



# Brains4Drones®

**C**limate events are a continuous threat to the Nation's electric infrastructure. Within the Department of Energy (DOE), the Office of Electricity (OE) provides national leadership to ensure that the energy delivery system is secured, resilient, and reliable. In 2017, OE issued an SBIR topic that focused on the application of Artificial Intelligence (AI), Machine Learning (ML) and sensing technology for rapid response inspections of the electric grid after climate disasters. Brains4Drones, a woman-owned small business, proposed equipping drones with AI to keep utility first responders safe and productive.

## FACTS

### PHASE III SUCCESS

Brains4Drones is working with utility partners on adaptation of this technology to perform line and vegetation inspections for wildfire prevention.

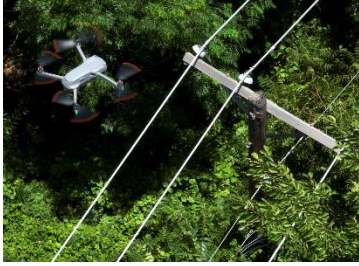
### IMPACT

Brains4Drones provides utility crews with an easy-to-use drone-based platform to quickly assess asset condition and respond to outages while keeping workers safe.

### DOE PROGRAM

Office of Electricity (OE)

<https://brains4drones.com>



Located in Plano (Texas), Brains4Drones was founded in 2016 and a few months later successfully secured their OE funded SBIR Phase I award (DE-SC0017796). Their tagline “we turn toys into tools®” reflects Brains4Drones’ commitment to develop practical, inexpensive solutions that can be applied to any drone. For electric utilities, Brains4Drones adds custom hardware and software to drones,

laptops and cameras to automate data collection and curation without the need for cell service or the cloud. The use of drones is not new in the electric utility industry, but the idea of using an off-the-shelf drone for preplanned missions that capture high-resolution imagery in real-time sets them apart from the competition. Power restoration times can be reduced from days to hours after a catastrophic hurricane with the smart drone assist.



Goksel Dedeoglu, Brains4Drones' chief technology officer, flies a drone over a power line on Grizzly Mountain. Photo by Brent Ten Pas

In 2022, Brains4Drones was awarded a Phase III award to mitigate another climate change threat - wildfires. The award came after a request from Secretary Granholm for DOE to identify DOE-funded technology that could be rapidly accelerated to mitigate wildfires. Committed to making wildfire mitigation a priority, Oregon Public Utilities Commissioner Letha Tawney heard about the call for utility partners to test the technology and knew that Oregon electric co-ops often grappled with rugged, high-risk wildfire areas.<sup>1</sup> In a matter of weeks, Brains4Drones was working with Central Electric Cooperative, Inc. (CEC) in Redmond and Consumers Power, Inc. (CPI) in Philomath to adapt their drone-based solutions to perform line and vegetation inspections in heavily-treed rights-of-way.

Both Oregon utilities had witnessed the devastating impacts of the 2020 wildfires in neighboring Santiam Canyon. They serve rural areas including some disadvantaged communities where their electric infrastructure is located on hard-to-reach, highly treacherous terrain. Tawney witnessed a demonstration of Brains4Drones’ early prototype at the highest point in Oregon’s coast range: the steep and heavily wooded Marys Peak in CPI’s territory. Instead of sending crews for hours into a deep canyon full of peril (i.e., twisted ankles and rattlesnakes), a co-op drone operator can stand on a ridgeline and, within minutes, flag areas of concern using only a laptop and a low-cost drone. “This technology has a low barrier to entry and provides access to the last places you can check,” Tawney said. With a service territory of over 3.4 million acres, CEC President and CEO Dave Markham is thrilled to work with Brains4Drones stating that “this technology has the potential to save us time and money and, more importantly, add another layer of safety to help protect the members and communities we serve.”<sup>2</sup>

<sup>1</sup> <https://www.oreca.org/using-all-the-tools/>; including image of Goksel Dedeoglu, Brains4Drones’ CTO, demonstrating the technology on Grizzly Mountain in Oregon.

<sup>2</sup> <https://www.oreca.org/using-all-the-tools/>





toy.



tool.

The Phase III effort resulted in the development of **SeeMore™**. Brains4Drones' tool-on-a-truck for wildfire mitigation enables utility crews to perform more frequent, more accurate and safer aerial inspections of poles, lines, and towers. The first commercial version shipped in January 2023 to CPI.

Visual detection and classification of various electrical equipment, geo-localization of utility assets and

automatic flagging of gross anomalies are some of the capabilities that were developed using DOE SBIR/STTR funding. Today, Brains4Drones offers these products:

- **Shutter+** helps the drone find, frame and photograph every distribution pole.
- **Gimbal+** enables the drone to perform automated 360-degree pole top inspections.
- **PoleMiner** extracts valuable distribution data.
- **SeeMore™** automates the targeted collection, curation and annotation of drone imagery in the field.

Responding to the FY17 Topic 5b and receiving the resultant Phase I award changed the trajectory of the company. According to Susan Rossbach, CEO of Brains4Drones, "We had done some consulting work in the self-driving car space and thought, what if we could do this for drones? DOE funding enabled us to approach electric utilities and work with them to develop our products for distribution line inspections. Without DOE funding, we'd probably still be working on cars!"

When asked about advice she wanted to share with other SBIR/STTR awardees, Rossbach highlights the importance of customer discovery and building relationships with stakeholders. Brains4Drones partnered with a major utility in the southeast during both Phase I and Phase II. Rossbach cautions entrepreneurs to "constantly monitor your roadmap and change course when you need to. Are you building what your end-user needs? It might not be what you originally thought!" In addition to being prepared to pivot, she says to "listen to your advisors in the industry. Our electric utility partners have given us great ideas and advice all along the way."

Stewart Cedres, Senior Technical Lead and Strategist for OE who served as Federal Program Manager for all three Brains4Drones SBIR efforts stated, "This could be a game changer. Brains4Drones' AI and machine learning technologies combined with their ability to rapidly and successfully adapt to the unique needs of utilities provides quick results against the impacts of climate threats on critical infrastructure and helps the utilities keep their workforce safe."

**T**echnology is not the only innovation at Brains4Drones. Building on her background as a former schoolteacher, Rossbach established an internship program for high school and undergraduate students designed to bridge the gap between robotics clubs/coding camps and declaring a major. Since 2016, the program has supported over 50 interns. In fact, [their 2022 cohort](#) included local high school students (who often continue participating into their college years) and visiting scholars from UT Dallas, Cal Poly San Luis Obispo, and Carnegie Mellon University. Rossbach points out that the interns are hands-on participants (some even flew drones!). The interns are major contributors on all their DOE-funded projects and are compensated fairly thanks to the DOE funding.

Rossbach exclaims, “We love our interns. I have personally made it my mission to ensure more female participation in the lab and to prepare students for their next big thing! One of our interns from this past summer just got an internship with a major electric utility for next summer. We’re very excited for her!”

The [Brains4Drones’ internship program](#) is a fantastic example of a small business promoting diversity, equity, inclusion, and accessibility in their projects. Beginning in FY24, the DOE SBIR/STTR Programs will begin requiring solicitation respondents to include a [Promoting Inclusive and Equitable Research \(PIER\) Plan](#) in their grant applications. PIER Plans will be used to inform funding decisions. Eileen Chant, Outreach Director within the DOE Office of SBIR/STTR programs, stated that Rossbach “has developed a genuine and impactful internship program, which is integrated with the research activity and focuses on inspiring women to pursue STEM.” Brains4Drones will find implementation of a PIER plan a low hurdle given the focus of their successful internship program.

*Prepared By Carol Rabke, Tech to Market Advisor, DOE Office of SBIR/STTR Programs, January 2023.*