

Alex Bell, MEM

31 Garrison Lane, Madbury, NH 03823 | (603) 361-1253 | accelbell@gmail.com |

<https://www.linkedin.com/in/alexbell161803/>

Consulting company: Alcheme Tech LLC | alcheme.tech | alcheme@pm.me

Manager, engineer, researcher, analyst, R&D/scaleup specialist, and builder with 14 years of experience in the development of the technology and the business of clean energy / climate-tech / decarbonization startups.

Sadoway Labs Foundation - Watertown, MA | *Nonprofit developing Decarbonization via Extreme Electrochemistry technologies*

Techno-Economic Analysis Engineer (Consultant)

Jun 2023 - Present

- Developed several techno-economic models & analyses for a variety of early-stage electrochemical concepts. Potential examples of new technologies: batteries, primary production of metals, metal and magnets recycling, CO₂ utilization.
- Researched into multiple electrochemical industries to inform the team about the incumbent technologies & players, markets, and GHG reduction potential.
- Helped fundraising by identifying funding sources via a data dive into the Climate Finance Tracker and Instrumentl.
- Built fundraising pitch deck from raw SLF team notes: created the structure & content, and worked closely with a graphic designer to create the visually and narratively compelling presentation.

Alcheme Tech - Madbury, NH | *Regeneration, Management, and Engineering Consulting*

Principal

Feb 2020 - Present

- Freelance engineering & management for clean energy / climate / decarbonization technologies development.

Phoenix Tailings - Burlington, MA | *Rare Earth Metals from Mining Tailings via Molten Halide Salt Electrolysis*

Sr. Process Engineer (Consultant)

Oct 2023 - Aug 2024

- Managed and engineered reactor exhaust system project: developed cell offgas system requirements to design air pollution controls of carbon monoxide and Criteria Pollutants & Hazardous Air Pollutants for compliance with local, state and federal air quality standards. Managed subsystem & equipment suppliers and air permitting consultants to minimize time, budget, and regulatory risks. Researched CO₂ capture technologies and down-selected to an implementable pilot system.
- Estimated CapEx from analogous, parametric, and factored methods, with particular focus on electrochemical systems.
- Designed physical plant layouts for both demonstration and commercial scales, balancing functional requirements of installation, commissioning, operation, maintenance, and R&D/engineering workflows.

Agilyx - Portsmouth, NH | *Advanced Plastic Recycling via Pyrolysis*

Product Development Engineer

Aug 2022 - May 2023

- Led skid design of oil filtration and oil conditioning systems, organizing closely with internal resources and external vendors, following the FEL / FEED methodologies.
- Estimated CapEx from parametric, and factored (e.g., Lang factor) methods to guide project management & technology development.

Boston Metal - Woburn, MA | *Carbon-Free Steel Smelting Technology via Molten Oxide Electrolysis*

Process Engineer

May 2019 - July 2022

- Key contributor on the commercial plant feasibility study executed with a global EPC: as an individual contributor, collaboratively engineered with EPC on Feed and Exhaust systems; also acted like an 'expeditor', operating within Boston Metal to translate project management's high-level questions into actionable requests to engineers, working cross-functionally to come to answers, on topics such as cell heat transfer, or electrochemical fundamentals.
- Selected to be Campaign Manager due to cross-functional knowledge of cell engineering, balance of plant engineering, R&D, and operations: developed flexible, operator-accessible, process model & activity planning tool for scheduling operations such as anode changeovers, feeds refilling, and metal tapping.
- Led and organized 2-day, technical-intensive, off-site meeting to increase cross-department collaboration, and alignment with management.
- Lead and engineered reactor cell feed system, a bulk solids handling system delivering 7 tons/day of five independent

- powders via vacuum conveyors, gravimetric feeders, screw conveyors, and a double valve airlock.
- As process engineer and project manager, developed reactor offgas system requirements, process flow diagrams (PFDs) and mass balances to aid in the design of air pollution controls of carbon monoxide and sulfur dioxide for compliance with local, state and federal air quality standards. Managed subsystem and equipment suppliers and air permitting consultant to minimize time, budget, and regulatory risks.
 - Designed physical plant layouts for the demonstration scaled-up reactor, balancing functional requirements of installation, commissioning, operation, maintenance, and R&D/engineering workflows. Led procurement processes for major long-lead equipment, e.g rectifiers, and air pollution controls (oxidizers, scrubbers, dust collectors).
 - Key contributor on inert anode program: provided expertise on thermo-fluidics, heat & mass transfer modeling, and the limitations of said modeling. Interviewed operators to record their observations and contextualize the data collected.
 - Created technical documentation for internal and external audiences: system manual detailing the offsite installation and operation of a demonstration reactor; subsystems and equipment specifications of safety, mechanical, electrical, controls, and environmental functions.
 - Interviewed and screened engineering candidates as the technical hiring lead, resulting in several successful hires. Onboarding expert for new engineers on the electrolysis and plant processes.

Fluence Energy - Arlington, VA | *Grid-scale Li-ion Battery Energy Storage*

Thermal Fluid Systems Engineer (Consultant)

Feb 2020 - July 2021

- Augmented and modified existing transient, air-based heat transfer Excel model to also simulate liquid cooling performance.
- Designed and detailed the prototype & first production runs of the liquid cooling plumbing system; formed industry partnerships for mass manufacturing of the plumbing assemblies. Documented the complete design in an “Engineering Dossier” that included all details on the process & equipment and the rationales for the design choices.
- To mitigate field coolant leak risk, developed in-factory leak testing specification and selected equipment.

Albany Engineered Composites - Rochester, NH | *Aerospace Composites*

Senior Engineer - Composite Materials

Sept 2019 - May 2020

- Led technology transfer and development efforts of In-Situ Laser Consolidation of Thermoplastic Composites.
- Hands-on troubleshooting, redesign, rebuild, and recommissioning of an integrally heated tool’s heating & cooling system.
- Developed transient 1D thermal modeling via the thermal-electrical analogy in SPICE electronics simulator.

Malta - Cambridge, MA | *Grid-scale Electro-Thermal Energy Storage*

Technical Consultant - Coolant System

Apr 2019 - Jun 2019

- Successfully executed water-based coolant system trade study by selecting the coolant to be used on the upcoming 10MW pilot plant; balanced thermal performance with safety, reliability, scalability, cost, corrosion resistance and other technical risks. Researched proposed coolants using academic and industry literature, identifying advantages, disadvantages and risks. Performed patent search to advise on coolant patent claims and scope.
- Reviewed test methods for measuring coolant properties to avoid false conclusions from sampling and instrumentation errors. Conceptualized test stands for quantifying the coolant’s technical risks, e.g. corrosion and thermal cycling degradation, for comparison against customer and market requirements.
- Led preliminary hazard analysis: engaged with external consultants to design safety in and hazards out, ultimately driving towards quantification of hazards/safety risks for better comparison to the competing technical risks and costs.
- Compiled technical documentation: PFDs, PowerPoints, and design document covering intent and assumptions for the coolant system’s installation, commissioning, operation, R&D/engineering, maintenance, and decommissioning.

Building Envelope Materials - Amesbury, MA | *Retrofit Injected Polyurethane Foam Insulation for Buildings*

Director of Engineering; Technical Advisor

Sept 2016 - May 2019

- Led BEM’s technical team for the Department of Energy’s Building America program. Successfully hit milestones on time and on budget (multi-year, \$600,000 grant). Developed the patented equipment and techniques for extending the current foam injection process into a new application: enclosed roof cavities e.g. cathedral ceilings.
 - *US Patent 12,000,139: Insulation Injection Device*
- Won and successfully completed Massachusetts Clean Energy Center’s Catalyst \$60,000 grant for creating a novel foam quality control device, the In-Situ Proportioner (ISP). Technical lead (researcher, designer, prototype builder & tester) for

this ratio control device.

- Designed, built, tested and operated mobile foam injection system for use in multi-story buildings, a \$100,000+ business in its second year. Incorporated design input from customers, market and competition analysis, and field trials to create a system 30% lighter, 35% smaller and 50% cheaper than competitors. Developed foam injection system to utilize flow meters and custom controls and data acquisition based on Arduino, enabling a novel audio feedback system that greatly reduces foam injection risk, improves and validates foam quality, and helps operators work faster and more efficiently. Executed patent search to identify claim space and tailor the patent application for its strongest, widest position.

RheOmega - Newmarket, NH | *Foam Isothermal Compression Technologies*

Founder

Feb 2016 - Sept 2016

- After the closure of General Compression & SustainX, explored applications for isothermal compression as enabled by foam: Isothermal Gas Foam Compressor, Foam Waste Heat Recovery, and Foam Power Generation.
- Executed technical and business evaluations: market research, product & process design, and techno-economic analysis.
- Brought Rheomega through Lean LaunchPad and Stanford's How to Start a Startup courses, and Wasabi Ventures Academy startup incubator.

Vionx Energy - Woburn, MA | *Vanadium Redox Flow Battery Energy Storage*

Consultant - Thermal Management System Design

Apr 2015 - Dec 2015

- Developed specifications for heating and cooling equipment and operating conditions to control electrolyte temperatures during normal running and failure scenarios.
- Created Excel-based and Matlab-based thermal system simulations with operational and environmental inputs.
- Analyzed test stand data on heat generation and consumption characteristics informing the scaled-up system design.

General Compression - Seabrook, NH | *Grid-Scale Isothermal Compressed Air Energy Storage*

Senior Research Engineer

Oct 2015 - Jan 2016

- Continued SustainX's work on foam technology (see below) after acquisition by General Compression:
 - One of two key SustainX employees retained during acquisition to help transition technology to General Compression
 - R&D lead on foam separation, developed non-dimensional charts and equations for scaled-up separation systems.

SustainX - Seabrook, NH | *Grid-Scale Isothermal Compressed Air Energy Storage*

Research & Development Manager; R&D Project Engineer

Jan 2010 - Sept 2015

- Over 2 years of leading the R&D team's weekly progress updates, actively contributing to the team's strategic and tactical decision making. Budgeted time, personnel and financial resources for the R&D department and numerous concurrent projects. Organized project data and analysis files and disseminated key information via a company Wiki. Led the recruiting, hiring, and managing of 10 interns over 3 years, directing them in research and testing efforts.
- Researched, assimilated and utilized theory from academic literature and industry white papers to estimate feasibility, scope problems, and model and simulate systems.
- Design engineer, project manager, experimenter, and analyst of 12 test stands for research and risk management in development of SustainX's patented Isothermal Compressed Air Energy Storage (ICAES) technology.
 - *US Patent 8,539,763 & 8,806,866: Systems and methods for efficient two-phase heat transfer in compressed-air energy storage systems*
 - *US Patent 8,234,863 & 8,474,255: Forming liquid sprays in compressed-gas energy storage systems for effective heat exchange*
- SustainX's "Foam Guy," i.e. internal subject matter expert on foam, the enabling technical advance for the novel and cost-effective isothermal compression and expansion process:
 - Improved heat transfer rate 12x while increasing isothermal efficiency 3% by using aqueous foam over water spray. Developed design rules and graphs for use of foam, compiled data into dimensionless numbers applicable to all scales.
- Air and water systems process designer, operator, and data analyst for SustainX commercial scale 1.5 MW, 1 MWhr demonstration electric energy storage plant.
- Designed, built, troubleshoot, and retrofitted processes, systems and components using high pressure pneumatics, hydraulics, compressors, slow-speed long-stroke diesel engines, air and water systems, such as fans, blowers and pumps (centrifugal & positive displacement), valves, filtration, piping, and fittings. Experienced with water meters (pH, conductivity, etc.), tensiometers, refractometers, high speed video, position, pressure and temperature transducers.
- Constructed P&IDs in AutoCAD Electrical, employed instrumentation and data acquisition, and implemented controls.

EDUCATION

ETH Zurich - Zurich, Switzerland

2024

Certificate of Advanced Studies - Designing Resilient Regenerative Systems

CAS#1 - Sustainability to Regeneration

Executive program for designing systems beyond sustainability, utilizing Systems Thinking and Complexity science

Thayer School of Engineering at Dartmouth College - Hanover, NH

2010

Master of Engineering Management, Hutchinson Fellow

Collaborative program between Thayer School of Engineering and the Tuck School of Business

Studies included: Technology Assessment; Entrepreneurship; Law, Technology & Entrepreneurship; Technical Project Management; Optimization; Climate Change & Engineering; Energy Utilization; Statistics; Operations Management; Corporate Finance; Marketing; Financial & Managerial Accounting

University of New Hampshire - Durham, NH

2008

Bachelor of Science in Chemical Engineering, summa cum laude

Elected focus on Biochemical Engineering, Air Pollution & Control, Natural & Synthetic Fossil Fuels, and Polymer Engineering