



## Local Resilience Lab - Proposal Draft

Eric Sauder: 12/15/25

**Mission:** We use technology and design to test and scale appropriate solutions that build resilient communities.

**Problem:** In the 1960s, Buckminster Fuller aptly described humanity's task of piloting "Spaceship Earth." In the decades since, communities face compounding challenges around fundamental needs as Earth exceeds numerous planetary boundaries. At the same time, we have never been better equipped with the knowledge, technologies, and resources to achieve Fuller's goal of "making the world work for 100% of humanity... without ecological offense or the disadvantage of anyone." So why isn't it working?

We believe technology often isn't serving humanity. Instead we get flashy stuff that isn't aligned with what it takes to build thriving communities. These trends are poised to accelerate rapidly as artificial intelligence and real-world robotics scale. If communities do not create local capacity to help metabolize innovation with the explicit purpose of benefiting humanity, we will likely see increased inequality, wealth concentration, and deeper tears in the community fabric. The Local Resilience Lab is an effort to use technology and design to test and scale appropriate solutions that build resilient communities.

### What is the Local Resilience Lab?

The Local Resilience Lab will be a physical design and prototyping facility in Lancaster, PA filled with the people, tools, and resources to build a resilient future. Imagine [IDEO](#), [Alphabet's X - the Moonshot Factory](#), and [Otherlab](#), but focused on community-scale challenges. People are designing and prototyping solutions, fabricating projects, and testing business models in the physical space and in the real world. It attracts curious innovators, and organizational collaborators that are able to question existing paradigms and develop novel solutions. Through social media tools, the world is invited into the lab. Ideas are exchanged to grow necessary solutions with speed.

### What is Resilience?

Our definitions of resilience follow [RegenAll](#)'s work to build community-scale collective impact models:

- **Energy Independence** - energy needs are met with locally produced, renewable energy
- **Food Security** - everyone has access to healthy, local, regeneratively grown food
- **Carbon Neutrality** - achieve net-zero emissions by cutting pollution and restoring natural systems
- **Ecological Regeneration** - ecosystems are prepared for tomorrow's climate
- **Thriving Communities** - all communities are empowered, and included in shaping a just future

## Values:

**Affordability** - solutions must be within reach of the people that need them most

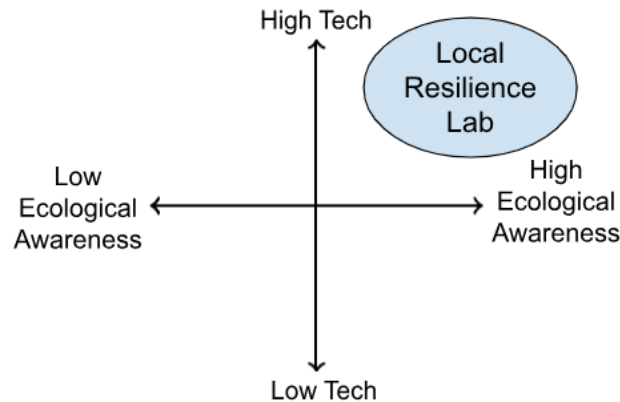
**Openness / DIY** - create replicable solutions and the services to help people implement

**Scalability** - ideal problems are faced by many communities/stakeholders vs. a single entity

**Decentralization** - solutions oppose further concentration of power & wealth

**Abundance vs. scarcity** - design to create a world where there is enough for all

**Solarpunk vs. Degrowth** - imagine a future where high tech and high ecological awareness coexist<sup>1</sup>.



## Business Model:

The Lab will evolve as a collaboration among individuals and organizations working toward shared resilience goals. It offers shared space, tools, and resources for building and prototyping, reducing costs and avoiding redundant investments for members. While members primarily pursue their own projects, the Lab's core value lies in its network: a creative community of innovators with diverse skills and perspectives. By intentionally fostering reciprocal knowledge exchange, the Lab enables members to quickly overcome technical and strategic hurdles, draw on collective expertise, and produce stronger, more scalable outcomes than would be possible in isolation.

### Minimum Viable Lab Pilot:

- **Identify a physical space** - 1,000 sqft minimum; ideally with room to grow.
- **Gather initial collaborators** - Identify a small group of innovators
- **Collect tools & resources from initial collaborators** - The lab probably doesn't need to purchase many things on its own in the early stage pilot. Initial collaborators can provide wood/metal fabrication tools, electronics, test bench equipment, measurement tools, laser cutters, 3d printers, and their own workstations.
- **Identify Initial Projects** - Collaborators bring their own projects. Ideal distribution would demonstrate diversity of real-world fabrication and testing and software development across an array of project themes.
- **Costs**
  - Intent is to keep this as small as possible, primarily any space rental and utilities (if needed)
  - No "staff" for lab
  - Initial tools are brought by collaborators

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<sup>1</sup> Earth has already exceeded many planetary boundaries - this is an important conversation and best critique of the techno-optimist worldview. Within this context, the job of the Local Resilience Lab is to develop strategies that utilize technology for the benefit of humanity.

- **Revenue**

- Short Term: Individual members are initially responsible for their own project budgets
- Long Term: Focus on building a YouTube/social media audience, and cultivate audience of people eager for climate solutions. Empower them to replicate solutions - offer consulting services to help people that find this content but don't have the technical capacity/desire to implement even with clear documentation

***A note on privacy & intellectual property:*** Collaborating individuals and organizations maintain the ownership of intellectual property that they create at the Resilience Lab - AND - the goal is to share. Ideal projects are complex challenges that would benefit from a network of creative individuals vs. cloistered teams focused on privacy and beating opponents to market. Success for these ideal projects generates creative ideas to scale solutions larger than any individual company could ever deliver, while creating revenue generating opportunities to implement solutions.

## **Possible Projects:**

### **Energy Independence**

**Electricity demand management tools** - Create software tools to help businesses quantify the cost of their current power demand spikes and identify solutions to manage (In process with Caleb)

- [www.pjmspike.com](http://www.pjmspike.com)

**Household energy mapping** - Create software tools that utilize available city/county data to identify households that would benefit most from targeted energy efficiency assistance. Reference [BlocMaps](#). (In process with RegenAll)

**Plain-sect diesel to solar conversion** - Create a scalable solution for replacing diesel generators on plain-sect farms with solar + storage (In process w/TeamAg)

**IR drone flights of urban centers** - Gather localized IR imagery to identify households that would benefit most from energy efficiency work

**Data center heat recovery** - Design a strategy to utilize heat recovered from the proposed Greenfield and Harrisburg Pike data centers. Create an advanced energy corridor along the rail line that enables other large industrial partners to offload or utilize heat. (In process with RegenAll)

### **Food Security**

**In-field soil sensors** - Create an inexpensive handheld soil sensor to gather N,P,K,pH, EC, temp data with GPS positioning. Compare with existing lab soil testing and augment with data not captured through these assessments. (In process w/TeamAg)

**Soil spectrometer** - Resurrect the [OurSci soil spectrometer](#) and explore potential uses like in-field rapid soil carbon monitoring or nutrient profile of food crops to link sustainable ag practices with food nutrient quality.

**Local food blockchain** - Implement [Regen Network](#)'s local ledger for ecosystem regeneration and combine with food nutrient quality to create a traceable data tag that recognizes the ecological and

nutritional benefits of food grown with enhanced stewardship to provide a financial premium for producers

## **Carbon Neutrality**

**Small manure storage covers / biogas capture & utilization** - Create systems to capture, quantify & utilize biogas that are cost-effective for existing liquid manure storages on the small plain-sect farms typical within the Chesapeake Bay. Component projects include: cheaper cover technologies that work as retrofits with round concrete storages, inexpensive biogas sensor electronics & volumetric quantification + data collection, gas utilization with low-cost generators/hot water heaters/flares. (In process w/TeamAg)

**Design cost-effective small-scale anaerobic digesters** - Anaerobic digesters exist for smallholder farms around the world with 1-5 cows, or on large local farms with 500+ cows. Design a viable solution for the 50 cow farm typical of this region. (In process w/TeamAg)

## **Ecological Regeneration**

**Ecosystem monitoring** - Build inexpensive sensor arrays to empower conservation nonprofits with better ecosystem monitoring (biodiversity, water quality, soil health etc)

## **Thriving Communities**

**Develop solutions to address Lancaster's poor air quality** - Better understand and innovate around the local causes of the Lancaster's chart-topping air pollution and associated health impacts. May have roots in ag, point source trash burning etc.

**Small-scale power-assisted vehicles** - Similar to the [Velove](#) and [Quicab](#), design small-scale pedal assist vehicles to democratize fossil-free transport.

More example ideas, feeding this initial proposal into Claude:

# 50 Additional Project Ideas for Local Resilience Lab

## Energy Independent (10 projects)

1. **Community Battery Systems** - Design modular neighborhood-scale battery storage that enables solar sharing between households without individual storage capacity
2. **Heat Pump Retrofit Toolkit** - Create standardized assessment and installation guides for converting plain-sect homes from propane/wood to cold-climate heat pumps
3. **Micro-hydro Assessment Tool** - Develop open-source software to identify viable micro-hydro sites using stream flow data and elevation mapping across Lancaster County
4. **Agricultural Waste-to-Energy** - Engineer systems to convert crop residues and spoiled hay into pelletized fuel or biochar for heating
5. **DIY Solar Thermal** - Design affordable solar hot water systems using readily available materials optimized for Pennsylvania's climate
6. **Energy Cooperatives Platform** - Build software infrastructure to help neighborhoods form energy cooperatives for bulk purchasing and shared infrastructure
7. **Window Retrofit Solutions** - Develop cost-effective interior storm window systems for historic homes that preserve character while improving efficiency
8. **Pedal-Powered Tools** - Create human-powered alternatives to common electric tools (washing machines, grain mills, water pumps) for off-grid communities
9. **Smart Grid Participation** - Build hardware/software enabling plain-sect farms to participate in demand response programs without internet dependency
10. **Seasonal Thermal Storage** - Design earth-coupled thermal storage systems that bank summer heat for winter use in greenhouses and homes

## Food Secure (10 projects)

11. **Urban Food Forest Mapping** - Create comprehensive GIS layers identifying suitable public/private land for edible perennial plantings with species recommendations

12. **Preservation Hub Design** - Engineer mobile or modular commercial kitchen facilities that travel to farms for on-site food processing and preservation
13. **Seed Library System** - Develop tracking and distribution platform for community seed libraries emphasizing climate-adapted heirloom varieties
14. **Aquaponics Optimization** - Design cold-climate aquaponics systems using waste heat from biogas or other sources for year-round production
15. **Gleaning Coordination App** - Build platform connecting farmers with excess harvest to food banks, processors, and volunteer gleaners
16. **Root Cellar Revival** - Create modern passive food storage designs incorporating traditional root cellar principles with improved moisture/temperature control
17. **Insect Protein Systems** - Develop small-scale cricket or black soldier fly farming systems for livestock feed or human consumption
18. **Perennial Grain Trials** - Test and promote Kernza and other perennial grains suitable for regenerative farming in Pennsylvania
19. **Community Milling Infrastructure** - Design mobile or shared grain milling facilities to add value to locally grown wheat, corn, and specialty grains
20. **Vertical Farm Prototyping** - Build demonstration vertical growing systems optimized for crops that make economic sense at community scale

## Carbon Neutral (10 projects)

21. **Biochar Production Systems** - Engineer small-scale pyrolysis units that convert agricultural waste to biochar while capturing energy
22. **Wetland Restoration Toolkit** - Create assessment and implementation guides for farmers to restore wetlands for carbon sequestration and water quality
23. **Electric Farm Equipment Conversion** - Retrofit diesel tractors and implements to electric power using modular battery systems
24. **Cover Crop Decision Support** - Build AI-assisted tools that recommend optimal cover crop mixes based on soil type, rotation, and climate projections
25. **Compost Temperature Monitoring** - Develop inexpensive sensor networks that optimize composting while capturing methane emissions data
26. **Silvopasture Design Tool** - Create software helping farmers integrate trees into pastures for carbon storage while maintaining productivity

- 27. **Building Material Carbon Tracking** - Design lifecycle assessment tools for local construction materials emphasizing low-carbon alternatives
- 28. **Transportation Electrification Hub** - Establish charging infrastructure and vehicle sharing programs centered on plain-sect community needs
- 29. **Regenerative Grazing Monitors** - Build GPS livestock tracking integrated with satellite imagery to optimize rotational grazing for carbon sequestration
- 30. **Carbon Credit Cooperative** - Develop infrastructure enabling small farmers to pool carbon credits for viable market participation

## Future-Ready (10 projects)

- 31. **Stormwater Management Systems** - Design residential-scale rain gardens and bioswales with plant selections for projected climate conditions
- 32. **Cooling Center Network** - Create community resilience hubs with backup power and cooling for extreme heat events
- 33. **Flood Early Warning System** - Build sensor networks on streams providing real-time flood prediction for at-risk communities
- 34. **Drought-Resistant Crop Testing** - Trial heat and drought-tolerant vegetable and grain varieties suitable for mid-Atlantic conditions
- 35. **Green Infrastructure Modeling** - Develop tools showing combined benefits of street trees, green roofs, and permeable pavement on urban heat island effect
- 36. **Backup Communication Systems** - Design mesh networks and alternative communication infrastructure for climate disaster resilience
- 37. **Passive Cooling Retrofits** - Engineer ventilation and shading solutions for homes and barns to reduce heat stress without air conditioning
- 38. **Water Harvesting Systems** - Create integrated rainwater and greywater systems sized for household water independence during droughts
- 39. **Climate Migration Planning** - Build data tools helping communities anticipate and plan for climate-driven population changes
- 40. **Emergency Seed Vault** - Establish regional seed storage with climate-adapted varieties preserved for community food security

## Thriving Together (10 projects)

41. **Tool Library System** - Design lending library infrastructure for expensive tools (soil probes, thermal cameras, specialized equipment) with training programs
  42. **Affordable Housing Prototypes** - Develop modular, energy-efficient housing designs using local materials and labor for workforce housing
  43. **Multilingual Tech Access** - Create Spanish/Pennsylvania Dutch interfaces for energy and agricultural tools to ensure equitable access
  44. **Youth Innovation Apprenticeships** - Build structured programs connecting high school students with lab projects and technical mentors
  45. **Air Quality Monitoring Network** - Deploy low-cost PM2.5 and ozone sensors across Lancaster to identify pollution sources and health impact patterns
  46. **Disability-Accessible Farming** - Design adaptive tools and farm layouts enabling people with disabilities to participate in agriculture
  47. **Community Land Trust Support** - Develop legal and financial templates for agricultural and residential land trusts preventing development sprawl
  48. **Repair Café Infrastructure** - Create toolkits and training materials for neighborhood repair events reducing waste and building community skills
  49. **Mental Health Green Spaces** - Design and test therapeutic garden programs addressing rural mental health challenges through nature connection
  50. **Economic Resilience Dashboard** - Build real-time tracking of local food/energy/housing costs and wages to identify community vulnerability and guide interventions
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