



INNOVATING FOR IMPACT  
**ANNUAL REPORT 2021**

Founded by: **WELLS FARGO** | **NREL**



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## FROM THE DIRECTORS

**Impact.** That is the single word that comes to mind when we at the Wells Fargo Innovation Incubator (IN<sup>2</sup>) ask ourselves: What is our ultimate goal? We want our program to support the technology advancement and commercialization of cleantech innovations that will go on to make buildings more energy efficient, agriculture more sustainable, and the next generation of housing more affordable to build and maintain.

Seven years into the program, we know IN<sup>2</sup> is but one link in the chain to a cleantech startup's success, but it is an essential connection that accelerates harvesting investments and movement into the market.

In 2021, we hit a huge milestone. Since joining IN<sup>2</sup>, companies have now raised more than \$1.18 billion in external funding. The road to commercialization, especially in hard tech, is not fast. Long-term capital and assistance like the type given in the IN<sup>2</sup> program bets on the long game and pays off. As we brought on two new cohorts, numbers 8 and 9, in 2021, we're seeing astounding outcomes from previous ones. 75% of Cohort 1 and 45% of Cohorts 1-3 were acquired, merged, or achieved an IPO. To us, this marks widespread success!

But what about that important word—impact? We haven't forgotten.

In this year's annual report, you will read about the impact our very first cohorts are making in the real world. IN<sup>2</sup> companies are changing the way the world manages, builds, and grows infrastructure and crops. We are proud to be part of their journeys.

2021 also marked the beginning of new adventures for IN<sup>2</sup>. We elected a cohort of companies working in indoor- and controlled-environment agriculture. This cohort encompasses everything from energy-efficient lighting innovations to the ability to measure the carbon footprint of indoor production. With the brainpower between our two technical powerhouses, the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) and the Donald Danforth Plant Science Center, we approached this cohort with systems thinking. The problems with climate, environment, and economics

are not individual issues—they share deep connections. Business, engineering, and biological expertise are all needed to tackle the challenges in this cohort, and we cannot wait to see the results.

We also embarked on a challenge to build a demonstration cohort in 2021, bringing together the trio of NREL, startups, and industry demonstration partners. This cohort will focus on assisting startups over the commercialization valley of death while offering NREL expert assistance to both the startup and the demonstration partner as they pilot new innovations in the real world. The application process took place in 2021, and the demo cohort was chosen in January 2022. To help drive additional demonstration projects, we partnered with Farmers Business Network to provide past and future agricultural cohorts with field trial opportunities, using an expansive grower network with the potential for building commercialization pathways for startups and decarbonization pathways for the agriculture sector.

In 2021, we expanded our diversity, equity, and inclusion initiatives. With our partners, we surveyed the cleantech landscape and curated the ecosystem's thoughts and recommendations, and we leveraged our Channel Partner Strategic Awards to provide \$350,000 in competitive awards to four partners tackling challenges in this space. We hope to apply the learnings from these projects to invest even more in our programmatic design and our partnerships, and advance minority entrepreneurship in the cleantech space.

The combined impacts our startups continue to make are humbling, but more must be done. This program should be something our community builds. It's time to embrace the goal of this community. Supporting promising startups on their paths to commercialization by providing demonstration opportunities, financing additional projects, or supporting the incubation programs that are building an innovation pipeline across the nation. Together, we can add to your impacts by delivering economically viable, low-carbon, and environmentally transformative products to the world.

## IN<sup>2</sup>: Built for Impact

The Wells Fargo Innovation Incubator (IN<sup>2</sup>) is a \$50-million collaboration between the Wells Fargo Foundation and the U.S. Department of Energy's (DOE) National Renewable Energy Laboratory (NREL) to provide technical assistance and validation to promising cleantech startups. The goal of the technology incubator is to speed to market innovative technologies that will lower carbon emissions and de-risk them for investment.

Founded in 2014, we continue to make a measurable impact in the built-environment and agriculture sectors, and we are ready to expand. IN<sup>2</sup> has supported 56 companies that each received up to \$250,000 in non-dilutive funding. The companies use the funding to engage the world-class talent and facilities at NREL and the Donald Danforth Plant Science Center. The program matches each company with a lead researcher who is an expert in the technology area and uses a team of relevant researchers, labs, and equipment to support a collaborative technical assistance project.

### Technical Assistance and Validation: NREL and the Danforth Center

The access to resources at two of the nation's most highly regarded research facilities sets IN<sup>2</sup> apart.

The research into affordable housing and commercial buildings takes place at NREL in Golden, Colorado. As a national laboratory, NREL is a global leader in advancing the science and engineering of energy efficiency, sustainable transportation, and renewable power technologies, and provides the knowledge to integrate and optimize energy systems. Our companies receive not only expert guidance from researchers at the lab, but also the benefit of access to multimillion-dollar user facilities.

Research with our agtech startups takes place at the Danforth Center in St. Louis, Missouri. The Danforth Center is the world's largest independent plant science institute. Founded in 1998, the nonprofit research institute's mission is to improve the human condition through plant science. The Danforth Center has 31

scientific teams; \$250 million in competitive research funding from government agencies, industry, and foundations; and a greenhouse complex that provides 54,130 square feet of active growing space.

Combining expertise from both the Danforth Center and NREL, in 2021 we embarked on supporting five indoor ag companies. Three of the five are leveraging services from both research facilities for their projects. They are working toward breakthroughs in lighting, water use, and sensors.

## Impact on the Market

Our numbers demonstrate  
our success:

**56**

portfolio companies

**\$1.18B**

in external funding received  
since the launch of IN<sup>2</sup>

**81:1**

For every \$1 invested by IN<sup>2</sup>, portfolio  
companies raise more than \$81

**146%**

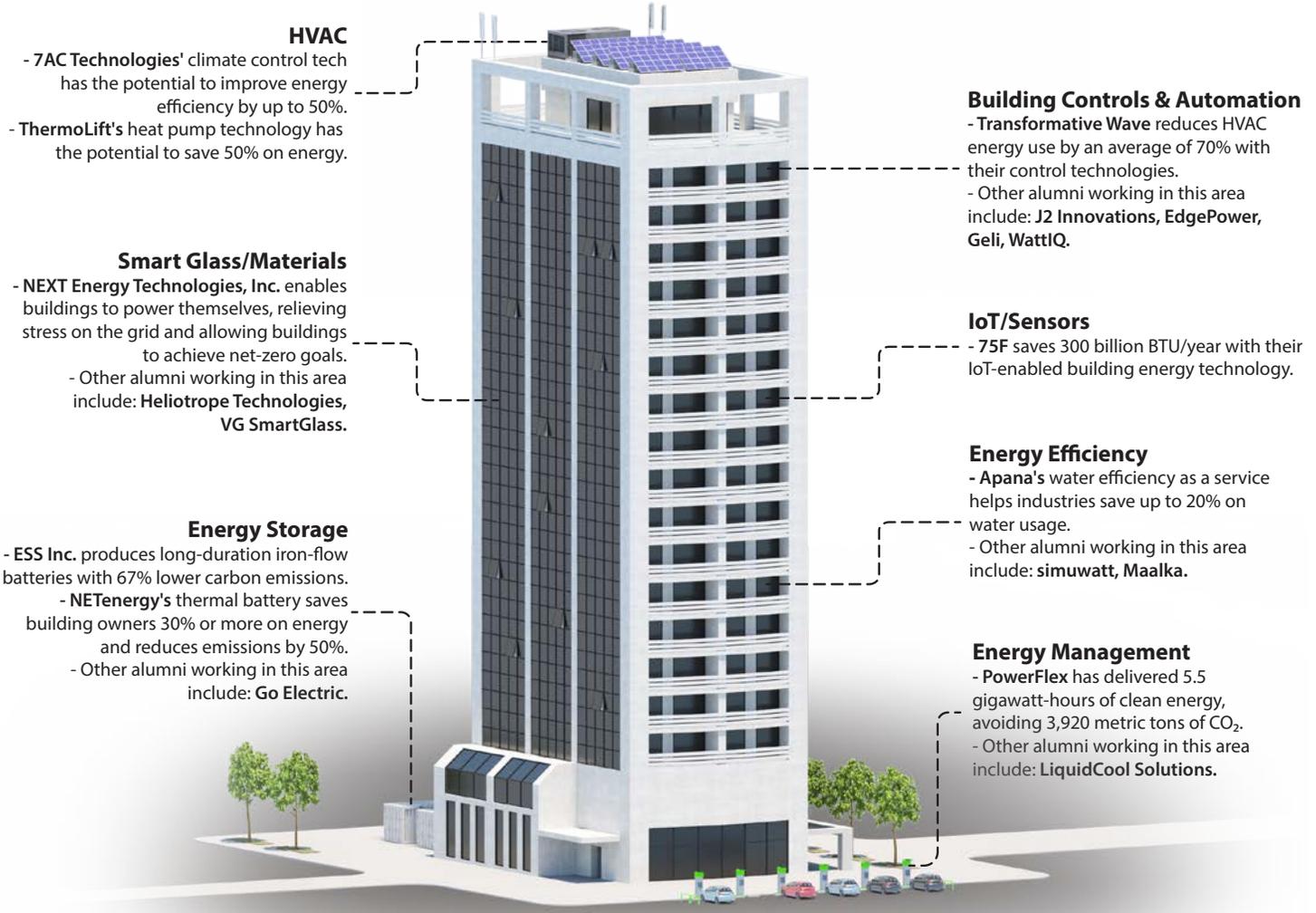
employment growth for  
the IN<sup>2</sup> portfolio of companies

**10**

mergers & acquisitions of  
IN<sup>2</sup>-assisted startups

# How IN<sup>2</sup> Alumni Impact the World

Commercial buildings, housing, and agriculture account for 23% of all the U.S. greenhouse gas emissions and 42% of U.S. energy consumption. Our alumni are working to lower these numbers.



## Crop Inputs/Nutrition

- Intrinsic Bio's beneficial microbes increase crop yield, quality, and drought tolerance.
- Other alumni working in this area include: Plastomics.

## IoT/Sensors

- Aker increases yields by transforming how farmers monitor crops for pests and pathogens, serving more than 2,500 ZIP codes.

## Materials

- SolGro can increase crop yields by 2x with greenhouse-glazing technology.

## New Crops/Genetics

- CoverCress creates a low-carbon cover crop for fuel and feed.
- Pluton Biosciences' micromining tech has the potential to sequester up to 1.7 tons of carbon per acre/year.

## Construction Innovation

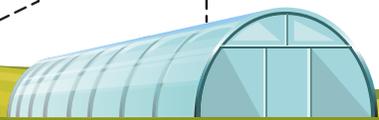
- Blokable's modular housing units provide affordability and electric grid resilience.
- Pre Framing Corp's preframed walls could save up to 2 million tons of CO<sub>2</sub> emissions.

## Building Controls/IoT

- Whisker Labs' sensing and software products have detected and prevented more than 450 house fires to date.
- Other alumni working in this area include: STRATIS.

## Materials

- Glass Dyanamics creates efficient windows that can save up to 20% on energy.
- Other alumni working in this area include: Cypris Materials, Techstyle Materials.





## IN<sup>2</sup> ALUMNI IMPACT THE ENVIRONMENT, THE MARKET

IN<sup>2</sup> identifies, validates, and scales promising cleantech startups, with the goal of commercializing high-impact, low-carbon solutions for the built-environment and agriculture sectors. One of the most important factors our board and industry experts consider when selecting which startups are accepted into the IN<sup>2</sup> program is if their technology has a high probability of making a positive environmental impact once they reach the market at scale.

We can define and measure environmental impact in several ways. The companies in our sustainable agriculture cohort, for example, address challenges related to the industry's ability to sustainably feed the growing population through innovative solutions in crop nutrition, physical infrastructure, automated crop protection, indoor agtech, and new crops. Our other cohorts include efforts to reduce the energy consumption of commercial buildings and residential housing, which combined consume 40% of the nation's energy. These companies make a difference, through energy management technologies, advanced manufacturing and construction processes, sustainable materials, energy storage, and improved heating, ventilation, and air conditioning (HVAC).

Since our founding in 2014, 32 of the 56 startups in IN<sup>2</sup>'s portfolio have graduated from the program. With the technical assistance and validation of the Danforth Center and NREL, and the prestige associated with that validation, IN<sup>2</sup> propels our companies along the path from bench or prototype scale to commercial viability. Our alumni remain active today, contributing to lowering the environmental footprint of their respective fields.

Impactful solutions also translate into market competitiveness. We're proud to say that 10 of our alumni companies were acquired or merged with major corporations. Also, our portfolio of startups collectively raised more than \$1.18 billion in external funding since joining IN<sup>2</sup>. As startups continue to join and graduate from the program, it is our hope they can deliver impacts similar to those provided the following sample of featured alumni companies:

### 75F

Commercial and residential buildings currently account for more than 40% of energy usage in the United States. To improve the energy efficiency of buildings, as well as the comfort and health of its inhabitants, 75F

developed an Internet-of-Things (IoT)-based building management system (BMS) that can monitor, analyze, predict, and control a building's hot and cold spots before they occur. This technology uses smart sensors and controls to optimize where and when to adjust indoor air quality and lighting, reducing energy use by 30%–50% for equipment controlled by the system.

Through IN<sup>2</sup>, NREL supported a technology validation study using DOE's EnergyPlus™ program, simulating the use of 75F's BMS across 14 different building types and 857 different U.S. climates. The simulations conducted using the national lab's supercomputers provided 75F with detailed data on their BMS's energy and cost savings potential, which 75F can then provide to potential investors and customers.

Since graduating from IN<sup>2</sup>, 75F has raised a \$28M Series A and announced a collaboration with Daikin Applied Americas, the world's largest manufacturer of HVAC systems. 75F has also been impactful in supporting commercial buildings facing challenges associated with the COVID-19 pandemic. 75F enables building managers to remotely monitor and adjust energy use in unoccupied spaces, and also offers an "epidemic mode," which automates adherence to the U.S. Centers for Disease Control and Prevention's guidelines concerning ventilation in indoor spaces such as offices and schools.

## Aker

Farmers need to regularly survey their fields to ensure their crops are not damaged by pests and diseases, a process that can take countless hours and comes with a large margin of error. Aker's TrueCause™ technology helps farmers automate this process by collecting data from above and below the growing canopy using drones equipped with probes and sensors. Aker then translates these data into information that allows growers to identify crop threats quickly and accurately.

By working with IN<sup>2</sup> and the Danforth Center, Aker expanded their technology's capabilities beyond insect pest information to include early detection of pathogens. Through the partnership, Aker conducted field pilot projects with early adopters, providing the information and proof points needed to help accelerate market validation.

By using Aker's technologies, farmers can reduce the amount of pesticides used on crops, focusing only on the areas that need attention. These increased efficiencies result in higher yields, lower costs, and increased environmental sustainability. Aker secured \$3.5M in venture capital funding since joining the IN<sup>2</sup> program and is currently expanding its business into Brazil and Mexico, in addition to the more than 2,500 ZIP codes they already serve.



## J2 Innovations

As buildings become smarter and more complex, the additional devices and equipment needed to operate them can result in increased energy use, and in turn, increased carbon emissions. J2 Innovations addresses this issue by working with building managers, original equipment manufacturers (OEMs), and IoT device companies to reduce the energy impact on the environment. J2's software, the Fluid INtegration (FIN) framework, enables OEMs to speed their time to market, system integrators to reduce labor and time required to design and commission building automation systems, and building owners and facility managers to save operating and energy costs.

J2 Innovations and IN<sup>2</sup> collaborated on prototyping a potential fault detection and diagnostics application for the FIN framework, which automatically and proactively identifies and addresses building system problems before they cause significant energy waste. The collaboration utilized DOE's EnergyPlus™ program to simulate various buildings, integrating the FIN framework to validate and quantify the energy impact this technology could have on the built environment without the need of existing buildings.

The same year they graduated from the IN<sup>2</sup> program, J2 Innovations was acquired by Siemens. Siemens was originally an OEM customer of J2 Innovations. The company has since doubled in size, expanding into Europe and Australia. As the reach of the FIN software grows, so does the reduction of carbon emissions, with J2 Innovations seeking to impact not only large, LEED-certified buildings, but underserved smaller buildings as well.

## PowerFlex

Despite the environmental benefits of electric vehicles (EVs), the increased use of EV charging presents challenges such as "peak demand events," where the widespread need for electricity can significantly increase prices and stress the grid. PowerFlex provides an adaptive EV charging technology that adjusts the speed of the charge based on several factors, such as



the number of vehicles plugged in at any given time, other energy demands on the system, and available power from different energy sources. Through managed charging, grid operators and charging station managers can save on the money and energy needed to power EVs.

PowerFlex approached IN<sup>2</sup> for help testing their joint optimization of EV charging and grid operation. The project used NREL's Flatirons Campus as a living laboratory, where NREL installed 16 charging stations managed by the PowerFlex adaptive charging network for employee use. PowerFlex used the resulting data to improve and develop its product. NREL ultimately purchased the chargers, as well as 108 more for its South Table Mountain campus in Golden, Colorado.

EDF Renewables North America, a major renewable-energy producer and service provider, acquired PowerFlex in 2019. Through its expanded capabilities, PowerFlex now contributes to on-site smart microgrid systems that incorporate solar and storage with the EV charging systems.

# OUR PORTFOLIO

IN<sup>2</sup> selects startup companies that have a high probability of making a real impact on the cleantech or agtech market. These active projects provide viable solutions in affordable housing, commercial buildings, and sustainable agriculture.



## Affordable Housing

The typical U.S. family spends more than \$2,000 a year for home utility bills, and around 10% of global energy-related emissions come from materials used in construction and maintenance of buildings, including housing. To make a positive impact, in 2021 IN<sup>2</sup> helped startups create high-quality housing using industrialized construction, develop energy-saving coatings on traditional wall materials, create more energy-efficient windows, and more.

“With the IN<sup>2</sup> program, we were looking for the third-party validation aspect—we don’t have certified testing procedures. And we were looking for the expertise as well. It really rounded out and enabled us to do our development effectively.”

— Elise Strobach

CEO and Co-Founder, AeroShield



A prototype of a prefabricated housing unit—called a Blok—is hoisted into position after it was transported to the Vehicle Testing and Integration Facility on the NREL campus in Golden, Colorado, where it underwent testing. The Blok is an experimental unit of the new Blokable affordable-housing design paradigm, which generates low-cost, secure, and resilient housing for previously unserved populations. *Werner Slocum, NREL 62502*



**AeroShield** manufactures a super-insulating, nanoporous form of gel for energy-efficient windows. NREL conducts lab material characterization and durability analyses of the AeroShield material, models whole-building energy to quantify the predicted savings on building energy use and cost, and conducts techno-economic analyses to help the company apply its resources strategically.



**Darcy Solutions** develops groundwater-sourced heating and cooling systems designed to eliminate hydrocarbon emissions and reduce HVAC costs in buildings.



**EnKoat** re-engineers traditional architectural coatings, like paint, plaster, and stucco, into energy-saving coatings by incorporating phase change materials. NREL has predicted energy efficiency with modeling and optimization tools, conducted material system performance optimization and verification, and worked with EnKoat on the development of a stakeholder engagement and market transformation plan.



**NeoCharge** is building an integrated software platform that will synchronize charging of electric vehicles and appliances. The company's Smart Splitters are designed to allow fast, simple charging at home and to reduce carbon emission by up to 55%.



**Radiator Labs** designs insulated, smart thermostatic radiator covers networked to a central-heating plant. The system redistributes steam flow from overheated to colder rooms to increase comfort and reduce energy costs and emissions.





**Shifted Energy** develops a power controller and accompanying software that converts existing electric water heaters into intelligent, grid-interactive water heaters. NREL is providing technical assistance with the controller’s forecasting algorithm and performing lab validation of their algorithms using actual water heaters.



**Span** is reinventing and redesigning the in-home electrical panel. Its goal is to make it easy and inexpensive to integrate renewable energy sources into the average electrical panel. Span looks to NREL to evaluate its panel in the lab’s smart-home simulation system and to characterize the potential value of its panel for effective grid operations/management.



**Stash Energy** develops a ductless heat pump with built-in thermal energy storage and a thermostat that allows electric utilities to balance heating and air-conditioning demand to lower costs.



**Tallarna** (formerly Pivot Energy Services) designed a cloud native platform that provides tooling and analytics to capture the energy performance of buildings, tailored specifically for financial and insurance underwriting.

**Our Alumni**

Blokable

Glass Dynamics

STRATIS

Whisker Labs

Cypris Materials

Pre Framing Corp

Techstyle Materials



Glazers install one of five quantum dot windows from UbiQD at the NREL Cafe. The windows will remain installed for one year as NREL and UBIQD collect data. Quantum dot laminated glass absorbs sunlight and the glow from quantum dots is trapped in glass by internal reflection and guided to the solar cells at edges to generate electricity. *Dennis Schroeder, NREL 64976*

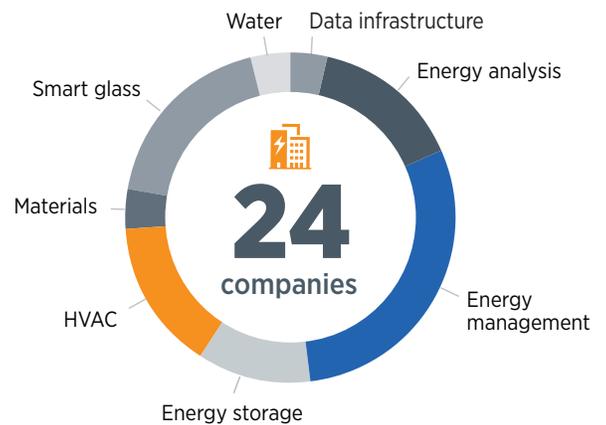


## Commercial Buildings

The buildings sector accounts for about **76% of U.S. electricity use and 40% of all primary energy use and associated greenhouse gas emissions.** To maximize impact, in 2021 IN<sup>2</sup> portfolio companies harvested energy through glass, revolutionized air-conditioning technology, and expanded storage and grid resiliency, while continuously looking for more opportunities for improvement.

“This program is extraordinary. For Blue Frontier, our participation in the IN<sup>2</sup> program was seminal. Through the IN<sup>2</sup> program, we conducted research that generated a step-change improvement in the performance, cost, and manufacturability of our ultra-efficient air-conditioning systems.”

– Daniel Betts  
CEO & Co-Founder, Blue Frontier



“As an early IN<sup>2</sup> cohort company, we were thrilled with the R&D funding and the opportunity to work with NREL. NREL helped develop the pricing structure for drivers, taking into account specific requests and looking at load management.”

– George Lee  
CTO, PowerFlex



**Blue Frontier** is a pre-revenue cleantech startup, founded to commercialize the integration of low-cost thermochemical energy storage with a revolutionary air-conditioning technology. In order to maximize the efficiency of the Blue Frontier air-conditioning technology, NREL assessed materials (alloys, desiccants, and others), performed bench-scale experiments on components (air turbulator, membrane, desiccant), performed sub-system modeling, and offered design assistance from the project's findings.



**Ladybug Tools** is a collection of computer applications that supports the design process for sustainable buildings and net-zero districts seeking to employ cutting-edge energy technologies. NREL is helping Ladybug Tools improve key back-end features of its software to expand its capabilities and improve interoperability with other platforms.



**Turntide Technologies** develops a reliable, efficient, and intelligent motor system that works in concert with IoT building automation technology. The system is less expensive to own and operate than its conventional alternative. NREL is currently conducting follow-on work with Turntide Technologies to validate the energy savings of the unique control algorithms for its intelligent motor system and maximize energy savings based on climate and building type. Turntide is conducting a demonstration of its motors on the roofs of two Wells Fargo bank branches.



**UbiQD** produces nanomaterials for energy harvesting that provide a simple, scalable, low-cost, and aesthetically pleasing approach to solar windows. NREL is conducting durability assessments of UbiQD's prototype devices using an appropriate industry standard for window technologies, as well as relevant standards from the photovoltaics industry. NREL is also conducting varied materials characterization studies related to fundamental properties of UbiQD quantum dots and Luminescent Solar Concentrator devices. The project also includes a demonstration of five windows installed at the NREL Café.



**Yotta Energy** develops modular energy storage integrated with solar, designed to reduce cost and expand development of energy storage and grid resiliency on commercial buildings. NREL characterized the technology performance of two Yotta Energy prototype units as compared to a baseline unit, first in a laboratory environmental chamber, subjected to a range of ambient conditions, and then an outdoor installation.

Our Alumni			
75F	Geli	NETenergy	Transformative Wave
7AC Technologies	Go Electric	NEXT Energy Technologies	VG Smartglass
Apana	Heliotrope	PowerFlex	WattIQ
EdgePower	J2 Innovations	simuwatt	
ESS Inc.	LiquidCool Solutions	ThermoLift	
	Maalka		

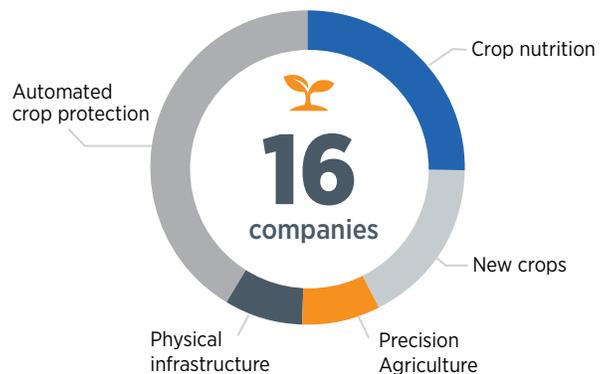
## Sustainable Agriculture

**Food systems cause one-third of global greenhouse gas emissions**, farms consume nearly two-thirds of all water each year, and one-third of all food produced annually ends up spoiled or rotten due to poor transportation or harvesting. With the help of the Danforth Center, in 2021 IN<sup>2</sup> startups improved crop protection and efficiency, advanced robotic planting, created safer pesticides, and more. The goal: Impact agtech at as many points in the production and distribution process as possible.

“Participation in the IN<sup>2</sup> program gave us the ability to develop and test an entirely new application area for our lignin polymer technology. We had already developed our core polymer technology and started application development with horticultural containers and other durable goods, but we saw an opportunity to investigate controlled release fertilizers as a new product category. We have since seen substantial market and partnership interest in this area. Additionally, our partnership with the Danforth Center led to new potential partnerships and collaboration activities.”

– **Tony Bova**

*CEO and Co-Founder, mobius*



“Plastomics’ IN<sup>2</sup> project with the Donald Danforth Plant Science Center gave us access to investigators with world-class expertise in RNAi biology and the ability to utilize state-of-the-art microscopy and plant growth facilities. Together, Plastomics and IN<sup>2</sup> investigators helped identify and validate the mechanisms of chloroplast RNAi that will result in increased efficacy of our traits.”

– **Jeffrey Staub**

*Founder and CTO, Plastomics*



**AgroSpheres** develops bio-based encapsulation and delivery technology to enhance the effectiveness of crop protection products against economically important fungal disease pests. This technology could reduce the amount of expensive biological compounds needed for crop protection. For AgroSpheres's IN<sup>2</sup> project, the Danforth Center is testing delivery and mode of action of two types of active biological pesticides encapsulated in minicells.



**Atlas Sensor Technologies** develops real-time water hardness sensing combined with sensors to detect nitrogen compounds for improved crop development. The Danforth Center will test Atlas sensors for functionality and for fit with applications in different greenhouse environments. NREL will perform materials characterization testing on sensor materials produced by Atlas.



**CarbonBook** works with NREL to provide inputs to a carbon footprint calculator. The Danforth Center is working out details for a greenhouse trial and will be providing microbes for CarbonBook's trials to test its carbon calculator.



**EarthSense** develops robots for autonomous and automated field data collection to improve accuracy and reduce labor and energy consumption in agriculture. The EarthSense IN<sup>2</sup> field trial project with the Danforth Center compared data being collected manually against its prototype robot in-field trials of corn varieties and provided further validation of analytical algorithms needed to extract meaningful biological patterns. Data collection focused on below-canopy traits that cannot currently be observed in images taken above the canopy. The trait analysis algorithms will be used to provide R&D tools for more rapid crop breeding and field agronomy.



**GrowFlux** is developing and evaluating a lighting optimization algorithm for greenhouses. It is working with NREL to create the algorithms for various scenarios—pricing, season, and location.



**mobius** develops renewable biodegradable polymers from food, forestry, and agricultural waste streams. The Danforth Center tests the functions of these polymers to optimize the release of nitrogen-containing compounds into the root-growing region of young plants. This will improve below-ground plant health and root growth in controlled environments.



**New West Genetics** creates proprietary hemp seed bred for high yield and stability that can be used for food, feed, biomass, and nutraceutical products.



**RNAissance Ag** produces safe, effective, and environmentally sustainable insecticide for precision pest management. Its technology disrupts the internal microbiome (gut) of targeted insect pests. Through its IN<sup>2</sup> project, the Danforth Center helped RNAissance Ag accelerate and validate its current methods for identifying and testing anti-insect RNAi products, focusing on fall armyworm and diamondback moth for its initial product development.



**SunPath** designed a lighting system that delivers actual sunlight deep inside buildings via fiber optics. The technology aims to save money, increase crop yield and quality, and offer environmental sustainability.



**TerViva** commercializes the oilseed, climate-resilient tree legume, pongamia. Together, TerViva and the Danforth Center investigated root-to-shoot compatibility among TerViva’s elite scion varieties and target rootstock candidates. These rootstocks and the knowledge of grafting compatibility will enable TerViva to produce more resilient and cost-effective trees through the production processes of grafting, rooted cuttings, and micropropagation, and to accelerate scale-up of its production processes.

**Our Alumni**

Aker Technologies

CoverCress

Intrinsyx Bio

Plastomics

Pluton Biosciences

SolGro





## IN<sup>2</sup> Agtech Companies Going After Carbon Sequestration and Lowering Emissions

According to the U.S. Environmental Protection Agency, agriculture accounted for 10% of total U.S. greenhouse gas emissions in 2019. Mitigating those emissions requires sustainable agricultural processes that work for farmers' business models as well as the environment. Companies are working the problem, sequestering carbon and avoiding emissions with cash cover crops and long-lived tree crops that minimize tilling and improve profitability, identifying and developing microbes that can pull carbon from the air and store it in the soil, and tracking and reducing indoor growers' carbon footprints.

To support these efforts, IN<sup>2</sup> provides technical assistance and non-dilutive funding to promising agtech companies. IN<sup>2</sup> launched in 2014 with a focus on reducing the energy impact of commercial buildings and expanded its focus to sustainable agriculture in 2018. Agtech research takes place at the Danforth Center, the world's largest independent plant science research institute.

Here are a few of the IN<sup>2</sup> companies that are innovating to have a positive impact by reducing carbon:

### CoverCress

Most of the 30 million acres devoted to corn and soy in the southern Midwest sit bare over the winter. Cover crops reduce soil erosion, prevent runoff, improve soil health, and sequester carbon, but for many farmers, they don't make financial sense.

That is changing. CoverCress created harvestable cover crops that fit in the time frame between corn and soybean rotations, which is the dominant farming method in the United States. Through traditional breeding and genetic modification techniques, the company and their Danforth Center research colleagues transformed pennycress, a common Midwest weed, into a commercially viable cover crop that can be sown after the fall corn harvest and harvested before soy planting in the spring.

The company is also developing a closed-loop business model to make the process easy and attractive for farmers. For example, there is no upfront cash cost; farmers receive free seed and CoverCress receives payment when the farmers harvest the crops.

## TerViva

Founded in 2010, TerViva is an agricultural technology company that is commercializing a patented, high oil-yielding pongamia tree. Native to Asia and Australia, pongamia trees produce abundant protein and oil-rich seeds that can create sustainable food ingredients. With the Danforth Center, TerViva is working on producing more resilient and cost-effective trees through grafting, rooted cuttings, and micropropagation.

The trees have natural pest resistance, drought and salt tolerance, and nitrogen fixation ability. In addition, over their 30-year lifetimes they sequester carbon above and below ground, making it easy and inexpensive for pongamia growers to adopt sustainable and regenerative practices.

## Pluton Biosciences

Pluton Biosciences' Micromining® Innovation Engine allows researchers to discover novel microbes in months rather than years. These discoveries can then lead to safe, effective, and potentially commercially viable pesticides from microbial sources for agricultural and human health applications. The collaboration with the Danforth Center validates Pluton's technology, which mines populations of microbes to identify specific microbes that harbor compounds with beneficial pesticidal characteristics. Specifically, the project is identifying active pesticide molecule(s) capable of killing mosquitos that harbor Zika virus. This test case will accelerate the development of crop protection applications from other microbes. In a collaboration with Bayer AG, Pluton will also use its technology to identify and develop soil microbes that can store carbon and nitrogen. Early research indicates that these microbes, sprayed at planting and harvest, could scrub nearly two tons of carbon from the air per acre of farmland per year while replenishing nutrients in the soil.



## CarbonBook

CarbonBook is a tool for making indoor growers more sustainable by quickly and easily determining their carbon footprint.

In 2021, the IN<sup>2</sup> focus broadened to include indoor and controlled-environment agriculture. CarbonBook developed an indoor farming carbon assessment tool (also called CarbonBook) that leverages artificial intelligence, machine learning, and current sustainability science to help indoor farms track and reduce their carbon footprints. Since it launched in 2016, indoor growers worldwide have also used the insights CarbonBook provides to optimize resources, reduce costs, minimize waste, and grow their operations.

The process is easy; users enter the relevant data and the software calculates their current carbon footprint and offers suggestions for reducing it. The indoor agriculture cohort takes advantage of the expertise and resources of both IN<sup>2</sup> technical partners—the Danforth Center for plant science and NREL for building science.

The upcoming cohort 11 will focus on agtech and environmental impact and participating startups. IN<sup>2</sup> will announce the winning companies in June 2022.

## OUR ECOSYSTEM

To boost impact, IN<sup>2</sup> fosters an ecosystem of expertise and support. The IN<sup>2</sup> Channel Partner network includes 60+ incubators, accelerators, and universities that mentor and refer companies to the program. The Wells Fargo Board of Directors reviews applicants, providing business expertise and guidance. Two external advisory boards, the Commercial Buildings and Housing Board and the Sustainable Agriculture Board, select the final participants. The Farmers Business Network provides field trial opportunities and exposure to commercial markets to agtech startups.



## Channel Partner Awards, Perspectives, and Impact

In 2016, we launched the \$5-million Channel Partner Award program to support events, strategic meetings and trainings, and large collaborative initiatives between the Channel Partners. We expanded the program in 2020, and will deliver an additional \$5-million in Channel Partner Awards through 2024.

In February 2021, we awarded four strategic Channel Partner Awards worth a total of \$350,000 to Channel Partners that provide entrepreneurial opportunities for historically underrepresented individuals in the cleantech industry. The 2021 Strategic Channel Partner Awards went to Centropolis Accelerator, AgLaunch, Elemental Exceleator, and Innovation Corridor.

Those awards resulted, in part, from ecosystem research we performed and published in January 2021: *Perspectives from the IN<sup>2</sup> Network: State of the*

*Cleantech Landscape*. For that paper, the authors reached out to the Channel Partner network to assess the current cleantech landscape and found that diversifying the cleantech workforce is a market priority. Additionally, the authors worked with the Channel Partners to assess geographic trends across the United States and the influence of universities and national labs on entrepreneurship.

In 2021, we followed up on the impact of the May 2020 Strategic Channel Partner Awards. We presented these to Channel Partners to provide aid in response to the COVID-19 pandemic. This included the dispersal of \$900,000 to support 371 startups, producing more than \$19 million in revenue, 106 new employees, more than 1,500 new customers, and raising more than \$78 million in investments or other funding.

# 2021 Follow-Up: Channel Partners Provided Real Pandemic Relief to Startups

In May 2020, IN<sup>2</sup> accelerated its award schedule to provide \$50,000 in pandemic relief to 18 Channel Partners—a total of \$900,000—to help them support their clean technology and sustainable agriculture portfolio companies through the economic disruption caused by COVID-19. It was money well spent. 2021 follow-up reporting determined that the 371 businesses that received support from Channel Partners produced more than \$19 million in revenue, hired 106 new employees, attracted more than 1,500 new customers, and raised more than \$78 million in investments or other funding.

**Here are two examples of how Channel Partners used the IN<sup>2</sup> COVID-19 awards to help their portfolio companies weather the COVID-19 pandemic:**

## Born-in-a-Barn Diagnostics

The North Carolina Biotechnology Center (NCBiotech) passed its pandemic relief funding through to a sustainable agriculture startup, Advanced Animal Diagnostics (AAD). As its name suggests, AAD focuses mainly on animals.

In March 2020, however, the expansion to a human test began when a hospital critical care head mentioned to Joy Parr Drach, AAD CEO, how useful a fast, patient-side white blood cell differential would be to identify patients likely to progress to severe COVID-19. Parr Drach realized in that moment that one of AAD's cattle tests could be turned into QScout RLD (rapid leukocyte differential) to help humans in the fight against COVID-19. The tests take about two minutes, require only a drop of blood, and are portable.

"Our 'born-in-a-barn' diagnostics are fast, accurate, rugged, cost-effective, and simple tests anyone can use with minimal training," said Parr Drach. "That's how we've made a difference for our livestock customers, and now we are bringing the same advances to human health."

The \$50,000 IN<sup>2</sup> COVID-19 award allowed the company to develop its QScout test in humans and begin a 510(k) application with the U.S. Food and



Drug Administration (FDA). A 510(k) is a premarket submission made to the FDA to demonstrate a device or test is safe and effective.

### **Outcomes of the trials supported by the COVID-19 award included:**

- Completing a pre-submission filing with the FDA, then meeting with FDA personnel to review the submission in detail
- Securing a cooperative strategic alliance with a major hospital system in the Midwest in response to FDA guidance on the importance of using samples representative of U.S. ethnic diversity
- Uncovering a cancer treatment use for QScout during the data collection process that extends the utility and value of the system beyond COVID-19



- Raising an additional \$7 million to expand the livestock testing platform and support the 510(k) submission for human blood test diagnostics
- Receiving follow-on funding for adding a marker for human sepsis to the test from the Biomedical Advanced Research and Development Authority, a part of the U.S. Department of Health and Human Services' Office of the Assistant Secretary for Preparedness and Response.

## The Farm-in-a-Box

The Los Angeles Cleantech Incubator (LACI) used the COVID-19 award to support professional development opportunities for companies in its portfolio, facilitate continued funding of business services, provide subscriptions to digital business tools, create a series of remote mentor sessions, and supplement fees for the use of office space at the Los Angeles Department of Water and Power.

One of the award recipients, Sustainable Entrepreneurial Ecosystem Development (SEED), produces a farm-in-a-box product, the Small Plot

Kit. This helps consumers and farmers raise their own produce and tackle hunger and climate change with precision soil moisture control and—soon—carbon monitoring. SEED is developing a handheld Radicle carbon sensor to enable small growers to measure their soil in situ and join the marketplace of carbon credit.

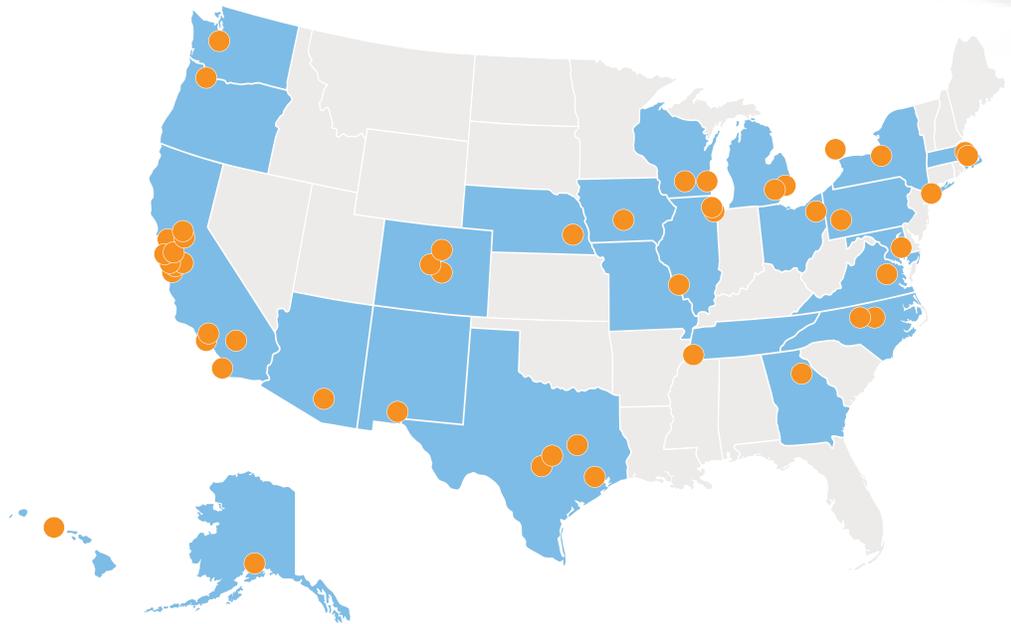
According to SEED founder and CEO Sabrina Williams, the IN<sup>2</sup> grant helped SEED find a marketer who redesigned and reframed the SEED story to help focus on its market and increase website traffic.

“COVID-19 forced us to reallocate resources, which impacted our ability to complete a key marketing campaign,” said Williams. “The IN<sup>2</sup> funds allowed us to test our product with the underserved farmers and community gardeners we serve while confirming the product market fit.”

The successful effort helped increase product site traffic by 400%. In addition, it facilitated reporting on the pilot results, which led directly to an increase in inquiries from funders and increased engagement with the Los Angeles Department of Water and Power.

# IN<sup>2</sup> Channel Partners

ACRE | New York, NY  
 Activate | Berkeley, CA  
 AgLaunch | Memphis, TN  
 AgSprint New Mexico State University | Las Cruces, NM  
 AgStart | Woodland, CA  
 Ann Arbor SPARK | Ann Arbor, Michigan  
 BioGenerator | St. Louis, MO  
 BRITE Energy Innovators | Warren, OH  
 Browning the Green Space | Boston, MA  
 Caltech, FLOW Program | Pasadena, CA  
 CMU - Wilton E. Scott Center for Innovation | Pittsburgh, PA  
 Evergreen Climate Innovations | Chicago, IL  
 Cleantech Group | San Francisco, CA  
 Cleantech Open | Los Angeles, CA  
 Cleantech San Diego | San Diego, CA  
 Coachella Valley Economic Partnership | Palm Springs, CA  
 Colorado State University Energy Institute, Powerhouse | Fort Collins, CO  
 Daugherty Water for Food Global Institute at the University of Nebraska | Lincoln, NE  
 Dominion Energy Innovation Center | Ashland, VA  
 Elemental Excelerator | Honolulu, HI  
 F3 Tech Accelerator | Easton, MD  
 FORGE | Somerville, MA  
 Greentown Labs | Somerville, MA  
 Helix Center | St. Louis, MO  
 Imagine H2O, Inc. | San Francisco, CA  
 Innosphere | Fort Collins, CO  
 Innovation Corridor Foundation | Denver, CO  
 Iowa State University | Ames, IA  
 Larta Institute | Los Angeles, CA  
 Launch Alaska | Anchorage, AK  
 Los Angeles Cleantech Incubator | Los Angeles, CA  
 MaRS | Toronto, Canada  
 Mass Challenge | Boston, MA



MIT | Boston, MA  
 New Energy Nexus | San Francisco, CA  
 NextEnergy | Detroit, MI  
 North Carolina Biotechnology Center (NCBiotech) | RTP, NC  
 Northeast Clean Energy Council (NECEC) Institute | Boston, MA  
 Northwestern University | Evanston, IL  
 Portland State University Business Accelerator | Portland, OR  
 Powerhouse | Oakland, CA  
 ProspectSV | San Jose, CA  
 Rice University | Houston, TX  
 Stanford, TomKat Center for Sustainable Energy | Stanford, CA  
 Syracuse University Center of Excellence | Syracuse, NY  
 TechAccel | St. Louis, MO  
 THRIVE | Los Gatos, CA  
 Texas A&M Engineering Experiment Station, Clean Energy Incubator (TEES-CEI) | College Station, TX  
 Texas State University | San Marcos, TX  
 The Water Council | Milwaukee, WI  
 The Yield Lab | St. Louis, MO  
 University of Arizona – Center for Innovation | Tucson, AZ  
 University of California, Berkeley | Berkeley, CA  
 University of California, Davis Energy and Efficiency Institute (EEI) | Davis, CA  
 University of California, San Diego | San Diego, CA  
 University of Colorado Boulder | Boulder, CO  
 University of Denver | Denver, CO  
 University of Georgia, Innovation Gateway | Athens, GA  
 University of North Carolina, Institute for the Environment | Chapel Hill, NC  
 University of Texas at Austin, Austin Technology Incubator (ATI) | Austin, TX  
 University of Texas at Austin, Texas Venture Labs | Austin, TX  
 University of Washington | Seattle, WA  
 University of Wisconsin-Madison, Wisconsin Energy Institute | Madison, WI  
 VertueLab | Portland, OR

## Advisory Boards

The IN<sup>2</sup> External Advisory Boards determine the companies accepted in each cohort. They provide insights and expertise in sector trends, challenges, and opportunities and technical understanding of the technologies, both traditional and emerging. Our two boards have expertise in either 1) the commercial and residential built environment or 2) agriculture and the food-energy-water nexus.



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 Global Institute*



**Craig Collin**  
*Senior Vice President,  
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**Christine Daugherty**  
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 AndMore Associates LLC*



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and Global Head of  
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**Steve Welker**  
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University

## Wells Fargo Board of Directors

The Wells Fargo Board of Directors comprises of executives and senior managers from Wells Fargo, representing more than a dozen lines of business who guide the strategic direction and the program. Board members provide applicant feedback and subject-matter expertise related to commercial and residential buildings, diversity, sustainability, agtech, cleantech, finance, law, supply chain management, government relations, and more.

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Head of Small Business Growth Philanthropy

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Counsel

### Tom Harper

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Sustainable Finance Strategist

### Akhlaq Khan

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### Bill Lawler

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### Jon Previtali

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### Curt Radkin

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### Tim Rafalovich

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### Matt Servatius

Market Executive Central Region Technology Banking & Head of Sustainable Tech

### Julie Slocum

Senior VP, Government Relations

### Mary Wenzel

EVP, Head of Sustainability and ESG Integration

# Team

The program management team at Wells Fargo, the National Renewable Energy Laboratory, and the Donald Danforth Plant Science Center work together to grow the IN<sup>2</sup> ecosystem and to help our cleantech and agtech companies realize success.



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Manager, NREL*



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*Product & Innovation Lead,  
Wells Fargo*



**John Moon**  
*Vice President, Climate  
Aligned Philanthropy and  
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*Project Coordinator,  
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## The Future

Change is a constant. As we look forward to 2022, we expect that change is part of the low-carbon equation. The pace of technology and the unpredictability of the environment are all part of a future IN<sup>2</sup> aims to impact as a part of this solution.

We are looking forward to the results of our indoor agriculture projects and the projects with our new partners formed as we launch projects with our demonstration cohort (pictured above). We also look forward to the literal growth we will see in the field as we conduct several field tests with IN<sup>2</sup> companies on farms across the country with our IN<sup>2</sup> companies alongside our partner, the Farmers Business Network.

One thing that COVID-19 and 2021 taught all of us is the value of relationships. Not just with families, but our work relationships and our partnerships. We look forward to a 2022 where we can gather with all our partners, companies, and stakeholders again in person and take the lessons from the last few years to inform the future with you. We will be asking tough questions of our program and asking new and existing partners to help us build the next version of IN<sup>2</sup>—one that continues to break barriers and exceed expectations.



## **Wells Fargo Innovation Incubator (IN<sup>2</sup>)**

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*March 2022*

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