
AC 2012-3092: NSF ATE CREATE RENEWABLE ENERGY CENTER

Dr. Kathleen Alfano, College of the Canyons

Kathleen Alfano is the Director/PI of the NSF ATE CREATE Renewable Energy Center and has led the multi-college consortium CREATE (California Regional Consortium for Engineering Advances in Technological Education) since its development in 1996-1997. She is currently a member of the National academy of Sciences Committee on the Energy and Mining Workforce. She served as a Program Director and co-lead for the ATE Program at the National Science Foundation in Arlington, Va. in 2007-2008 and previously as Dean of Academic Computing and Professional Programs and as a faculty member at College of the Canyons. Alfano has a B.S. in chemistry, an M.S. in education, and a Ph.D. in higher ed. and adult development from UCLA.

**NSF ATE Regional Center CREATE
NSF ATE grant #1002653
Annual Report
March 2012**

Section One: Research and Education Activities:

1. Executive Summary: Major Accomplishments in 2011-2012

- CREATE sponsored a Wind Turbine Technician DACUM. The DACUM industry experts (predominantly senior wind technicians from the Tehachapi and Palm Desert wind farms) were representative of the different regions in California and various sizes/types of companies, and some members also taught at several colleges/organizations offering wind technician education programs. The location for the DACUM work session was conducted at the GE plant in Tehachapi, CA. Regional DACUM profiles and materials were produced from the November 30, 2010 and December 1st and 2nd, 2010. In the Fall of 2011 and the Spring of 2012, after an intensive gap analysis between the DACUM results and the curriculum of Cerro Coso Community College, faculty at Cerro Coso College have developed a series of 23 courses that are extensively mapped to this DACUM and have been reviewed and approved by the curriculum committee.
- After completing NABCEP certification through workshops sponsored by the Department of Energy Solar Training Network, CREATE colleges have developed solar PV and solar thermal course sequences and certifications and these have been mapped into a NABCEP cross-college skill map to aid collaboration and articulation.
- Kid Wind Teacher Workshops were presented at five Central and Southern California locations for over 100 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.
- Five Kid Wind Student Regional Competitions were hosted with co-sponsorship from the wind industry and the highest performing student teams will compete at the Kid Wind Student finals co-supported by CA State grant funding, CREATE, AWEA, industry partners and KidWind at the AWEA national conference in Atlanta, GA June 4 (middle school students) and June 5 (high school students). (Information is available at the Kid Wind site at: <http://learn.kidwind.org>).
- CREATE hosted another successful Teaching skills Workshop (an intensive microteaching experience now in its tenth year) for four California community colleges in January 2012. A new on-line Getting Results using NSF/WGBH Boston material is being pilot tested in the Spring of 2012.

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2. Description of Activities and Accomplishments:

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. This four year grant proposal will allow 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 imbedded 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.

a. Enhancement and Development Activities for Faculty:

WindSenators Program

In the summer of 2011 CREATE sent another high school teacher to the Kid Wind WindSenators program in order to increase the number of qualified California wind Senators as the demand for Kid Wind training continues to increase in CREATE's southern and central California region. The one week training program uses the WindWise curriculum, which was developed in partnership with Normandeau Associates, and other curricular tools to introduce teachers to a variety of techniques and materials to engage students in wind energy subject matter and meet national and state science and technology standards.

During this week WindSenators spend a significant amount of time learning from experts in the field about the social, economic and wildlife issues in addition to the science and engineering of small and large wind turbine systems.

A sample agenda of the WindSenators training and some of the lessons we use at the trainings can be found on the Kid Wind site as are more of the WindWise curricula at <http://learn.kidwind.org/windwise/curriculum>.

Teacher Workshops

In conjunction with Kid Wind, CREATE held five full-day teacher Kid Wind/wind energy teacher workshops in the southern California area. Michael Arquin, Director of KidWind, traveled to California and was the lead facilitator at the first event at Cerro Coso College in Ridgecrest, CA. CREATE Wind Senators Brad Collins and John Galisky were in attendance at this event and then proceeded to lead many of the other workshops.

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|---------------|--------------------------------------|-------------|
| October 2010 | Cerro Coso Community College | 28 Teachers |
| January 2011 | College of the Canyons | 10 Teachers |
| Feb 2011 | College of the Desert | 30 Teachers |
| January 2011 | Cuesta Community College | 8 Teachers |
| February 2011 | San Diego County Office of Education | 38 Teachers |

The primary goals of these workshop 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 turbine kit and a folder of curricular materials.

At all of these workshops we administered pre and post testing. Some of the results of the pre and post test are attached to this report under Findings.

IREC/CREATE Solar Workshops for Faculty

CREATE has collaborated with the Interstate Renewable Energy Council (IREC) and the Department of Energy Solar Training Network to co-host and/or sponsor workshops for community college and high school faculty on beginning and advanced solar curricula and to promote the continued NABCEP certification of CREATE faculty. An extensive NABCEP skill map has been produced in Spring 2012 to detail the resulting classes for solar PV and thermal at CREATE colleges.

As an outgrowth of the CREATE lead faculty's successful completion of their Facilitator Development Workshop training and their subsequent presentations and mentoring of part-time and full-time faculty at their own campuses, CREATE's faculty decided to

implement a process of expertise sharing and mentoring by specific content areas between the CREATE community colleges. The resulting workshops and mentoring have resulted in workshops and CREATE meetings involving more than forty additional California community colleges and high schools.

b. 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 and the solar focus group work are examples of the level of seriousness and rigor with which the CREATE colleges conduct the development of their curricula. The excellent materials produced are already being shared with other colleges.

c. Processes for recruiting students:

All community colleges are open access institutions. The recruitment issues occur in getting students to be attracted to and understand the benefits of the engineering technology majors that CREATE colleges offer. Outreach efforts, summer camps, career fairs, print, video, and on-line material are all used to target students, parents, and counselors. A wind and solar summer camp for middle school students was piloted at Lompoc High School in the summer of 2011 and a new girls only energy camp will be piloted in the summer of 2012.

d. Activities and classes for students

Baseline data was gathered for all the CREATE community colleges and high schools. In addition, as mentioned under Schedule changes, most of the classes and certificate programs that will be energy-related have now moved through the curriculum committee approval process and will be piloted in the 2011-2012 academic year. Course outlines are being provided to the NVC and will be available on the CREATE website. Also, Lompoc High School teachers will present the results of the girls only and high school energy pilot at the Hi Tec meeting in Denver in July 2012.

e. Involvement of industry:

CREATE's extensive involvement with industry is detailed in the Collaborators Chart which shows: monetary contributions, and collaboration types including: internships, curriculum development, equipment donation, articulation agreements, industry jobs, and other types of support for the over 100 industry collaborators for 2011-2012.

As an outgrowth of the CREATE lead faculty's successful completion of their Facilitator Development Workshop training and their subsequent presentations and mentoring of part-time and full-time faculty at their own campuses, CREATE's faculty decided to implement a process of expertise sharing and mentoring by specific content areas between the CREATE community colleges. The resulting workshops and mentoring have resulted in workshops and CREATE meetings involving more than thirty additional California community colleges and high schools.

CREATE faculty have begun to work with local agencies and their economic development activities and plan to continue these efforts in the coming year. These include the efforts of the faculty working with Grid Alternatives and the Southern California Forum to give faculty and students internship opportunities to assist State and federally-funded nonprofit agencies to make low income homes more energy efficient, including solar panel installation.

As part of CREATE's sustainability plan, CREATE has maintained an active role in State and regional efforts, especially through its placement as the Cisco Academy Training Center for all of California and Nevada and its appointment as one of only four Cisco Security CCNA Security Training Centers in the United States.

CREATE has also become an active mentor and coordinator for leveraged funding efforts within the State and region including the successful ATE-funded Imperial Valley College geothermal new institutions grant and the CSU Monterey Bay internship program with three community colleges.

CREATE's Pedagogical Teaching Facilitator Training Program for Technical faculty expanded to energy faculty as another Teaching Skills Workshop was held at Casa de Maria retreat center in California. The Master Facilitators continued to offer train the trainer workshops both for Teaching Facilitators and participants in microteaching certifications, and initiation of an expanded research model to assess facilitator skills, faculty performance, and impact on student learning.

Teacher Trainings

In conjunction with CREATE we held 5 full day teacher trainings in the southern California area. Below are the details of these trainings. Michael Arquin the director of KidWind traveled California and was the lead trainer at the Cerro Coso event. Brad and John were in attendance at this event and then proceeded to lead the other trainings.

| | | |
|------------------|---------------------------------|------------|
| June 29-30, 2011 | San Diego Office of Education | 20 schools |
| October 13, 2011 | State Center Consortium, Clovis | 17 schools |
| Feb 4, 2012 | College of the Desert | 13 schools |

March 31, 2012

San Diego County Office of Education

upcoming

The primary goals of each Kid wind teacher training 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 to execute these lessons back in their school classrooms.

Teachers at all the trainings were provided with a basic kit of turbine materials and curricular materials. CREATE also co-sponsors Kid wind Regional Competitions for students throughout the year which lead to Kid wind finals at the AWEA national convention. This year it will be in Atlanta, GA and CREATE will have teams there.

Section Four: Outreach activities:

Conferences & Presentations

Alfano, Ph.D., K. Board, L., Collins, B., Galisky, J., Karnes, V. (May 22 - 25, 2011). Co-Sponsor. *AWEA WindPower 2011 Conference & Exhibition and KidWind Finals Competition*. Anaheim, CA.

Alfano, Ph.D., K. (June 25 - 30, 2011). Poster Session. *ASEE 2011 Annual Conference & Exposition*. Vancouver, B.C.

Alfano, Ph.D., K., Ama, S., Karnes, V., Temple, G. (July 26 -29, 2011). Presentation: CREATE/TIME's Collaboration to Develop a Wind Turbine Technology Curriculum Throught DACUM & Gap Analysis. *HI-TEC - High Impact Technology Exchange Conference*. San Francisco, CA.

Galisky, J., Wold, T. (July 26 – 29, 2011). High School Curriculum for Renewable Energy. *HI-TEC - High Impact Technology Exchange Conference*. San Francisco, CA.

Alfano, Ph.D., K. (September 30 - October 5, 2011). Panelist/Presentation on Energy. *STEMtech - Learn & Earn Conference*. Indianapolis, IN.

Alfano, Ph.D., K. (October 26 - 28, 2011). Group Discussion Leader with Ellen Kabat-Lensch. What Are the Secrets of Success for Energy Projects? *ATE National Principal Investigators Conference*. Washington, D.C.

WORKSHOPS

Robertson, S. (April 14, 2011). *KidWind Regional Competition – 8 Teams Participated*. Cuesta College, San Luis Obispo, CA.

Alfano, Ph.D., K. (April 14 - 16, 2011). *U.S. Department of Education's Community College Regional Summit*. San Diego City College, San Diego, CA.

Collins, B., Karnes, V. (April 16, 2011). *KidWind Regional Competition – 7 Teams Participated*. Cerro Coso Community College, Ridgecrest, CA.

McLaughlin, L. (April 16, 2011), *KidWind Regional Competition – 9 Teams Participated*. College of the Desert, Palm Desert, CA.

(June 6 – 10, 2011). *NABCEP PV Training PB Entry Level Exam Program*. Fresno City College, Fresno, CA. (Stevenson, B.)

(June 7 – 10, 2011). *Solar Thermal Installation Train-the-Trainer Professional Development Technical Training for Community College Faculty*. Rio Hondo College, Whittier, CA. (Walls, W.)

CREATE Sponsored Event. (June 29 – 30, 2011). *KidWind - Wind Energy Workshops for Educators*. San Diego County Office of Education, San Diego, CA. (20 Schools Participated)

Collins, B. (October 13, 2011). *KidWind – Wind Energy Workshops for Educators*. State Center Consortium, Clovis, CA. (17 Schools Participated)

Ross, Ph.D., A. (November 19, 2011). *MATLAB Focus Group*. Cuesta College, San Luis Obispo, CA. (Alfano, Ph.D., K., Alldredge, R., Buxamusa, A., Cascamo, J., Cater, Dinter, P., Gallardo, R., Marsh, D., Parrish, P., Reese, J., Walls, W.)

(December 2, 2011). *Electronics & Robotics Workshop*. Burroughs High School, Ridgecrest, CA. (Buxamusa, A.)

Crowther, S., Moos, Ph.D., F., Richardson, Ph.D., R., Slowinski, M. (January 10 – 12, 2012). *Teaching Skills Workshop – Getting Results*. La Casa de Maria Retreat Center, Montecito, CA. (Bellocchi, T., Bolanos, S., Brown, A., Buxamusa, A., Chavez, A., Coronel, M., Factor, S., Gereau, S., Greenaway, S., Parrish, P., Schultz, T., Sornborger, G., Thrasher, D.)

Magner, R., McLaughlin, L. (February 4, 2012). *KidWind Project Wind Energy Workshop for Educators*. College of the Desert, Palm Desert, CA. (13 Schools Participated)

Collins, B., Karnes, V. (March 3, 2012). *KidWind Regional Competition (3 Schools, 12 Teams)*. Cerro Coso Community College, Ridgecrest, CA.

Magner, R., McLaughlin, L. (March 3, 2012). *KidWind Regional Competition (6 Schools, 20 Teams)*. College of the Desert, Palm Desert, CA.

Other Events

Board, L., Karnes, V. (March 28, 2011). *Rio Tinto State of the Industry Meeting*. Petroleum Club, Bakersfield, CA.

Alfano, Ph.D., K. (March 29 - 30, 2011). NAS Committee member, *National Academies' Committee on Emerging Workforce Trends in the U.S. Energy & Mining Industries*. National Academies' Keck Center, Washington, D.C.

Board, L., Karnes, V. (April 7, 2011). *Industry Technology Advisory Meeting*. Cerro Coso Community College, Ridgecrest, CA.

Alfano, Ph.D., K., Houser, K. (April 19, 2011). *Solar Advisory Committee Meeting*. College of the Canyons, Santa Clarita, CA.

Alfano, Ph.D., K. (April 21 – 22, 2011). NVC Chair, *Mid-Pacific Information and Communications Technologies Center National Visiting Committee*. City College of San Francisco, San Francisco, CA.

Alfano, Ph.D., K. (May 15 - 16, 2011). Advisory Committee Member, *Wind Advisory Committee Meeting*. Laramie County Community College, Cheyenne, WY.

Alfano, Ph.D., K., Alldredge, R., Ama, S., Board, L., Buterbaugh, M., Constantinescu, E., Foster, Ph.D., P., Houser, K., Karnes, V., Klocko, J., McLaughlin, L., Moos, Ph.D., F., Reese, J., Richardson, Ph.D., R., Ross, Ph.D., A., Stanton, K., Steveson, B., Temple, G., Walls, W., Weeks, I., Wigfall, E., Wold, T. (May 25, 2011). *CREATE National Visiting Committee Industry Partners Dinner*. College of the Canyons, Santa Clarita, CA.

Alfano, Ph.D., K. (June 1-3, 2011). NAS Committee Member, *National Academies' Committee on Emerging Workforce Trends in the U.S. Energy & Mining Industries*. Austin, Texas.

Karnes, V. (June 21, 2011). *Green Jobs Advisory Council*. Kern Community College District Office, Bakersfield, CA.

Houser, K., (July 18, 2011). *SoCAL Solar Energy Industries Association (SEIA), hosted by CREATE*. College of the Canyons, Santa Clarita, CA.

Alfano, Ph.D., K. (July 21 - 23, 2011). NAS Committee Member, *National Academies' Committee on Emerging Workforce Trends in the U.S. Energy & Mining Industries*. National Academies' Keck Center, Washington, D.C.

Galisky, J., Wold, T. (August 1 – 5, 2011). *Renewable Energy Camp (6th - 9th Graders)*. Lompoc High School, Lompoc, CA.

Alfano, Ph.D., K. (August 21 - 24, 2011). *National Academies' Committee on Emerging Workforce Trends in the U.S. Energy & Mining Industries*. Golden, Colorado.

Buxamusa, A., Karnes, V. (September 7 – 8, 2011). *Site Visit*. Laramie County Community College, Cheyenne, WY.

Buxamusa, A. (September 10, 2011). *High School Student Outreach – Career Day*. Eastern Sierra College Center, Bishop, CA.

Karnes, V. (September 16, 2011). *Career Day – High School Outreach*. Cerro Coso Community College, Ridgecrest, CA.

Alfano, Ph.D., K. (September 21 - 22, 2011). *National Science Foundation Planning Grant Advisory Board*. Austin Community College, Austin, TX.

Ama, S., Buxamusa, A., Karnes, V. (September 22, 2011). *Wind Technology Advisory Committee Meeting*. Tehachapi, CA.

Buxamusa, A., Karnes, V. (October 4, 2011). *Green Jobs Advisory Council*. Tehachapi, CA.

Alfano, Ph.D., K. (October 6, 2011). *Emerging Renewable Energies Program Meeting*. Santa Monica College, Santa Monica, CA.

Buxamusa, A., Karnes, V. (October 13, 2011). *Kern County Board of Supervisors Meeting – Planning Commission*. Kern County Board of Supervisors Chambers, Bakersfield, CA.

Alfano, Ph.D., K. (November 3, 2011). *ATEEC National Advisory Committee*.

Alfano, Ph.D., K. (November 8 - 12, 2011). *National Academies' Committee on Emerging Workforce Trends in the U.S. Energy & Mining Industries*. National Academies' Keck Center, Washington, D.C.

Buxamusa, A., Karnes, V. (December 8, 2011). *Continental Wind Power Meeting*. Continental Wind Power, Carpinteria, CA.

Alfano, Ph.D., K. (January 16 – 18, 2012). NAS Committee Member, *National Academies' Committee on Emerging Workforce Trends in the U.S. Energy & Mining Industries*. National Academies' Keck Center, Washington, D.C.

Alfano, Ph.D., K. (February 6, 2012). NVC Member, *Advanced Technology Environmental & Energy Center (ATEEC) National Visiting Committee Meeting*.

Alfano, Ph.D., K. (March 9, 2012). Advisory Board Member, *CSIT CSU, Monterey Bay Advisory Board Meeting*. CSU, Monterey Bay, Seaside, CA.

2. Outreach to students and colleges

CREATE is very active with high schools in the Southern and Central California region for the purpose of student education and outreach and articulation. 2011-2012 activities have/will include summer and after school

activities (such as the Kid Wind Challenge) and career and Tech Fairs. The Regional and Finals for the Kid Wind Challenge are expected to bring a minimum of 130 students to Anaheim, CA to the AWEA national meeting for the two days of competition. Pre and post evaluation and follow-up will determine the short and long-term gains in knowledge and attitude for these events. Also, the high school energy curricula has been piloted at Lompoc High School and the results of both the middle school summer camps and the energy curricula was presented at the July 2011 HiTec conference in San Francisco. It is anticipated that these will provide a good pathway for students 2+2 work. University pathway partners will meet with CREATE in Fall 2011 to begin the university articulation process for the new curricula.

3. Work with industry:

An extensive collaborators chart with detail over 100 collaborators is available in the annual report.

Part III. Dissemination Activities: Publications, videos, and website:

The CREATE website 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 (e.g. RSVPs for Getting Results); assessment (on-line surveys); information (agendas for all meetings and meeting minutes); best practices; and technical course information downloads.

A major publication for the CREATE Center was 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 for 2011-2012.

Five CREATE students from Lompoc High School were filmed for the AACC ATETV series while presenting at a booth at the ATE PI conference in October 2011. Two of ATETV current videos feature CREATE Lompoc High School student cohorts showing the impact of engineering technology educations on underrepresented students.