Wind for Schools: A Cornerstone for Sustainable Energy Education

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Abstract

Northern Arizona University launched the Arizona Wind for Schools project in August 2010. The project and several existing university programs make up a larger sustainable energy education initiative at NAU. Existing programs include a "solar for schools" initiative pioneered in the electrical engineering department, the established Anemometer Loan Program, the student internship programs of the Landsward Institute, and the interdisciplinary Sustainable Energy Solutions group, which has been performing renewable energy research across disciplines at NAU for several years. The Wind for Schools project worked with these programs to develop an organizational structure that allows for budgetary and program efficiencies and collaboration among program elements. Outreach strategies harness existing university channels to allow for widespread awareness and use of the Wind for Schools and partner programs by students and faculty in disciplines from physics to environmental sciences and policy. External program support is leveraged through partnerships with: parties interested in broader sustainable energy education implementation; existing programs and structures in the public and private sectors of Arizona, including initiatives of the State Energy Office and the state's utilities; and non-profit organizations seeking sustainable energy implementation solutions that can be strengthened through the educational focus of Wind for Schools.

By providing a small seed of funding to Northern Arizona University, the Wind for Schools project facilitated bridge-building across and among numerous state organizations and institutions, allowing wind and other sustainable energy education to be integrated into education at all levels in Arizona from kindergarten to graduate school.

Grants, New Mexico Wind Workshop Fall 2010

Puente De Hozho Elementary School, Fall 2010

The Sustainable Energy Solutions Center

The Wind for Schools project proposal to the U.S. Department of Energy conceived of the project's implementation as one component of a larger sustainable energy education, research, and professional development center to be housed at NAU. The Sustainable Energy Solutions group at NAU, a partnership among faculty, students, and resources in the colleges of business and engineering, among others, has been performing energy education and cutting-edge research for a decade.

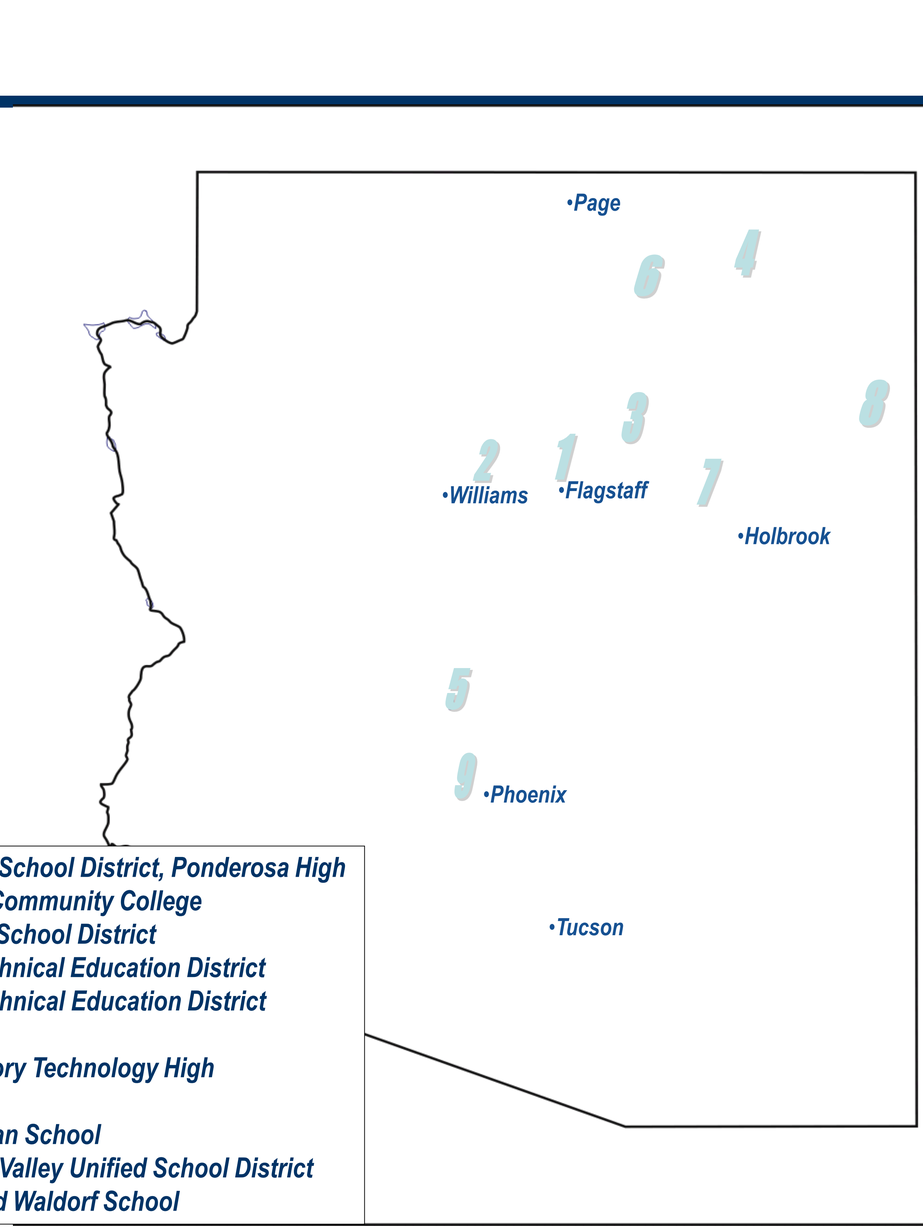
This year, NAU is launching a Sustainable Energy Solutions Center to build on these programs and harness the enthusiasm of faculty and students across campus for sustainable energy research and other initiatives, and serve as a resource for the university's external partners.

The Sustainable Energy Solutions Center will allow NAU to:

- expand energy curriculum and degree programs at NAU
- establish efficiencies of program management in energy-related initiatives
- offer a one-stop-shop physically and electronically for NAU energy programs
- increase research resources offered to external partners for guided projects
- increase internships with energy partners (e.g. utilities, industry, advocacy)
- build a more effective K-12 – Community College – NAU bridge in critical energy-related STEM fields
- offer faculty across campus and external partners the opportunity to participate in a larger range of exciting energy RD&D and education projects

This Center at NAU has been essentially under construction for a decade through the work of programs like the SES Group and now the Arizona Wind for Schools project. Its launch in 2011 marks the culmination of many efforts and the prioritization of sustainable energy research and education programs at NAU. The Center will function as a home to the university's best and brightest in energy programs, and will provide new opportunities to the university community and its community of partners.

Inaugural Partner Schools



1. Flagstaff Unified School District, Ponderosa High School, Coconino Community College
2. Williams Unified School District
3. CAVIAT Joint Technical Education District
4. NATIVE Joint Technical Education District
5. Orme School
6. Shonto Preparatory Technology High
7. STAR School
8. St. Michaels Indian School
9. CREST/Paradise Valley Unified School District and Desert Marigold Waldorf School

Teacher Workshops and Direct Education

The Arizona Wind for Schools project performed more than a half dozen direct education wind energy activities and three teachers' workshops in its first six months. The program sponsored one teacher to attend the 2010 WindSenators training program and sent two people to the Southwest Windpower small wind installers training course.

Two NAU students have been working directly with teachers in Flagstaff and Northern Arizona to offer them tailored lessons and activities, and to participate in class teaching these with our partners. This support has dramatically increased interest in, and implementation of, wind energy curriculum with our partner teachers.

Teachers' workshops and follow-up opportunities ensure that our teacher partners are proficient and comfortable in implementing new wind and other energy curricula and activities with their classes. Direct education with students engages young minds in thinking about energy issues and renewable energy solutions. All of these activities establish a strong foundation for the future of renewable energy education with NAU's K-12 partners.

St Michaels Indian School Teacher Workshop Fall 2010

Installations

The Wind for Schools project is installing funded wind or solar projects at 6 partner schools in 2011. The project is also working with Arizona schools and districts that have already installed a dozen more wind turbines. All of these will be used for educational purposes, and serve as a physical reminder to teachers and students of the importance of renewable energy and energy education. Data from each installation can be used by any teacher or professor in Arizona, and in fact there are several research projects going on at NAU right now involving small wind turbine or met tower data for distributed wind energy research. Similar installations using other renewable energy technologies will be used in research at the SES Center.

Shonto Preparatory Technology School Saturday Academy at NAU, Fall 2010

Partnerships

The Wind for Schools project and the Sustainable Energy Solutions Center at NAU rely on partnerships for support and for project development that is mutually beneficial. NAU students have performed research for utilities, industry, and national laboratories; served as interns for wind manufacturers and national laboratories; designed renewable energy systems to be installed on Arizona K-12 schools and managed the installation process; and taught in K-12 classrooms and helped out with teachers' workshops. All of these experiences serve as invaluable career training for NAU students while providing unparalleled benefits to our partners. In many cases, the work that has been accomplished simply would not have taken place without the dedication, motivation, and hard work of NAU students and faculty.

The Sustainable Energy Solutions Center, by providing a multi-disciplinary hub for initiatives across campus, offers NAU's external partners access to students and faculty in our Colleges of Business and Engineering, our School of Earth Sciences & Environmental Sustainability, our Sustainable Communities program, and our many climate change science and behavior projects and programs across campus. In addition, NAU has a long partnership with many tribes and has many resources for tribal governments and initiatives, through the Institute for Tribal Environmental Professionals, the Center for American Indian Economic Development, and others.

St Michaels Indian School Teacher Workshop Fall 2010

St Michaels Indian School

Moving Forward

In the next year, the Wind for Schools program will:

- install turbines at nearly a dozen schools
- host at least 6 teachers' workshops, training at least 120 teachers
- perform at least 12 direct education activities with K-12 students
- develop a regional (four corners) wind energy training network

The Sustainable Energy Solutions Center at NAU will function as a research and education hub, partnering with industry, governments, foundations and the utilities in moving the nation toward a more sustainable energy future. In addition to providing superior energy education and cutting-edge research opportunities to future energy leaders, this Center will continue NAU's provision of data and research resources for renewable energy development and industry in the state.

Lastly, the Center will facilitate the expansion of partnerships to tackle key technical and policy issues for successful implementation of sustainable energy solutions and the local, state, tribal and national level.