combined using MESA standards

**MESA-2 ESS – 2.0 MW / 1.0 MWh Vanadium Redox Flow**  
Snohomish Public Utilities District, Everett, WA  
- VRFB from UniEnergy Technologies.

**Glacier ESS – 2.2 MW / 4.4 MWh Lithium Iron Phosphate**  
Puget Sound Energy, Glacier, WA  
- Includes four BYD integrated battery/PCS containers capable of islanding a 12 kV distribution circuit.

**Marshall ESS – 1.25 MW / 750 kWh Lithium Polymer**  
Duke Energy, Sherrills Ford, NC  
- Kokam lithium polymer battery with S&C Electric PCS.

**Rankin ESS – 402 kW / 282 kWh Sodium Nickel Chloride**  
Duke Energy, Mount Holly, NC  
- Used to develop new grid-supportive control algorithms. Winner of Power Grid Int’l Project of the Year (2013).
Selected Projects for Energy Storage (continued)

McAlpine Microgrid – 250 kW / 500 kWh Lithium Iron Phosphate
Duke Energy, Charlotte, NC
• Includes BYD batteries coupled with solar and capable of seamlessly islanding a critical 12 kV facility.
• Awarded Electric Power Research Institute (EPRI) Technology Transfer award as a founding member of the Energy Storage Integration Council (2014).

Community Energy Storage (CES) Units (2) – 25 kW / 25 kWh Lithium Ion
Duke Energy, Charlotte, NC
• Installed underground CES units (S&C Electric Company and Kokam) that could automatically island residential transformers and provide grid services.

Selected Projects for Other Distributed Energy Resources

Marshall Solar Smart Inverter Project – 1 MVA solar inverter with 500 kW solar array
Duke Energy, Sherrills Ford, NC
• Designed multiple grid-supportive algorithms that demonstrated innovative ways for a solar inverter to support the grid.

Deployment of Plug-in Electric Vehicle (PEV) Test Fleet and Associated charging infrastructure
• Led the deployment of 15 Chevy Volts (pre-market release) and 35 Level-2 (240V) electric vehicle charging stations as part of a DOE-funded vehicle electrification study. Led power quality and charging behavior analysis.

Grid-integrated smart appliances demand side management pilot
• Led the deployment of 46 Samsung smart appliances including dishwashers, clothes washers, dryers, and refrigerators with four levels of demand response capabilities.
• Led a six-month test to assess the demand response capacity and impacts on the customers of these appliances.
Tess Williams, Ph.D.
Co-Founder & Principal

I am an expert in power system modeling and the integration of distributed energy resources (DERs) into the electric grid, committed to advancing the use of DERs through sound engineering.

Experience

2018-Present

**Sound Grid Partners, LLC**
Co-Founder & Principal (Seattle, WA)
Provide engineering, analytics, procurement, and advisory services to enable better integration of distributed energy resources. Manage power system analytics and DER design services.

2016-2018

**Doosan Gridtech**
Manager, Power System Integration (Seattle, WA)
Led power system analytics team, responsible for conceptual design studies of energy storage projects and analytics to support DER controls development for utility applications.
- Led energy storage conceptual design studies submitted to state utility regulators and critical for project approval, resulting in multiple rate-based energy storage projects.
- Directed economic modeling of distributed energy resource and traditional utility assets to optimize sizing, location, and DER control algorithm functionality.
- Managed modeling that developed new control applications for utility-integrated, megawatt-scale energy storage systems.

2012-2016

**Pacific Northwest National Laboratory**
Smart Grid Engineer (Seattle, WA)
Conducted research and utility projects related to distribution system control and DER integration.
- Power systems analysis including state and parameter estimation, quasi-static time-series simulation, with a focus on distribution system control and renewable integration.
- Developed on-line, minimally-intrusive, efficient new measurement and verification technique to analyze energy savings from volt/var management systems; results used in rate filings.
- Led team of engineers and economists to provide innovative solutions for microgrid design, renewable energy and energy storage integration for US Army Office of Energy Initiatives.

2011-2012

**Harvard Center for the Environment**
Postdoctoral Research Associate (Cambridge, MA)
Analyzed major U.S. shale extraction activities to characterize trends in shale gas and oil production; advised member of the President’s Council of Advisors on Science and Technology.

About Tess

Tess Williams, Ph.D., is a co-founder and Principal of Sound Grid Partners and leads analytics and design services. She is an expert in helping electric utilities and other megawatt scale power producers to evaluate, procure, integrate and optimize energy storage and other distributed energy resources.

Education

2011

**Harvard University**
Doctorate in Physics

2005

**Stanford University**
Bachelor’s in Physics
Patents

01. **Electrical Power Grid Monitoring Apparatus, Articles of Manufacture, and Methods of Monitoring Equipment of an Electrical Power Grid.**
   - Algorithms for applying state and parameter estimation to distribution systems, including incorporation of AMI data, for the purpose of monitoring state of health of distribution system infrastructure.
   - Filed September 30th, 2013: [US Patent Application #14/042](#)

02. **Development of Method for Evaluating Benefits of Volt VAR Control and Verification.**
   - Measurement and verification algorithm for energy savings from Volt VAR Control. Previous state of the art required multiple months of testing with interruption of operation; this technique is on-line, minimally intrusive, and enables widespread, on-going verification of benefits.
   - Filed September 30th, 2015: [US Patent Application #62/057](#)

Selected Projects for Conceptual Design of Energy Storage

**Outer Cape Energy Storage System – 25 MW / 38 MWh Lithium Ion**
Eversource Energy, Provincetown, MA
- Primary objective is reliability improvement in geographically challenging and environmentally sensitive area. Energy Storage System (ESS) will island circuit to mitigate impact of outages located in distribution system or transmission system.
- Study filed with MA Department of Public Utilities as part of rate filing, $40M project budget approved, expected in-service 2020.

**Martha’s Vineyard Energy Storage System – 5 MW / 20 MWh Lithium Ion**
Eversource Energy, Martha’s Vineyard, MA
- Primary objective is reliability improvement on island supplied by submarine cables; ESS will contribute to reliability resource that enable retirement of backup diesel generators.
- Secondary use cases include voltage support to enable higher penetration of distributed solar PV generation and peak shaving to manage bulk system capacity charges.
- Study filed with MA Department of Public Utilities as part of rate filing, $15M project budget approved, expected in-service 2021.

**Nabb Energy Storage System – 5 MW / 5 MWh**
Duke Energy, Nabb, IN
- Primary objective is reliability improvement of rural circuit; ESS will island distribution circuit when supply lost.
- Secondary use case is participation in MISO frequency regulation market.
- Study filed with Indiana Utility Regulatory Commission as part of rate filing. Two energy storage projects approved (~$9mm each), expected in-service 2019.

**Blair Energy Storage System – 2 MW / 4 MWh**
Eversource Energy, Blair, CT
- Primary objective is voltage support to increase circuit hosting capacity of distributed solar PV.
- Secondary use cases are peak shaving demonstration and management of bulk system capacity charges.
Selected Projects for Conceptual Design of Energy Storage (continued)

New Bedford Energy Storage System – 5 MW / 5 MWh Lithium Ion
Eversource Energy, New Bedford, MA
- Primary objective is voltage support and energy shifting to increase hosting capacity of distributed solar PV on a distribution circuit.
- Multiple scenarios for control of third-party-owned solar and storage and control of utility-integrated storage modeled and compared to inform evolution of DER interconnection and control requirements.

Pittsfield Energy Storage System – not recommended
Eversource Energy, Pittsfield, MA
- Primary objective was deferral of utility substation transformer upgrade.
- Study determined that conventional substation upgrade was better solution than energy storage, so energy storage project was not recommended to proceed.

Chicago O’Shea – 1 MW / 1 MWh Lithium Ion
DTE, Detroit, MI
- Pilot energy storage project designed to demonstrate and enable learning about use cases including voltage support for solar integration, peak shaving, and wholesale market participation.

Selected Projects for Techno-Economic Analysis

Austin SHINES System Levelized Cost of Energy to Serve Load
Austin Energy, Austin, TX
- Detailed economic modeling of distrusted energy resources and utility assets to optimize sizing, location, and control algorithms for Department of Energy-funded SHINES project.
- Developed and implemented calculation of System Levelized Cost of Energy to Serve Load, a new metric to characterize impact of DERs to overall system cost, including interactions between all system components under varying control strategies.

Economic Analysis and Tool Development for Remote Alaskan Microgrids
Department of Energy Project, AK
- Developed tools for off-grid Alaskan villages to enable optimal generation asset sizing and model investment requirement and economics over lifetime.

Selected Projects for Other Distributed Energy Resources and Controls

Distributed Energy Resource Optimizer – ESS Fleet Optimization Software
Austin Energy, Austin, TX
- Designed and installed ESS fleet control software with seven applications that enabled Austin Energy to optimize and dispatch their ESS fleet, including participation in ERCOT markets.
Selected Projects for Other Distributed Energy Resources and Controls (continued)

ESS in Wholesale Market Analysis and Design
Doosan GridTech

• Assessed wholesale market revenue potential for merchant energy storage projects in multiple ISOs, including NYISO, ISO-NE, MISO, and CAISO, for Doosan GridTech sales and project origination team.
• Developed dispatch strategies to maximize value over lifetime, optimizing between revenue and lifetime with consideration of degradation of battery cycling.

NSA Crane Microgrid – Solar, Energy Storage, and Diesel Generator Microgrid
Duke Energy and US Navy, Crane, IN

• Designed a microgrid capable of islanding critical load of NSA Crane in case of loss of supply.
• Critical load identification and modeling, optimal sizing of generation, control and communication specification, operations and workflow design, analysis of power quality and stability, and conceptual budget.

JFTB-Los Alamitos Microgrid – Solar, Energy Storage, and Diesel Generator Microgrid
Army Office of Energy Initiatives, Los Alamitos, CA

• Designed a microgrid capable of islanding Joint Forces Training Base Los Alamitos in case of loss of supply.
• Critical load identification and modeling, load management process, optimal sizing of generation, equipment specification, operations and workflow design, and conceptual budget.

Field Evaluation of Volt VAR Optimization Pilot
American Electric Power, Owasso, OK

• Assessed effectiveness of Volt Var Optimization system in reducing end-use energy consumption in pilot project.
• Developed on-line, minimally-intrusive, efficient new measurement and verification technique to analyze energy savings from Volt VAR management systems.

Loads as a Resource
Department of Energy Research, PNNL, Richland, WA

• Studied effectiveness of distributed, responsive loads in participating in primary frequency response to control frequency, traditionally only managed by generation.
• Evaluated performance of residential water heaters in delivering primary frequency response with modeling and laboratory testing.

Distribution System Asset Monitoring
Department of Energy Research, PNNL, Richland, WA

• Developed algorithms to bring state and parameter estimation techniques to distribution systems with incorporation of AMI data.
• Modeled how algorithms could identify distribution system components in need of repair or replacement.
Axel Schmidt, BS
Partner

I am an experienced project manager and engineer with an extensive background managing the design and delivery of solar and energy storage projects for utility and developer customers. I have a particular expertise in energy management systems and software controls for DERs.

Experience

2021-Present  
**Sound Grid Partners, LLC**  
Partner (Seattle, WA)  
Lead client-facing projects related to the technical design, component procurement, grid integration, and project management of distributed energy resource projects.  
- Provide subject matter expertise on energy storage software integration including multi-asset projects and market integration.

2019-2021  
**Doosan Gridtech**  
Manager, Software Delivery (Seattle, WA)  
- Managed Software Delivery team responsible for design and deployment of custom controls for energy storage and renewable energy projects.  
- Customer-facing Program Manager for high-profile software projects and clients.

2015-2019  
**Doosan Gridtech**  
Senior Engineering Project Manager (Seattle, WA)  
- Managed design, construction, testing, and commissioning of utility-scale energy storage systems.  
- Led contract negotiations and execution with end customers, subcontractors, and other key project stakeholders.

2013-2016  
**Alpha Technologies, Alpha Energy**  
Manager, Renewable Energy Systems (Bellingham, WA)  
- Managed team of engineers, project managers, and sales staff to design and deploy renewable energy systems.  
- Reviewed and assessed the viability of new technologies and emerging companies.

2009-2013  
**Alpha Technologies, Alpha Energy**  
Lead Renewable Energy Systems Engineer (Bellingham, WA)  
- Led renewable energy system designs including specification of equipment, system sizing, performance modeling, quoting, and drawing packages.  
- Conducted on-site commissioning, testing, and troubleshooting of renewable energy systems.

About Axel
Axel Schmidt is a consultant at Sound Grid Partners where he leads client-facing project management, engineering, and procurement projects. He has extensive experience with design, deployment and operation of DERs, as well as energy management systems (EMS) and controls. He has designed and deployed dozens of renewable energy and energy storage projects throughout the world.

Education
2009  
**Western Washington University**  
BS, Vehicle/Plastics Engineering
Selected Projects for Energy Storage

Chisholm ESS Energy Management System – 100 MW / 100 MWh Lithium Ion
Able Grid/Map Energy, Dallas, TX

- ESS participating in ERCOT market services, including Fast Frequency Response
- EMS responsible for interfacing with Samsung batteries, Sun Grow PCS/BSC, substation, QSE interface, cloud data storage server.

Distributed Energy Resource Optimizer – BESS Fleet Optimization Software
Austin Energy, Austin, TX

- Designed and installed ESS fleet control software with seven applications that enabled Austin Energy to optimize and dispatch their ESS fleet, including participation in ERCOT markets.

Kingsbery ESS – 1.5 MW / 3.0 MWh Lithium Ion
Austin Energy, Austin, TX

- LG Chem Li-Ion and Parker-Hannifin PCS (containerized system).

Mueller ESS – 1.5 MW / 3.0 MWh Lithium Ion
Austin Energy, Austin, TX

- Consists of seven Younicos integrated battery/PCS units connected to a 12 kV utility distribution circuit.

Distributed Energy Resource Optimizer – BESS Fleet Optimization Software
Snohomish Public Utilities District, Everett, WA

- Designed and installed ESS fleet control software with four applications that enabled SnoPUD to optimize and dispatch their ESS fleet, including optimization of Bonneville Power Authority market operations.

HBC Microgrid – 60kW PV, 40kW generator, 130kWh ESS
Hummingbird Cay, Bahamas

- Hybrid power system powering all site loads on a remote island, including university research center.

Ft. Bliss Hybrid Power System – 64kW PV, 60kW generator, 768kWh ESS
Motorola, Ft. Bliss, TX

- Hybrid power facility located in active missile range supporting army telecommunications.

Customs and Border Patrol Hybrid Power System – 21 kW PV array, 10 kW generator, 384 kWh ESS
Motorola, Remote location, Maine

- Hybrid power facilities on remote mountain tops supporting CBP and local emergency telecommunications.

Joint Base Lewis-McCord Hybrid Power Skid- 5 kW PV, 5 kW generator, 19.2 kWh ESS
Saab Sensis, JBLM, WA

- Multiple skid-mounted hybrid power systems designed to support radar tower sites.

Contact Axel Schmidt
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Location
212 Broadway Ave E #22774
Seattle, WA 98122
Selected Projects for Other Distributed Energy Resources

**Time Warner Hilo PV – 30kW**
Hilo, HI
- Flush roof-mount commercial PV array.

**Time Warner Kona PV – 40kW**
Kona, HI
- Flush roof-mount commercial PV array.

**SCTE PV – 17kW**
Philadelphia, PA
- Ballasted, roof-mount commercial PV array.

**Arizona Game and Fish Department PV – 191 kW**
Phoenix, AZ
- Ballasted, roof-mount commercial PV array.

**Cox Communications PV – 318 kW**
Phoenix, AZ
- Elevated commercial PV shade structures (4 sites).
Andrew Epstein, BS
Power Systems Engineer

I am a power systems engineer with experience designing and modeling energy storage systems (ESS) in various markets. In particular, I have experience developing and deploying Energy Management System (EMS) software products for large scale battery ESS projects.

Experience

2021-Present
Sound Grid Partners, LLC
Power Systems Engineer (Seattle, WA)
Provide market analytics, modeling, and engineering services to enable the successful integration of renewable energy resources.

2020-2021
Doosan Gridtech
Technical Product Manager (Seattle, WA)
• Managed the delivery and integration of battery energy storage control software offerings through close coordination with market regulators, scheduling entities, system developers, owners, operators, and hardware vendors.
• Designed algorithms and architectures for ESS and solar+storage control systems with an emphasis on new system topologies, features for new services, and compliance with connection requirements in new markets.
• Supported software development process via technical specifications of new features, software/hardware integration plans, and validation of control functionality.
• Built and maintained PSCAD control system models used to demonstrate system performance in interconnection studies.
• Triaged and prioritized a backlog of features to optimally address product roadmap and project requirements.
• Led product-focused performance analysis and demonstrations for prospective clients and their investors.

2017-2019
Peace Corps Benin
Technology Resource Officer (Cotonou, Benin)
• Supported local government initiatives in rural electrification through landscape analysis of deployed technologies and feasibility studies of DER projects in new localities.
• Designed and deployed a mobile software application used by 100+ field agents for internal monitoring and evaluation of malaria prevention projects.
• Designed and implemented an assessment of malaria transmission in 20 zones using geospatial data which culminated in a presentation of new insights in malaria treatment practices to the Beninese Ministry of Health and its international partners.

About Andrew
Andrew Epstein is a power systems engineer at Sound Grid Partners where he provides a suite of services in analytics and engineering. He also provides subject area expertise in software products for energy applications.

Education
2017
Stanford University
BS, Electrical Engineering
Selected Projects for Energy Storage

**Chisholm ESS Energy Management System - 100 MW / 100 MWh Lithium Ion**
Able Grid/Map Energy, Dallas, TX
- ESS participating in ERCOT market services.
- EMS responsible for interfacing with Samsung batteries, Sun Grow PCS/BSC, substation, QSE interface, cloud data storage server.

**Wandoan ESS Energy Management System - 100 MW / 150 MWh Lithium Ion**
Vena Energy, Darling Downs, Queensland Australia
- ESS participating in NEM market services.
- EMS responsible for interfacing with Samsung batteries, Power Electronics PCS, site SCADA system.

Selected Projects for Software Products

**Doosan GridTech Intelligent Controller (DGIC)**
Energy Management System
- Operating modes address market services and requirements including voltage regulation, primary frequency response, fast frequency response, SOC management, and basepoint following.
- System and device constraints ensure valid ESS power flow.
- Loss compensation achieves desired performance at point of interconnection.
- EMS manages communication interfaces with devices (Modbus) and external control systems (DNP3).

**Site Manager**
EMS User Interface
- Real time control capability and visualization of ESS operating conditions.
- Alarm surfaced and management.
- EMS settings configuration.

**Performance Analyzer (PA)**
Cloud hosted historian and data visualization
- Full-system data access and trends.
- Dashboards for specific use cases: analytics, operations, warranty tracking.

Contact Andrew Epstein
andrew.epstein@soungridpartners.com
(970) 372-9868

Location
212 Broadway Ave E #22774
Seattle, WA 98122
Marley Cross, BA
Power Systems Engineer & Analytics

I am a power systems engineer with a focus in analytics. I have experience in quantitative analysis of solar, energy storage, and energy efficiency projects and programs. I have strong experience in distributed-scale solar operations including time-series analysis of production data and commissioning of data acquisition systems (DAS).

Experience

2022-Present  
**Sound Grid Partners, LLC**  
Power Systems Engineer & Analytics (Seattle, WA)  
Provide market analytics, modeling, and engineering services to enable the successful integration of renewable energy resources.

2020-2022  
**Nexamp**  
Associate Solar Performance Analyst (Boston, MA)  
- Designed and ran performance analyses of operational solar and storage facilities in Excel and SQL utilizing internal project, outage, and equipment databases.  
- Installed, programmed, and troubleshooting modems, weather station equipment, and SCADA systems on-site. Effectively communicated these processes to field technicians over the phone for out-of-state projects. Developed new workflows, communication processes and templates to increase efficiency of project hand-off during commissioning.  
- Conducted capacity testing of solar and storage plants based on ASTM (American Society for Testing and Materials) standards to demonstrate the performance of assets to lenders/buyers. Automated this process in R and Python, made broadly accessible with a web interface to decrease calculation time by 50% per test.  
- Tracked performance of 300MW+ of solar and storage plants through monitoring software. Reported to third-party customers, responding to requests and questions in a timely and clear manner.

2020-2020  
**Optimal Energy, INC.**  
Quantitative Intern (Providence, RI)  
- Built a model in R comparing net present values of heat pumps to gas systems under variable interest rates, carbon prices, and decarbonization pathways to feed into potential studies of cost-effective energy efficiency resources for commercial customers and state policy groups.  
- Developed a tool in Excel enabling swift comparisons between complex energy savings models to inform statewide energy planning for the Rhode Island Office of Energy Resources, enabling prioritization of energy efficiency programs in the state’s Annual Energy Efficiency Program Plan.

About Marley

Marley Cross is a power systems engineer in analytics at Sound Grid Partners, where she provides a suite of services in analytics and engineering.

Education

2020  
**Brown University**  
BA, Economics and Environmental Studies
Selected Projects for Plant Commissioning

Data Acquisition System Commissioning – 25MW of Distributed Solar and Storage Projects
Massachusetts, New York
- Installation of weather stations and modems.
- Network programming of inverters, remote relays, and revenue-grade meters.
- Configuration of assets in remote monitoring software.
- Troubleshooting of systems in the field.
- On-call troubleshooting support for field crew encountering complex problems.

Capacity Testing – 45MW of Distributed Solar Projects
Massachusetts, New York, Illinois
- Data collection from site and data preparation of energy models.
- Regression analysis, calculation of expected output, and performance comparison.

Selected Projects for Analysis Tools

Capacity Test Automation
Performance Testing Tool
- Automated previously manual capacity test process into Python-based tool with:
  - User-adjustable configuration inputs specifying minimum test irradiance and filter band widths.
  - Data preparation and filtering of measured plant data and modeled 8760 data.
  - Stepwise regression runs to determine expected production based on weather data.
  - Results calculation comparing measured plant performance to modeled plant performance.
  - Report printout to excel with relevant data tables, regression results, and final test percentage.
  - Made available to performance analysis team via web interface; reduced manual test calculation time by 50% per test.

Optimal Energy
Energy Efficiency Program Analysis Tool
- Processed historical energy efficiency program data and annual plan data.
- Mapped categories of energy efficiency technologies to enable swift comparisons between costs and energy savings.
- Identified and highlighted gaps between program data and state energy savings goals.

Contact Marley Cross
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(206) 769-2366

Location
212 Broadway Ave E #22774
Seattle, WA 98122
Jared Silvia, Ph.D.
Partner

With experiences ranging from helping global energy and materials companies execute billion dollar investments, developing roadmaps for software that integrates solar and battery resources into the grid, and commercializing new clean energy technologies, I help clients make the right decisions at both the strategic and operational level to realize their renewable energy goals.

Experience

2022-Present
Sound Grid Partners, LLC
Partner (Seattle, WA)
Engage utilities and private companies in software control solutions for managing inverter-based resources on the power grid.

2019-Present
Bluedot Photonics
Co-founder and CEO (Seattle, WA)
Responsibilities include: Crafting company’s business and product strategy, managing company operations, handling company’s finances and accounting, securing investment and funding, engaging in business development and customer discovery work, handling company legal matters.
- Built a team of 5 full-time employees to develop company’s products.
- Raised $1.45M of private capital to accelerate the company’s growth.
- Secured $1.5M in non-dilutive funding from DOE SETO, Shell GameChanger, Cascadia CleanTech Accelerator, American Made Solar Prize, and NSF SBIR.
- Secured letters of support from 5 leading solar panel manufacturers for follow-on engagement.
- Negotiated global, exclusive license with the University of Washington for key patent in BlueDot’s IP portfolio.

2012-2016
Doosan Gridtech
Director, Product Management and Marketing; Product Manager (Seattle, WA)
Responsibilities included: Crafting company’s business and product strategy, creating overall marketing strategy for company across both engineering and software business lines, developing consistent pricing and packaging schemes for software products, serving as company spokesperson, exploring partnerships with ecosystem players.
- Led task force to evaluate growth areas for software portfolio, initiating development of two new products
- Responsible for $600k marketing budget to build company brand in core markets
- Initiated $35k public relations and media campaign for flagship DOE SHINES project with Austin Energy
- Launched v2.0 of Doosan GridTech energy storage control system software

About Jared
Jared Silvia is a consultant at Sound Grid Partners, where he leads engagements with electrical utilities and developers. Jared has experience in the cleantech, solar, and energy storage sectors with a specialty at breaking down strategic problems into operational actions.

Education
2011
Massachusetts Institute of Technology
Doctorate in Inorganic Chemistry

2006
University of Cambridge
Masters in Chemistry

2005
University of Washington
Bachelor’s in Chemistry and Biochemistry
Experience (continued)

- Oversaw development of 2019 annual operating plan, creating strategy to deliver 2x growth in sales year on year
- Developed 2017 and 2018 business plans with Executive Team, targeting 3x growth in market share over 5 years
- Developed market entry strategy for new business segments (microgrids, and commercial storage)
- Created pricing and packaging scheme for DERO® product for utility customers

2013-2016

**Mckinsey and Co.**
Engagement Manager (Seattle, WA)

- Managed McKinsey Global Institute team researching the opportunity for renewable energy growth through 2035
- • Assessed the impact of energy price declines on ammonia plant investment returns through scenario analysis
- • Identified a 30-40% inventory reduction opportunity for an aerospace client through lean operation improvements
- • Implemented project management processes and tools to improve productivity at an LNG export facility by 50%
- • Led effort to create “should cost” model for aerospace manufacturing facility highlighting $1.3B opportunity

2011-2013

**Mckinsey and Co.**
Associate (Seattle, WA)

- Developed a 5-year business unit strategy for an international specialty chemicals manufacturer
- • Supported fertilizer manufacturer in investment and go-to-market strategy for $750M ammonia plant project
- • Assessed growth opportunities for independent oil company through analysis of competitive landscape
- • Identified and implemented operational improvements at 4 manufacturing and 2 transportation facilities