CLEAN ENERGY INSTITUTE
UNIVERSITY of WASHINGTON

Envisioning Beacon Hill Clean Energy & Climate Resilience

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Community Partners

Beacon Hill Council Seattle
El Centro de la Raza
Filipino Community of Seattle
Community Liaison: Maria Batayola
Special Thanks: ECDLR: Miguel Maestas, Veronica Gallardo, Ashley Haugen, Maxine Li.

FCS: Agnes Navarro, Gemma Mechure, Germelyn Pasia.

Rev. Angela Ying. Green Project Solutions.

BHCS
EL CENTRO de la RAZA — The Center for People of All Races
Filipino Community of Seattle

Co-Design Goals

This collaboration led by the Beacon Hill Clean Energy & Climate Resiliency Task Force seeks to enhance community resilience and reduce the impact of climate change. Co-design goals include:

> **Decarbonization** of buildings
> **Lower energy burden** through utility bill savings
> **Energy resilience** to support vulnerable populations

The report is structured to be useful for facilitating community decision-making and capital grant applications.

Methodology

Tailored building data, operations, and use scenarios are specific to the community.

> Weekly meetings with community liaison and one or more site visits to each site.
> Coordination with vendor on space use analysis of community buildings.
> Analysis of utility meter data establishes building performance baselines.

Design tools PVWatts and REopt enabled technical and cost performance analysis for energy system design variations around envelope retrofits, heat pumps, solar, and storage.

Financial analysis shows 10-year Net Present Value (NPV) savings vs. capital costs.

Outcomes

> Provided a thorough understanding of how each site operates in regards to **energy used and potential cost savings and reductions in GHGs.**
> **Built Beacon Hill's capacity** to apply for clean energy and climate resilience grants.

Next Steps: Further collaboration with Beacon Hill community facility partners to customize analysis to support grant writing.

Design Process

1. **Understand and document existing building systems** 🔍
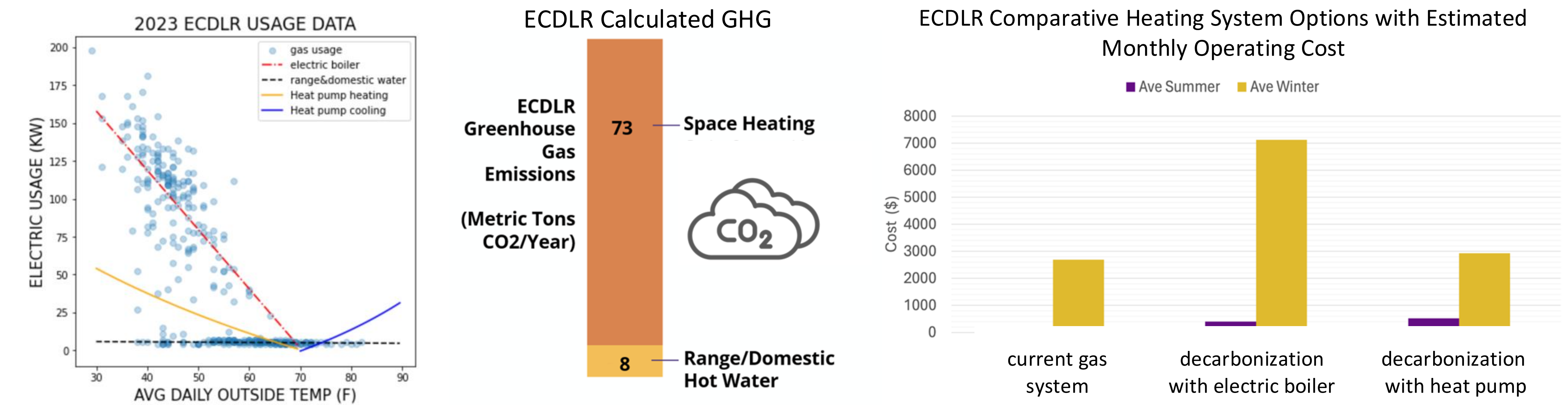   > Space usage
   > Equipment
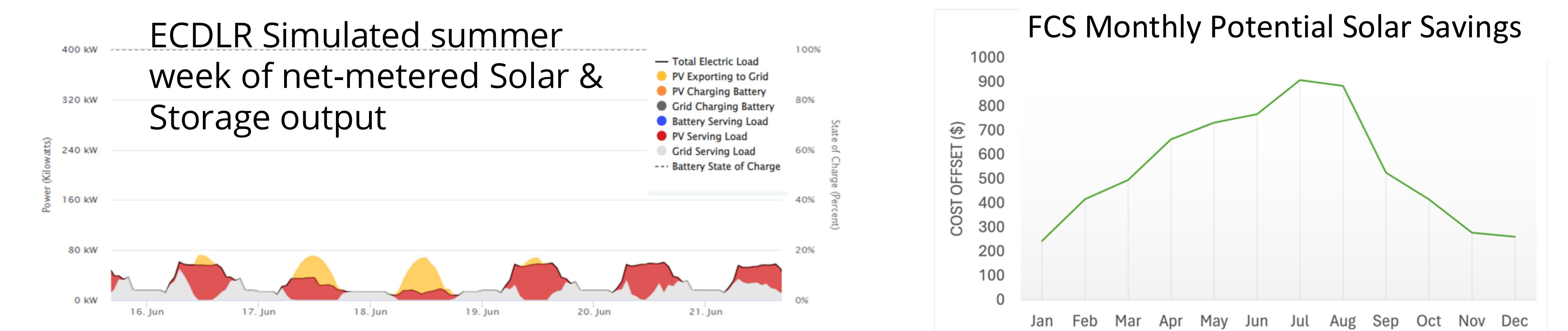

Visiting site and observing equipment.

2. **Analyze meter data** to establish an as-built building performance model 📊
   Service providers: Puget Sound Energy (gas), Seattle City Light (electricity)

2023 ECDLR USAGE DATA — gas usage, electric boiler, range&domestic water, Heat pump heating, Heat pump cooling. ELECTRIC USAGE (KW) vs AVG DAILY OUTSIDE TEMP (F)

ECDLR Calculated GHG — ECDLR Greenhouse Gas Emissions (Metric Tons CO2/Year): 73 Space Heating, 8 Range/Domestic Hot Water

ECDLR Comparative Heating System Options with Estimated Monthly Operating Cost — Ave Summer, Ave Winter. current gas system, decarbonization with electric boiler, decarbonization with heat pump
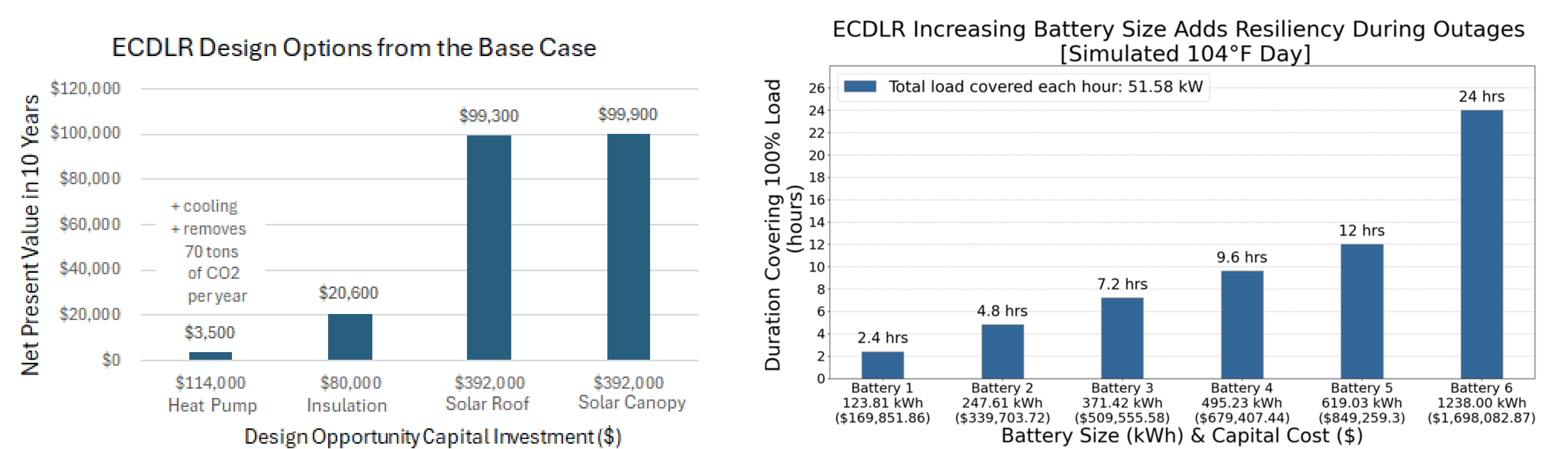
3. **Model alternative energy systems** based on hourly scheduled loads & resources ☀️
   > Performed parametric analysis of retrofits, heating pumps, solar, and storage

ECDLR Simulated summer week of net-metered Solar & Storage output — Total Electric Load, PV Exporting to Grid, PV Charging Battery, Grid Charging Battery, Battery Serving Load, PV Serving Load, Grid Serving Load, Battery State of Charge

FCS Monthly Potential Solar Savings — COST OFFSET ($) Jan–Dec

4. **Design cost options** for capital needs and operating savings 🏅

ECDLR Design Options from the Base Case — Net Present Value in 10 Years. $3,500 ($114,000 Heat Pump), $20,600 ($80,000 Insulation), $99,300 ($392,000 Solar Roof), $99,900 ($392,000 Solar Canopy). + cooling + removes 70 tons of CO2 per year. Design Opportunity Capital Investment ($)

ECDLR Increasing Battery Size Adds Resiliency During Outages [Simulated 104°F Day] — Total load covered each hour: 51.58 kW. Duration Covering 100% Load (hours). Battery 1: 123.81 kWh ($169,851.86) 2.4 hrs; Battery 2: 247.61 kWh ($339,703.72) 4.8 hrs; Battery 3: 371.42 kWh ($509,555.58) 7.2 hrs; Battery 4: 495.23 kWh ($679,407.44) 9.6 hrs; Battery 5: 619.03 kWh ($849,259.3) 12 hrs; Battery 6: 1238.00 kWh ($1,698,082.87) 24 hrs. Battery Size (kWh) & Capital Cost ($)

Based on HP design option. Battery life is about ten years.