



## NSF ATE Regional Center CREATE

### Dr. Kathleen Alfano, College of the Canyons

Kathleen Alfano has a Ph.D. from UCLA and has served as the Director of the California Consortium for Engineering Advances in Technological Education (CREATE) based at College of the Canyons since 1996. She directs and is Principal Investigator for the National Science Foundation (NSF) Advanced Technological Education (ATE) CREATE Renewable Energy Center of Excellence. As Director of CREATE, she is involved in efforts across the United States and internationally to define and implement credit technician curricula in many areas of renewable energy, including wind, solar, geothermal, and energy efficiency. In 2012 she served on the Department of Labor Employment and Training Administration working group that developed the Renewable Energy Competency Model (<http://www.careeronestop.org/CompetencyModel/>). Dr Alfano also served as the only community college representative on the National Academy of Sciences Committee on Workforce Trends in the U.S. Energy and Mining Industries which released their report in March 2013.

## **NSF ATE Regional Center CREATE** **NSF ATE grant #1002653**

### A. Overview:

The California Regional Consortium for Engineering Advances in Technological Education (CREATE) was formed nineteen years ago as a joint consortium effort of seven community colleges and over fifty high-tech engineering technology employers to develop a regional approach to the preparation and training of engineering technicians. Since its formation, CREATE has emerged as a major education-industry partnership and was selected as one of only forty National Science Foundation Advanced Technological Education Centers of Excellence funded nationally (NSF ATE Regional Center for Renewable Energy [www.create-california.org](http://www.create-california.org)).

### B. Goal/Objectives:

The goal of this ATE Regional Center is to address the demonstrated high demand for renewable energy technicians in southern and central California as a multi-County consortium. The current four year grant has allowed the Center to complete objectives in five areas: 1) the development and refinement of modular in-class, on-line, and hybrid renewable energy curricula integrated into degree pathways concentrating on the areas of wind and solar photovoltaic and thermal technologies and energy efficiency and management that are tied to industry skills standards and certifications; 2) development and implementation of a technical teacher professional development program in renewable energy which will allow community college, high school teachers, and industry professionals recruited to be teachers to acquire the technical knowledge and certifications and pedagogical skills to teach renewable energy in their classrooms; 3) develop and implement a 2+2+2 pathway through partnership with high schools and universities to allow students interested in renewable energy careers to have a defined career ladder with multiple exit points integrated with industry certifications and college certificate and degree attainment; 4) conduct continuous assessment and evaluation with embedded targeted research of curricular and professional development strategies to ensure that student, faculty, and industry goals are attained; and, 5) disseminate both the products and the partnership process to maximize the impact both regionally and nationally. Additional funding from NSF has allowed the Center to include faculty development learning exchanges between renewable energy faculty in Australia and New Zealand (2013) and Germany and Denmark (2014).

### C. Recent Accomplishments:

1. International Efforts: CREATE submitted and was awarded two NSF supplemental grants in 2012-2013 and in 2013-2014: one for a faculty study tour in March of 2013 for Australia and New Zealand (NSF 1239631) and one for a faculty study tour in May and June of 2014 for Germany and Denmark (NSF 1345306). Both of these projects fulfilled the stated intention in the CREATE Center application (NSF 1002653) to pursue a

comparison of international best practices that could better inform current U.S. community college renewable energy programs. While international funds had been approved for the Center Director for international travel in the NSF 1002653, a supplemental grant was necessary to pay for the learning exchange trips for representative community college faculty (selected through a competitive process) from across the U.S. Both study tours resulted in the submission of individual and sector reports by each faculty and the dissemination has already yielded significant new information and insights that could positively impact U.S. community college renewable energy programs. One of the most recent results of the international learning exchanges has been the request for the CREATE team to assist the University of the Virgin Islands effort to develop a renewable energy curriculum. As part of this effort, four CREATE study tour faculty (including CREATE's Director) have been chosen to participate in the March 2015 Caribbean Clean Energy Technology Symposium as core members of the Energy Education stakeholder working group.

## 2, Curriculum development:

Developed, implemented and disseminated curricula and workshops on the following subjects: Incorporating wind and solar mathematics exercises using MatLab; SCADA; Energy Systems Technologies; Energy Auditing; and a new on-line electronics series using wind technology examples.

## 3. Enhancement and Development Activities for Faculty:

### a. Kid Wind Teacher Workshops, Student Regional Competitions, Summer energy Camps:

Kid Wind Teacher Workshops continue to be presented at Central and Southern California locations for middle and high school teachers and the resulting pre and post evaluation data showed a high degree of improvement in teacher content knowledge and attitude toward wind energy curriculum and teaching.

Kid Wind Student Regional Competitions were hosted with co-sponsorship from public schools and highest performing student teams raised funds to compete at the Kid Wind Student finals co-supported by CREATE, industry and KidWind at national Kid Wind Challenge at the USA Science and Engineering Festival in Washington, D.C. at the end of April 2014. A CREATE team won the middle school national championship.

The primary goals of these workshops are to; 1) improve teachers content knowledge related to wind energy technology and related issues in wildlife, economics and society, 2) and to explore some of the WindWise curricular lessons in enough detail that the teachers have the confidence and materials to execute these lessons back in their classrooms. Teachers at all the trainings were provided with a basic kit of turbine materials and curricular materials.

Lompoc High School STaRs Academy has been named a California Lighthouse

Academy (as mentor for other Partnership Academies) and they are continuing their successful CREATE-sponsored renewable energy camps for middle school students and girls only groups. Lompoc High students will again be featured in a new ATETV series. The new series will film in February 2015 and will focus on bilingual technological education.

b. Faculty Development Workshops and Mentoring:

CREATE continues to fund faculty to learn new techniques or areas of expertise and to come back to the CREATE faculty to train them. Examples of these are CREATE community colleges Santa Barbara City college and Oxnard College collaborating to explore the introduction of energy auditing of their college campuses as part of their energy curricula, under the guidance of Energy Chair Roger Ebbage of Lane Community College (OR) and the presentation for CREATE faculty on geothermal, HVAC, and energy efficiency at the Geysers and Laney College by Dr. Dave Boden of Truckee Meadows College (NV) and Peter Crabtree (NSF BEST Center, CA).

D. Processes used for developing, testing, and validating materials

Curricula are validated through college academic senate and curriculum committee review, review at regional meetings including the CREATE consortia and the Regional Career and Technical Deans and through industry advisory committee (both college and CREATE Regional) review. Matching curricula to industry skills standards and certifications have been very important to the success of CREATE and its employer partners. The DACUM process and gap analysis conducted for the wind turbine technician curriculum, the MatLab wind and solar focus group work, and the proposed Caribbean Renewable energy DACUM study are examples of the level of seriousness and rigor with which the CREATE colleges conduct the development of their curricula. The excellent materials produced continue to be shared with other colleges.

E. Dissemination:

The CREATE website [www.create-california.org](http://www.create-california.org) remains the primary vehicle for dissemination about the CREATE courses and the Center activities. The website acts also as a vehicle for communication; assessment (on-line surveys); information (agendas for all meetings and meeting minutes); best practices; and technical course module downloads. CREATE has also been utilizing the expertise of Learning Coordinator, Mary Slowinski of Bellevue College (WA) to manage the LMS for the Australia, Germany, and Virgin Islands supplements.

A major publication for the CREATE Center is still the joint publication of the ATE Centers Impact Booklet. This joint booklet is currently being used by CREATE at all regional and national exhibits and presentations and a new version has recently been released.