IN²

Innovation Incubator

WELLS FARGO

+

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

+

Whisker Labs

Funding, Mentorship, and Coaching

Research and Testing Support

Energy Metering

NREL researcher Bethany Sparn installing an early prototype of the Whisker Labs technology in NREL's Energy Systems Integration Facility's Systems Performance Lab.
Photo by Dennis Schroeder/NREL

Peel-and-stick submetering technology enabling cost-effective insight into whole-building energy performance

The Wells Fargo Innovation Incubator (IN²) fosters and accelerates early stage commercial building technologies. Founded in 2014, IN² is a five-year, $10 million program funded by the Wells Fargo Foundation and co-administered by the U.S. Department of Energy's National Renewable Energy Laboratory (NREL).

Whisker Labs

MARKET NEED

The ability to measure the energy consumption of individual building systems provides a wealth of information allowing building owners and operators to track and improve whole-building energy performance. Existing submetering systems are costly and require skilled technicians to install and monitor. The commercial building market, particularly in small- to medium-sized buildings, needs reliable, cost-effective submetering solutions.

TECHNOLOGY SOLUTION

Whisker Labs develops peel-and-stick energy metering technology that could reduce energy metering costs by 90%. The sensor is applied directly to the outside of a circuit breaker, allowing for simple, non-invasive installation by non-technical staff. Information collected through the sensors and the Whisker Labs data management system can be used by third-party energy information systems, providing building owners with real-time insight into building energy consumption to drive optimization and planning decisions. The ease of use and affordability of Whisker Labs' technology could break down barriers to adoption for building owners and operators, enabling cost-effective energy savings in commercial buildings.

INNOVATION INCUBATOR (IN²) PROJECT

Whisker Labs, a startup out of Oakland, California, was referred to the program by Bay Area accelerator Prospect Silicon Valley. At the time of their selection into the IN² program, Whisker Labs self-categorized as producing a Tier 2 (prototype) technology, with their meters installed in prototype form but not yet commercially available. The company identified several challenges to advancing the commercialization of their technology, including a need for technical development of the embedded software and technology validation through pilot opportunities.

IN² Program Structure

IN² supports companies in three stages of development, with the goal of helping each company meet critical milestones to advance them to the next tier.

Tier 1 **Bench scale**

- Concept development
- Plans for prototyping

3 to 5 years to market

Tier 2 **Prototype**

- Testing and validation
- Plans for final product

less than 2 years to market

Tier 3 **Commercially-ready**

- Integrated demonstration
- Production models available

less than 18 months to market

Whisker Labs hub for wirelessly communicating circuit-level information to the cloud.

For the IN² project specifically, Whisker Labs requested pilot project support and detailed technical evaluation of their technology.

To kick off the project, the Whisker Labs team visited the NREL campus to tour lab facilities, learn more about NREL's research capabilities, and discuss options for the scope of work. Between the technical assistance and project support funding, a scope of work was developed that addresses many of the current development challenges facing the company.
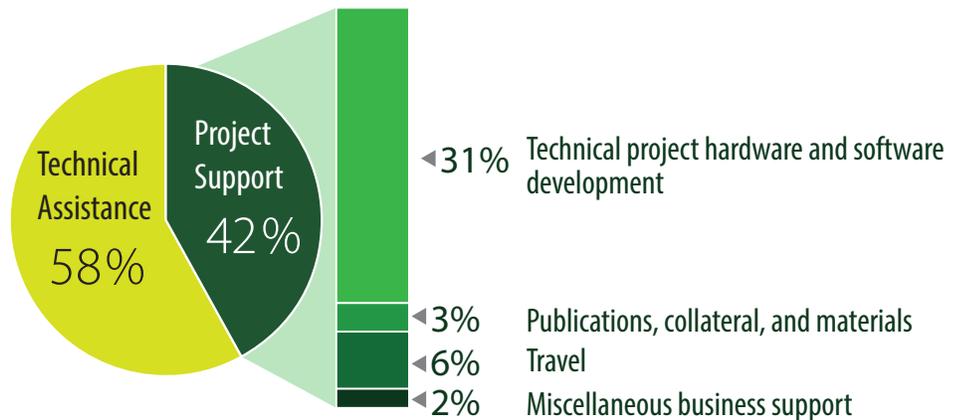
Project Support Funding

Whisker Labs received project support funding primarily for hardware and software development related to the technical project. This included purchasing testing supplies, developing the prototype sensors to be tested, and advancing the development of the software components of the technology.

According to Oren Schetrit, chief executive officer of Whisker Labs, the availability of this direct funding was extremely valuable.

> *Especially when developing hardware, there are a number of capital-intensive expenditures that a small company like ours needs to make,"* explains Schetrit. *"Achieving these milestones is critical before raising capital from outside sources, who want to see development progress before investing."*

Whisker Labs IN² Project Funding

Technical Assistance **58%**

Project Support **42%**

- ◄ **31%** Technical project hardware and software development
- ◄ **3%** Publications, collateral, and materials
- ◄ **6%** Travel
- ◄ **2%** Miscellaneous business support

Awarded companies are eligible for up to $250K in total funding. Funding is primarily allocated for technical assistance, followed by requests for project support funding.

Technical Assistance

NREL will conduct a third-party laboratory validation of the accuracy and usability of the Whisker Labs technology, and potentially support a pilot demonstration of the technology in a real-world application.

Accuracy

Whisker Labs' sensors were tested for accuracy against reference research-grade meters using typical building loads in the Systems Performance Lab at NREL's Energy Systems Integration Facility. This highly flexible laboratory contains a variety of residential and commercial building loads, allowing researchers to plug various technologies into the system and test them under a variety of conditions. In parallel to the testing at NREL, Whisker Labs continued to refine its product and sent a second iteration of the sensors for the researchers to test. Feedback to the Whisker Labs team on the results of the accuracy testing can help the company further understand how components of the technology can be optimized.

Ease of Installation

A key value proposition of Whisker Labs' technology is ease of installation by building owners and staff. The Whisker team used a portion of the project support funding to develop a smart phone application to assist customers during the installation process. This will eventually be an end-to-end system capable of guiding the user through the entire process from unboxing the technology to integrating the sensor data into a third-party analytics tool. The NREL researchers provided feedback to Whisker Labs on their experience using the mobile application to install the technology, while also testing the sensors to determine any impacts improper installation have on sensor accuracy and operability.

Real-World Testing

Following completion of NREL lab testing and performance validation, the Whisker Labs technology will be beta tested in a commercial facility such as a Wells Fargo bank branch. The less controlled environment of a pilot will allow NREL to evaluate how the technology performs under real-world load profiles and electrical distribution systems as well as demonstrate the benefit of submetering in a commercial building. NREL will support this pilot effort by assisting in site selection and conducting site monitoring, data analysis, and reporting. According to Schetrit,

> ❝ *A real value will come from the site demonstration by obtaining an independent third party's unbiased feedback on how the technology performs in the wild, a critical validation point for early adopters. Bar none, the most important thing for an early stage startup is gaining market traction—and that means getting customers."*

Whisker Labs' plotting interface shows circuit-level power, voltage, and current information via the Web.

Whisker Labs' sensors are about the size of a thumbnail. They have a peel-and-stick interface allowing them to be applied to the front face of a circuit breaker.
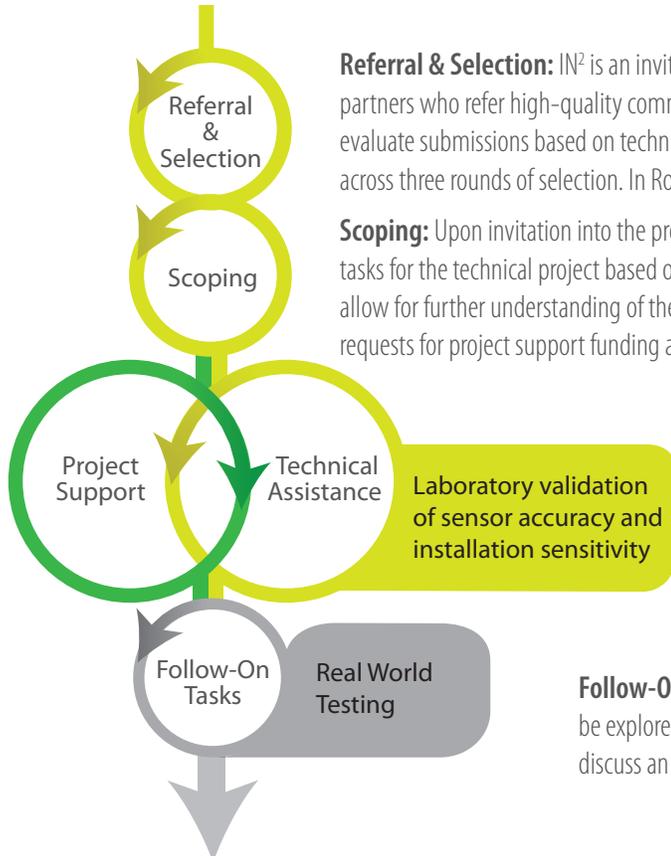
Photos and screenshot provided by Whisker Labs

PROJECT IMPACT

Feedback from the NREL researchers regarding installation and system usability will help optimize the associated software packages, including the user interface and data management platform. Results of the sensor testing, within both NREL's lab and in the field, will provide sensor accuracy data that Whisker Labs can pass along to potential customers. A pilot test of their technology in an operational environment will also help prove the technologies applicability and potential value within a commercial building setting. Whisker Labs plans to use momentum from these activities to build up their customer base and revenue to continue scaling their company.

Steve Lanzisera, Whisker Labs chief technology officer, demonstrates the sensing technology to IN^2 stakeholders in NREL's Energy Systems Integration Facility. The sensors are connected to breakers used to power the light panel, and energy data is displayed through Whisker Labs data management system.

IN² PROCESS

Referral
&
Selection

Scoping

Project
Support

Technical
Assistance

Laboratory validation of sensor accuracy and installation sensitivity

Follow-On
Tasks

Real World Testing

Referral & Selection: IN^2 is an invitation-only program, relying on more than 30 incubators and universities as channel partners who refer high-quality commercial building technology companies to apply. Three separate selection committees evaluate submissions based on technical merit and business opportunity. Companies will be invited to participate in IN^2 across three rounds of selection. In Round 1, Whisker Labs was one of four early stage companies awarded.

Scoping: Upon invitation into the program, an iterative scoping process begins during which NREL proposes various tasks for the technical project based on the company's request for assistance. A site visit often accompanies this process to allow for further understanding of the company's technology and fit with NREL's capabilities and facilities. Secondarily, any requests for project support funding are scoped.

Technical Assistance: Tasks outlined in the technical project begin with stage gates associated with each task. Projects may range from 6–18 months.

Project Support Funding: Awardees may request project support funding for specific critical business related activities, primarily in support of the technical project. Agreed funding is allocated to the awardee via a subcontract with associated milestones and deliverables.

Follow-On Tasks: Upon completion of an IN^2 project, options for a beta demonstration may be explored for commercially-ready technologies. For lower-tier technologies, opportunities to discuss an additional technical project may arise.

For more information about IN^2, email *IN2@nrel.gov.*