Greg Linder

glinder@linderworks.com
(217)621-2372

Cofounder Skyfri Corp (Formally SolarSCADA) (www.skyfri.com)
Founder and Owner, Linder Engineering Works, LLC (linderworks.com)

Objective

To use my decades of knowledge across the PV industry to grow Solar and BESS systems in the energy mix. I founded a competitor to Also Energy, SolarSCADA, which I grew to a $500K ARR entity prior to sale in 2022 to Skyfri. I am now SVP of Hardware Design within Skyfri. In addition, I maintain Linder Engineering Works to address DER integration issues outside of Skyfri's scope.

Qualifications

- Over 3GW of PV Plant and BESS SCADA and O&M Experience.
- Implemented solutions for various BESS and Solar Grid Response type functions, including frequency response, ADR, peak shaving, Volt/Var control, and others, with various ISO's.
- 20 years of experience with SCADA for distributed generating assets of all kinds
- 20 years embedded system design, including firmware and hardware design, using multiple types of microcontrollers mainly for BMS, EMS, SCADA, and Solar-Specific applications.
- 20 years PLC system programming, design, and panel layout across many industries

Education

- MSEE, Clarkson University, May 2009
- BSEE, University of Illinois Urbana-Champaign, May 2005
- MS Study in PV Modules at University of New South Wales, Sydney, Australia, '03-'04

Professional Memberships and Certifications

- Colorado Professional Engineer (Dec, 2014)
- IEEE member (2003)
- American Solar Energy Society (ASES) (2007)
- ARRL Member and Amateur Extra radio licensee, call: KC9OPU

Experience

- **Skyfri Corporation: SVP Hardware Design** (Denver, CO + Oslo, Norway) (Jan 2023-Present)
  - Skyfri Acquired SolarSCADA LLC, in its entirety, in Jan 2022
  - Transitioned to role of Senior Vice President of Hardware for Skyfri, currently developing V04 SolarSCADA Integrated (SSI) IEC 61724 compliant interface device
  - Provide expert knowledge for PV, BESS, and Grid interface systems, including inverter throttling, Volt/Var control, frequency response, battery dispatch and others
  - Support design specification through engineering support, including CT sizing, equipment placement, data interpretation, performance testing, and related tasks.
  - Provide guidance in panel design, electrical layout, and electrical codes
- **SolarSCADA, LLC: Founder** (Denver, Colorado) (2017 - Dec 2022, Acquired by Skyfri)
  - Received "Set" award for the American Made Solar Challenge Round 5 Hardware Track
  - Designed and launched the SolarSCADA SSI Device, the industry's first purpose-built IEC 61724 compliant integrated data interface device.

- o Designed and launched the SolarSCADA "tri-power" UPS: The industry's first Solar/DC/Battery integrated UPS specifically targeting PV site control systems.
- o Grew to $500K ARR with ~100 projects (57MW AC) in six states prior to acquisition.
- **Linder Engineering Works, LLC: Founder** (Denver, Colorado) (2008 – Present)
  - o Discovered new failure mode of transformerless PV inverters, whereby damaged power electronics can cause breaker damage which leads to further system harmonics.
  - o Designed and launched SPD (Surge Protection Device) for protection of RS-485 connected pyranometers with long cable homeruns.
  - o Designed the Pyranometer "passive Surge Tee"- A lower cost version of above.
  - o Currently developing encoder retrofit for legacy trackers from a well-known vendor.
  - o Currently running feasibility study for life-extension of legacy solar inverters: Replace known aged components prior to system failure to extend inverter life.
  - o Field commissioning and debugging services in the solar space and BESS space related to system underperformance and troubleshooting power quality issues on-site
  - o Integrated emerging data protocols in renewable generation space, including various legacy solar protocols including SunSpec, SMA Sunny Data, and OpenADR
  - o Prototyped and tested encoderless universal dual-axis solar tracker controller
  - o Provided legacy support of semiconductor fab tools running obsolete PLCs.
  - o Designed, built, and deployed custom-built automatic aneroid tuning and testing system
  - o Developed and sold custom-built drying systems for aerospace gas regulator components.
  - o Designed and constructed hardware and firmware for multiple ARM-based embedded systems, including embedded end of arm (EOA) actuators.
  - o Led teams installing and commissioning shipyard overhead crane lifting equipment
  - o Designed and constructed hardware and developed firmware for Microchip PIC-based embedded systems, including a multi-axis motor drive device with wireless mesh data aggregation and precision distance measuring system for pneumatic tools
  - o Developed and tested embedded indoor-agricultural controller system for low-cost control of indoor aeroponic and hydroponic growing systems.
- **Kleinfelder Group: Project Professional** (Denver, Colorado) (October 2014 – Jun 2018)
  - o Provided SCADA knowledge base to Kleinfelder team for 100's of MW of solar systems
  - o Designed and implemented large-scale reservoir monitoring ADAS Systems involving 100's of Vibrating Wire Piezometer (VWP) sensors and other instruments.
  - o Support substation protective relay setting and SCADA design efforts
  - o Provided field support for last-minute commissioning efforts to bring solar assets online – Ask me about the SEL Story that got in their company newsletter.
- **Juwi Solar Inc: SCADA Engineer** (Boulder, Colorado) (July 2010 – August, 2014)
  - o Deployed full plant-wide configurations in Subnet Solutions Substation Server platform for data integration of solar plant assets, including various brands of inverters, weather stations, protective relays, utility meters, and programmable logic controllers
  - o Designed and configured SCADA Master, including operator screens, redundant database configuration using Control Microsystems ClearSCADA host platform
  - o Designed and implemented VPN solution for secure plant to control center communication using DNP3 over IP and OPC
  - o Designed and managed construction of electrical panels for utility-scale solar plant control, including integration of PLCs, temperature rated computers, uninterruptable power systems, radio communications systems, and DC and AC sensing
  - o Designed custom shunt assembly for revenue grade DC side measurements
  - o Responsible for the design, implementation, and commissioning of the Juwi SCADA system, which then exceeded 250 MW of PV generating capacity.

- o Spearheaded push for NERC/CIP requirements for the Juwi Solar SCADA system.
- **IC Systems Inc: Engineer** (Potsdam, NY, Irvine, CA) (2009-2010)
  - o Ported OpenADR protocol to Linux-based PLCs
  - o Developed and deployed UPS system for wind turbine network comms reliability
- **Clarkson University: Research Assistant** (Potsdam, New York) (2007-2009)
  - o Designed and constructed SCADA system for Clarkson Anaerobic Manure Digester
  - o Designed and built 500 gallon trailer-mounted portable anaerobic digester
  - o MS Thesis, "Failure Analysis and Smart Grid Control Protocols for Anaerobic Digesters"
- **SolFocus Inc: Intern** (Mountain View, California) (Summer 2008)
  - o Assisted with installation and commissioning of SolFocus solar tracking systems
  - o Installed and configured equipment for solar telemetry and control systems
  - o Advocated the use of utility-standard control protocols and hardware to solar field control
- **Chicago Spotlight: Field Service Technician** (Chicago, Illinois) (2006-2007)
  - o Installed and commissioned building-integrated lighting control networks
  - o Trained others in the use and installation of dimming and control equipment
  - o Repaired theatrical electrical systems, including automated fixtures, follow spots, lighting control consoles, and dimming equipment
- **SmartSpark Energy: Embedded Systems Engineer** (Champaign, Illinois) (2005-2006)
  - o Designed and built a large scale PLC based water-immersion battery cycling test system
  - o Wrote firmware for family of proprietary non-dissipative BMS systems.
  - o Designed and built floating-channel data acquisition PCB for cell-level measurements.
- **U of I Future Energy Challenge: Team Leader** (Urbana-Champaign, Illinois) (2004-2005)
  - o Lead development of high-efficiency 500-watt Variable Frequency Drive (VFD)
  - o Designed and wrote 3-phase motor control firmware in PIC-18 assembly language
  - o Designed and built hand-wired prototype hardware to test code prior to PCB completion
  - o Designed and built multiple mixed-signal circuit boards
  - o Performed debugging, and testing of our VFD on dynamometer-equipped test stands.
- **UNSW Solar Racing Team: Mechanical Team Leader** (Sydney, Australia) (2003-2004)
  - o Race Team member for UNSW Sunswift II solar car in the 2003 World Solar Challenge
  - o Mechanical Team Leader for the initial design phase of the UNSW Sunswift III
  - o Negotiated sponsorship contracts for fiberglass materials supply and CNC machining.
  - o Assisted with design and debugging of soft-switched maximum power point tracker
  - o Lead various PR events related to Solar, via radio interviews and trade shows.
- **George L. Clark X-ray Facility: Student Employee** (Urbana, Illinois) (2000-2005)
  - o Designed custom cable support bracket for Kappa-geometry diffractometer
  - o Performed maintenance and repair work on x-ray diffraction equipment
- **Fermi National Accelerator Lab: Intern** (Batavia, Illinois) (2001-2003)
  - o Designed and constructed RF test stands for particle accelerating structures
  - o Preliminary design of automated high-volume RF disk testing and sorting system
  - o Assisted with acceptance testing of large vacuum brazing furnace
  - o Recovered presumed-lost magnet data and Fortran code from legacy VAX/VMS systems
- **University of Illinois School of Chemical Sciences: Undergraduate Research Assistant** (2001-2002)
  - o Designed and built in-situ platinum polishing attachment for a kappa-geometry x-ray diffraction instrument
- **Aberle GmbH & Company: Apprentice** (Gutach, Germany) (2000)
  - o Manufactured parts, programming machines, and quality control
  - o Assisted ISO 9001 compliance documentation

- **Norris Cultural Arts Center: Student Crew** (St. Charles, Illinois) (1997-2000)
  - Responsible for maintenance of theatrical systems, lighting, rigging, hydraulics.
  - Performed crew roles, including set construction, lighting, and fly-rail operation.

Posters, Patents, Presentations and Publications

Patent #9,802,116 *Machine learning controller for prize dispensing entertainment machines*, 2017

1. Sekulic, William, Greg Linder. *PV Component Failures May Lead to AC Power Quality Issues.* EC&M, Dec, 2024: Web: https://www.ecmweb.com/renewables/solar/article/55242780/why-pv-inverter-failures-may-lead-to-ac-power-quality-issues
2. Deline, Chris, Bill Sekulic, Greg Linder. *PV inverter failures cause AC breaker damage – power quality issues and causal analysis.* [Poster], presented at the 2023 PV Reliability Workshop, December, 2023.
3. Linder, Greg. *Protecting Your Pyranometer Investment: Isolation, Grounding, and Protection for Digital Pyranometers.* [Poster], presented at Solar Power International 2020, virtual.
4. Linder, Greg. *High Reliability Systems for In-field Solar Performance Measurement.* [Poster], presented at Solar Power International 2020, virtual.
5. Linder, Greg. *1500VDC Power Supply Topology for Integrated In-Field Measurements of Solar System Data.* [Poster], presented at Solar Power International 2020, virtual.
6. Linder, Greg, Marques Montes. *Demonstration of Inverter Based Grid Voltage Support Functions on 19 MW (DC) PV Generating Facility.* Presented at the 2014 ASES / Intersolar conference. San Francisco, California.
7. Linder, Greg, John Tembrock, Tony Motisi, Electra Lamb, Dave Kubat, Mike Pauly. *AC and DC Restoration for Utility Scale Photovoltaic Generating Assets.* Presented at the 2012 IEEE Power and Energy Society Transmission and Distribution Conference and Exposition. Orlando, Florida.
8. Linder, Greg. *Communications Reliability for Utility Scale Photovoltaic Plants.* Presented at 2011 Subnet Solutions User Group, October, 2011. Austin, Texas.
9. Linder, Greg. *Subnet Solutions' Substation Server Simplifying Solar SCADA.* Presented at 2010 Subnet Solutions User Group, October, 2010. Phoenix, Arizona.
10. Linder, Greg, Stefan Grimberg, Ph. D. *Comparison of Monitoring Systems for Anaerobic Digesters.* Presented at 2010 IEEE Power & Energy Society Conf., New Orleans, Louisiana
11. Linder, Greg, Stefan Grimberg, Ph.D., Eric Thacher,, Ph.D. Shaun Jones. *Implementation of a Distributed Standard Anaerobic Digester Control System Based on Observations from Real World Failure Analysis.* Presented at 2009 ASABE Annual International Meeting
12. Linder, Greg. *The Importance of Standard SCADA Protocols to the Reliable Operation of Distributed Farm-Scale Anaerobic Digesters.* Presented at 2009 IEEE PES Power Systems Conference and Exposition, Seattle, Washington
13. Linder, Greg. *Failure Analysis and Smart Grid Control Protocols for Anaerobic Digesters.* [Thesis] Clarkson University, May 2009
14. Romanov, Gennady, Tug Arkan, Harry Carter, Timergali Khabiboulline, Gregory Linder. *Measurements of high order modes in high phase advance damped detuned accelerating structure for the NLC.* Proceedings of LINAC 2004, Lubeck, Germany.