

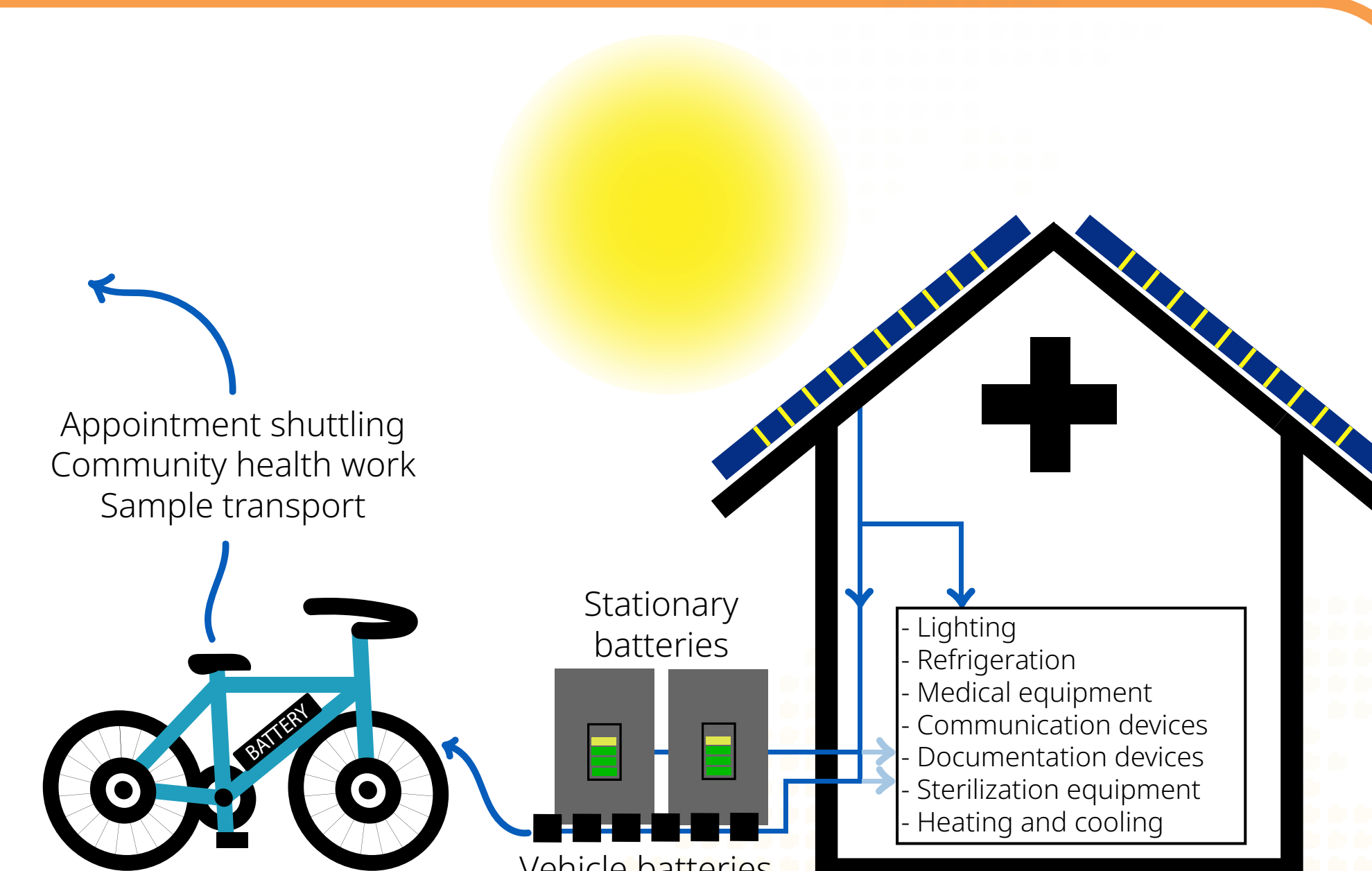
NOVEL RENEWABLE ENERGY NETWORKS

for CLINIC AND COMMUNITY RESILIENCE

This project supports the United Nations Sustainable Development Goals.



A climate-resilient solution



- Off-grid solar microgrids are a promising solution for last-mile electrification. However, standard design methods often fail to consider the unique context and financial constraints that accompany the engineering of renewable energy systems for clinics in resource-limited settings.

- In response, we are developing an open-source decision-support toolkit for clinics and global health organizations that provides custom design parameters for a novel vehicle-to-grid network, i.e., an **off-grid solar microgrid-to-electric bicycle** network.

- The basis of our toolkit is two mathematical optimization models that take the clinic's preferences and traditional solar design parameters as input.

- The key objectives of the sizing model are to 1) minimize cost of the system while safeguarding the clinic against high-impact, low-probability, non-stationary weather predictions and 2) balance resilience and cost in a way that ensures implementation is attainable.

- Why e-bikes? The batteries can supply backup power to the facility and be leveraged to augment clinic services. Plus, e-bikes have been proven to be effective agents of last-mile healthcare delivery and offer a more accessible and serviceable mode of transportation.



Does it work?

Short answer, yes! Using a local test case, our model achieves significant savings in solar and storage capacity compared to textbook design methods and industry standards.

Now, we are refining the model and building simulation scenarios to better quantify performance.

What's next? This spring, we will travel to Colombia to collect input data and baseline clinic utilization metrics in close collaboration with our community partners. Based on the results of our analysis, we aim for implementation later this year.



Did you know?

1 billion

people worldwide receive healthcare in a facility without reliable electricity.

World Health Organization (2023)

Effective healthcare provision, from recordkeeping to administering lifesaving treatments, requires reliable access to electricity. Without it, consequences for providers and patients are disruptive at best and deadly at worst.

Madison, Wisconsin, USA



PILOT SITE

Tezhúmake, La Guajira, Colombia



CASE STUDY

