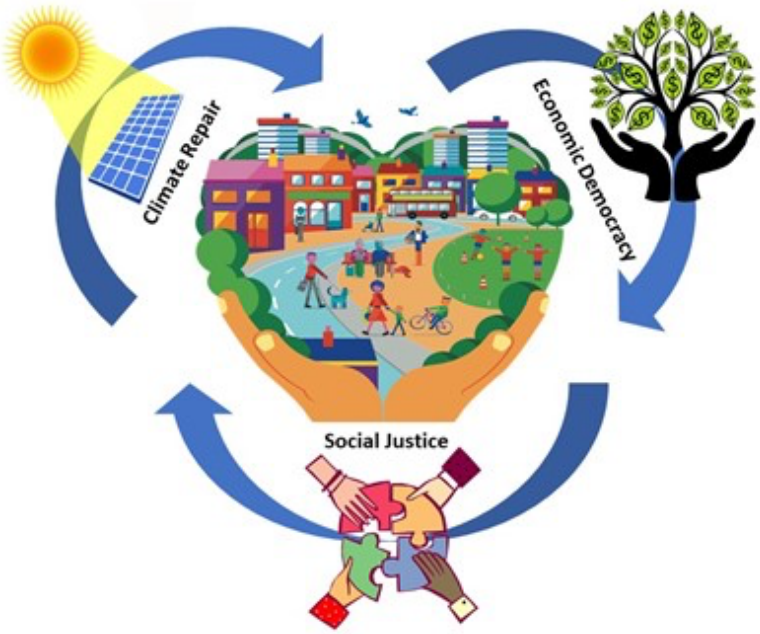
A Feasibility Study for the Integration of Net-Zero Carbon Utility Systems with Affordable Housing in the Eugene-Springfield Area



2021 EWEB GreenPower Grant Application

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Submitted by

Cooperation Eugene and the PROUT Institute

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Cooperation Eugene

PROUT INSTITUTE

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Background

Mission of the organization

The mission of Cooperation Eugene is to develop local resilience and implement strategies that invest in regional self-sufficiency. Cooperation Eugene (CE) seeks to cultivate a thriving and regenerative local economy in the Eugene-Springfield area collaborating with people and organizations and building networks. They are leveraging local knowledge and resources to empower the community and re-center marginalized populations. A cooperative economy in the Eugene-Springfield area offers economic democracy to low-income and BIPOC communities. We are inspired by a national network of similar local organizations, many led by working class and BIPOC communities.

Needs addressed by our organization and population we serve

Cooperation Eugene addresses the needs of the Eugene-Springfield area, emphasizing integrated approaches to problem solving and infrastructure that sustains a Just Transition. The organization reinforces this international movement for regenerative economies. Discussion groups are local, participating in the larger conversation currently taking place world-wide.

Current programs and operating budget

Cooperation Eugene works at the grassroots level to develop, implement, and support programs that promote community development and regional self-sufficiency. Its approach seeks to transcend and repair earlier destructive systems, built principally on exploitation and extraction. Programs implemented by our organization include:

- Homes for All Design Challenge: A collaboration to develop a design to address the need for affordable housing in the Eugene-Springfield area
- Study Circle: Monthly meetings to read, view, and/or listen to materials and discuss them in order to deepen our understanding about the theory and practice of systems change for the regenerative economy
- Time Bank: Lane Service Sharing Network
- Community Asset Mapping: Identification and documentation of community organizations and projects that build the commons
- Community Forums and Discussions: Exploration of methods to integrate activism into projects within the community, including topics of racial justice, housing affordability, economic development and resiliency, and cooperatives

Prior to the COVID shutdown, Cooperation Eugene began to develop a community wealth-building summit, bringing together stakeholders in response to the observation of focused approaches to development that act as an obstacle to systemic change that relies on holistic thinking. This endeavor identified the need to “break down the silos” and create a well-organized community of activists for environmental justice and housing. The PROUT Institute, the fiscal sponsor for Cooperation Eugene, has written widely on and is committed to systemic change and integrated development. This positioned PROUT to bridge these chasms at the theoretical level. Both PROUT Institute and Cooperation Eugene have studied cutting-edge models of solutions and aspire to implement possibilities locally.

COOPERATION EUGENE 2021 BUDGET

Assets	
Checking Account Opening Balance	$2,471.53
Total Assets	**$2,471.53**
Checking Account Minimum Balance	$500.00
Revenue	
Donations	$0.00
Other Income	$0.00
Total Revenue	**$0.00**
Expenses	
Online Services Subscriptions	
Web Hosting	$71.40
Zoom (video conferencing / virtual office)	$180.00
Space Rental	
Large Group Space	$200.00
Outreach & Tabling	
Printing, Supplies & Misc.	$300.00
Projects	
Unforeseen Misc. Project Expenses	$200.00
Grant Writing	$500.00
General Administrative	
5% of Income to PROUT	$0.00
Miscellaneous	$100.00
Total Expenses	**$1,551.40**

Project Description

Purpose of the project and relationship to EWEB's mission

The Homes for All Design Challenge anticipates a new system of housing development that includes climate justice and community involvement to remediate the extreme shortage of housing affordable to low-income community members. The Design Challenge addresses the need for affordable housing while reducing climate impacts and increasing civic engagement, resulting in systemic change. We are engaging forward thinking developers and planners who consider different approaches and solutions to problems that have limited our ability to meet the needs for the Eugene-Springfield community. This feasibility study is a key part of this project.

We propose conducting a **feasibility study** that evaluates the potential of implementing cutting-edge alternative energy and water processing systems developed by a Danish partner, Green Island, into a neighborhood-scale affordable housing and community development project in the Eugene-Springfield metro area.

This project would address EWEB's two strategic priorities:

1. Diversifying sources of energy and water supply
2. Addressing resilience and disaster recovery

Our project is also geared toward dramatically reducing GHG generation in new buildings intended to address local housing shortages.

We expect to employ the assistance of Green Island technology that decentralizes energy production and distribution. Its community-level, modular, on-site design and synergistic alternative energy support resilience and disaster recovery. In addition, modular energy production and distribution systems save energy lost in transmission and reduce environmental liability.

By designing an optimal system of renewables for the Eugene-Springfield area, energy sources are diversified. The Green Island approach synchronizes the full complement of renewable energy sources. Additional information about Green Island can be found in the Attachments.

Our feasibility study will answer important questions regarding the feasibility of neighborhood level solutions of renewable energy in the Eugene-Springfield area and document the potential of this integrated technology in our specific context. The study would be a jumping off point for developers, planners, and policy considerations.

The first such development is a reference project comprising a multi-unit housing development focused on addressing the housing shortage in Bennington, Vermont. This project will be designed as a model showcasing a holistic and integrated approach to fossil-free housing developments that provide community amenities to all residents. The development will use Green Island's advanced energy conservation and production technologies to develop the community, providing good housing and green utilities that result in minimal environmental impact. A reference letter from the Vermont project is in the Attachments.

The population you plan to serve and how they will benefit from the project

The Eugene area has a lower-than-average median income, is in deep housing crisis, and faces deep concerns about climate change. We believe these issues are interwoven, affecting a broad swath of our local population. We focus on systems change to address these urgent crises.

The population served will be the people who are not satisfied or served by local economic opportunity in the Eugene-Springfield area, those households who earn less than 80% Area Median Income. In Eugene, this represents a household income of approximately $38,000 per year.

The Housing Challenge

Lane County faces a profound challenge in providing adequate affordable housing to residents. The Eugene-Springfield area comprises the highest per capita homeless population in the United States. Over half of Lane County renters pay more than 30% of household income in rent and utilities. 32% of Eugeneans live on a household income of less than $25,000/year. For this income bracket there is a deficit of 13,500 affordable housing units. For middle income people with household incomes of $50,000 to $75,000 per year, the community needs an additional 1,700 affordable units.[1] These factors indicate that housing needs, especially for low-income households, are not being met through market-based solutions. According to the December 2020 Lane County Affordable Housing Action Plan, there are only 15 low-income housing units available for every 100 households in need.

It appears that non-profit and policy approaches combined with market solutions are not able to tackle the scale of the problem. The housing shortfall is not as simple as assembling bricks and lumber into livable structures but requires addressing underlying barriers such as policy, financing, economics, environment, and discrimination. These components are often approached as separate issues, lacking the synergy of a multi-faceted approach that will lead to systems change. Our Homes for All Design Challenge attempts to grapple with this issue in order to devise an innovative solution to the housing challenge.

The Climate Challenge

In addition to housing, Eugene has been challenged to design a climate mitigation plan that meets our aspirations as a community. Our holistic vision addresses energy use in *buildings* directly by introducing net-zero carbon technology, *energy use in transportation* by integrating power storage for electric vehicles into residential energy

[1] https://www.eugene-or.gov/DocumentCenter/View/38749/Housing-Affordability-in-Eugene. "Affordability" is defined as 30% of household income.

use, and *consumer energy waste* with dense and cooperative housing design and landfill gases (waste) converted into energy as part of an integrated system. We believe

that this innovative, integrated approach to design can further the Climate Action Plan 2.0 (CAP 2.0) goals of Greenhouse Gas (GHG) reduction.

Besides instituting a resilient, stable, and low-cost power service, the neighborhood development will serve the interests of the wider community as follows:

- Employment of the local workforce and financial partners stimulates the local economy
- Costly climatic impacts are reduced through environmentally-friendly construction and a fossil-free neighborhood utility
- Blackouts are reduced thanks to the redundant systems built into the utility
- Responsible stewardship is demonstrated through the use of sustainable materials and energy-efficient construction
- Cost of housing construction and utilities installation is reduced through the use of modular and prefabrication of shared power modules centered within the community
- Savings generated by this neighborhood power district permits its inhabitants to build capital and retain control of their shared power supply

Strategies you will employ to implement the project

The feasibility study is a component of the Homes for All Design Challenge described above. The Design Challenge is engaging stakeholders and subject matter experts to deepen understanding of components of affordable housing such as land use, financing, innovative materials, climate repair, and community equity and ownership. The resulting project design proposal will integrate these components and affect systemic change.

The feasibility study will identify land that could potentially be used for affordable housing (potentially Urban Growth Boundary expansion) on which to base a hypothetical project that we would use to research feasibility assumptions. We will work with Green Island technical assistance to evaluate potentialities and tap partners and consultants to generate and analyze necessary data.

The feasibility study will offer a realistic plan for Net-Zero Carbon (NZC) affordable housing. Considerations will include cost-efficient construction technologies that emphasize high energy-efficiency, low-toxic material, low-environmental site impact, prefabrication, modularity, adaptability, durability, and resilience. Because we know that all solutions require trade-offs, the study is necessary to identify the optimal configuration of neighborhood/district-level energy production and distribution system of renewable sources.

Below are the questions we anticipate the feasibility study can answer and the strategies we will apply to do this:

QUESTION 1: What is the ideal configuration of renewable energy solutions, based on the climate and natural resources of the Eugene-Springfield environment?
STRATEGIES:

- Employ the Green Island methodology to determine the optimal configuration in the local environment (sources of renewable energy---solar, wind, bio-gas, etc.) for best alternative energy strategies to incorporate.
- Consider upfront investment, on-going cost, availability, reliability.

QUESTION 2: How will this decentralized model integrate with the EWEB grid?
STRATEGIES:

- Collaborate with EWEB to work through the potential interface of microgrid and microgrid systems in the Green Island system to mutual benefit.

QUESTION 3: Will the Green Island model open up funding opportunities in the Eugene-Springfield area?
STRATEGY:

- Beta-test the Green Island "Community Strength Index" that evaluates the risk of social investment strategies and provides data for further discussions with potential funders.

QUESTION 4: What is the cost-benefit and how does it compare to traditional development projects? Will cost to customers be reduced?
STRATEGIES:

- Evaluate the cost of the Green Island solution against traditional energy solutions.
- Integrate ongoing energy savings into estimated monthly housing expenses.

QUESTION 5: How will the system manage fluctuations due to uneven production from multiple sources and disruptive events such as blackouts, fire, storms, etc.?
STRATEGY:

- Analyze the Green Island recommendations.

QUESTION 6: How will this project reduce Greenhouse Gas emissions to help meet CAP 2.0 goals?
STRATEGY:

- Analyze the Green Island recommendations against current solutions. Further information can be found in the Green Island description, attached.

QUESTION 7: What are the policy changes needed to implement this system?
STRATEGY:

- Analyze the Green Island recommendations against current policy.

Project Evaluation

Criteria for a successful project
Determination of the feasibility of the project using the questions listed above.

The results you hope to achieve by the end of the funding period
Documented package of well-researched strategies and methodologies allowing us to approach policymakers, investors and residents.

The method by which you will measure effectiveness.
Panel of experts, representing stakeholders, such as investors, residents, academics, policymakers, energy managers, engineers, architects, and planners, to determine the extent to which the questions have been answered and to stimulate conversation in the community.

Budget and Timeline

Budget

Administrative (10%)	5,000
Architectural and development consulting	30,000
Engineering consulting	10,000
Evaluation review	5,000
Total budget	**$50,000**

Additional support

In-kind expertise	
Studio E	$30,000
Green Island	$50,000
Cooperation Eugene	$35,000
Pending Meyer Memorial Trust grant	$63,000

Timeline

Phase 1: Project Kick-off
Gather information and inputs about energy production and construction design and costs, plan integration of micro/macro with EWEB, identify policy issues to be addressed (6 months)

Phase 2: Midterm Report
Analysis of integration of development and energy systems (3 months)

Phase 3: Expert Review
Presentation and discussion with stakeholders, including but not limited to EWEB, potential residents, policy makers and planners, academics, investors, and developers (6 months)

Phase 4: Final Evaluation
Develop final report (3 months)

ii. List of Board of Directors – *Not Applicable*

iii. Resumes of Key Staff

Clare Strawn, PhD (Project lead)
Clare Strawn's academic background – MEd in community education and PhD in Urban Studies- provides the training to analyze urban problems, design programs and policy, and conduct evaluations. She brings 10 years of experience managing Federal grants and conducting formal evaluation research in the areas of technology and community development. In 2015 she joined the PROUT Institute and participated in a collaboration with a Danish community development project. She instigated Cooperation Eugene in 2018 as an effort to "de-silo" activist projects and integrate them towards cooperative community infrastructure. These efforts build on four decades of grassroots organizing and local involvement in community development.

Jan Fillinger, AIA, CPHC, LEED AP (Project manager)
Jan Fillinger is principal of Studio.e Architecture, a certified passive house consultant, an educator, and a developer of sustainable projects on the West Coast. His academic and professional design work focuses on reducing carbon emissions, through socially and environmentally conscious strategies, climate- and site-responsive buildings, and urban high-density projects. He has devoted 30 years to designing award-winning architecture that combines building science, art, and craft into sustainable, functional, and beautiful buildings. Jan co-founded SOLARC Architecture + Engineering, a firm specializing in cutting-edge energy-efficiency and sustainable design that played a critical role in the design of hundreds of millions of dollars' of green projects in California, Oregon, Hawaii, Washington, and Utah.

Jason Schreiner
Jason Schreiner is President of PROUT Institute. In his professional work, he serves as Associate Director of the Teaching Engagement Program (TEP) in the Office of the Provost at the University of Oregon. For more than a decade he has taught courses for UO's Environmental Studies Program and teaches a First-Year Interest Group called "Just Futures" each fall for new undergraduate students. He has previously worked for Partners for Sustainable Schools, focused on environmental education in K-12 schools in Eugene and Springfield, and for Goal One Coalition, which focused on empowering citizen involvement in Oregon land use decisions. He has previous experience as a commercial organic farmer in Kansas, as a co-owner of an organic food business in Toronto, Ontario, and as Development Director for the Kansas Rural Center.

Alberta Pedroja, PhD (Analyst)
Alberta Pedroja has a doctorate in Applied Statistics and a MS in Education. She brings decades of experience and expertise in multivariate analysis, systems design and project management. She is a charter member of Cooperation Eugene which began in 2018 as part of the New Economy movement.

iv. Amount and source of any other funding support previously received from EWEB *– Not Applicable*

v. Green Island Description

Mission:
Green Island is a social corporation that supports communities in the efforts toward energy self-sufficiency, with a tailored combination of proven fossil-free technologies, from the production of electricity, heating and cooling to the on-site treatment of sanitary sewage. These solutions are available at a competitive cost to buildings, multi-family housing developments, commercial projects, as well as neighborhoods and towns.

Green Island is dedicated to delivering fossil-free energy solutions to housing developments. Green Island uses the most advanced energy conservation and production technologies to develop green utilities, thus benefiting the environment.

Green Utilities are defined as: fossil-free, reliable, community-owned utilities that transfer the savings from energy cost reductions to the home and infrastructure ownership of the community residents.

It will be critical that the community partners with the local utilities to implement the community-owned utility managing heat, power, and waste. The result is that, instead of draining revenue from the community, savings get funneled back into the community and circulated in the local economy, thereby contributing to economic growth that benefits both the community directly served and the wider society.

One component of the Green Island model is community-owned utilities that transfer the savings from energy cost reductions into the community via home and infrastructure ownership.

Partnerships with local utilities will be critical in introducing the hybrid community-owned utility that will manage climate, power, and waste. The feasibility study will develop the mechanism by which we interface the modular system and the macro-grid to store or distribute excess load.

Green Island provides a centrally-sited integrated utility containing centralized heat pumps. A neighborhood-wide distribution network conveys heating and cooling to every resident of the community.

The system will provide onsite energy storage for supplemental peak energy use, will include redundant technology to eliminate power outages, and thanks to its connection to the dominant grid will help reduce excess loads on local utilities during peak power usage times.

The energy unit uses an integrated energy-production mix of energy, including solar, wind, local storage, and recovery of excess heat, resulting in both reduced cost to the community residents and reduced energy load on municipal utilities. The system is therefore beneficial to the local community, the wider society, and the environment.

Heating & Cooling system:

- Use of neighborhood distribution and centralized heat pumps capable of providing heating and cooling
- Use of cyclical systems in the production of energy via solar, wind, local storage, and recovery of excess heat resulting in reduced cost to the community residents and a reduced load on municipal utilities benefiting the environment
- Energy management using the Green Island remote monitoring and platform, low-carbon building materials, handling, and construction techniques

Micro-on-Macro Power system:

- Onsite energy storage for supplemental peak energy use
- Redundant systems will be in place to eliminate power outages
- Connection to the grid to reduce load on local utilities during peak times

Green Island anticipates Greenhouse Gas emissions to be reduced in the following ways:

- Economies-of-scale, efficient resource-use, and mass construction maximizes resource use, leverages bulk material purchasing, reduces construction waste
- Community-centered/cooperative type of development promotes shared transportation and consumer strategies. Eliminate all fossil fuel use, promote electric-only
- Reduced household waste, increase recycling reduction and reuse
- Onsite treatment of graywater and, potentially, blackwater/sanitary waste. Onsite/district power generation and disconnect from fossil fuel (coal and gas) power sources reduce transmission power losses (up to 30%) from remote power sources

Green Island finances the above-described solutions and is reimbursed by the community through a service agreement. Once the system is repaid in full, the price per energy unit drops to reflect only the operations cost. This permits the community to set any price desired and to begin accumulating community capital.

vi. Green Island Vermont Reference

GI VT
GREEN ISLAND VERMONT

Gerald Byrd
Development Advisor
Green Island Vermont
(802)379-7223

To Whom It May Concern;

Green Island Vermont is a newly created company which has been collaborating with Green Island Denmark and the Prout Institute in Eugene, Oregon, for the past year to introduce fossil free innovative energy and utility design to American communities.

Green Island Vermont is a few steps ahead of the Prout Institute in Eugene, having identified land for affordable housing and community development. We have enlisted a Developer, Architect, Engineers and funders for our projects, involving Green Island Denmark technologies.

In working with Green Island Denmark over the past year, we have been encouraged by their generous involvement in applying their designs and financing in the US markets. They have been flexible in scaling down their traditional global and European projects to accommodate smaller scale project developments here in rural Vermont.

With this demonstrated flexibility we are sure they will meet the needs of alternative power and utility projects in the Eugene area.

We are excited to continue our collaboration with the Prout Institute in Eugene with its initiatives, sharing our findings as we proceed with these holistic, integrated models that will change the current building and community development paradigm.

Sincerely,

Gerald Byrd

vii. Green Island Commitment Letter

Green Island ApS, CVR-nr: 40359966 May 2021
Frederiksholms Kanal 30, DK-1220 Copenhagen

Letter of support

Green Island wishes to take active part in this feasibility study. We will provide experience and supporting material based on our model for managing and mitigating risks involved in community-based developments. A substantial portion of this work will be delivered in the interest of freely sharing knowledge with our long-time partners in Eugene – resources spent estimated at USD 50.000 to be delivered pro bono. However, some of the work will be commissioned by Green Island from third party consultancy with the expectation of reimbursement from the grant – amounting to USD 10.000.

Green Island ApS is a Copenhagen-based company established in 2019 with the purpose of mobilizing the achievements in Danish greentech to offer turnkey fossil free utility solutions for local communities.

We integrate the different green technologies to ensure resilience in our systems and create savings for the consumers by harvesting the synergies that arise when combining several technologies.

The vast majority of Danish utilities are cooperatively owned, and Green Island follows this proven model by ensuring local ownership whilst offering professional operations and billing service.

We offer utility solutions within:

Power. PV, small wind turbines, and biogas combines with battery storage and energy management software to organize a micro-on-macro power grid. This system is highly flexible and can operate efficiently with just the battery, software, and a small power generation capacity. The micro-on-macro ability means that the community's power grid is fitted to help stabilizing the macro grid as a service to the DSO whilst trading for electricity to ensure savings for the community.

Heating-cooling. Solar heat combined with electric generation heating and colling using a neighborhood heat pump standard solution. Securing the demand for heating and cooling is done through storage, both short term and seasonal, in systems like Aquifer Thermal Energy Storage.

Water. Solar powered reverse osmosis treats any type of contamination from sewage to groundwater polluted by industry or saltwater intrusion. The system can deliver both drinking water and domestic water.

Waste-to-value. Circular management of organic waste from farming, sewage, and food waste. The system loops nutrient streams resulting in a significantly diminished footprint, alongside significant value creation. The output of the system includes biogas to be used in running electric and/or heating-cooling utilities, and high-grade fertilizers, which can be sold as a commodity or used locally for food production.

Green Island has been involved in implementing these solutions in a number of markets. In Denmark, we have implemented frequency regulating batteries providing services to the national Transmission System Operator (Energinet) through a subsidiary Green Island Aggregators A/S. This effort is to be followed by the implementation of local energy communities, organizing micro-on-macro behind the meter grids. This model is being demonstrated together with a cooperative housing association in Copenhagen, and a model for scaling is being explored with the DSO and municipal representatives.

GREEN ISLAND