# Pacific Northwest Center of Excellence for Clean Energy

*"A Centralia College Partnership"*

## Partner Evaluation Report

June 2012

# Evaluation Report

**DE-OE-0000398**

# Pacific Northwest Center of Excellence For Clean Energy

*A Centralia College Partnership*

**Funded and supported by the U.S. Department of Energy**

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June 2012

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## Purpose and Scope

The purpose of this document is to provide an evaluation report describing some of the impacts and effectiveness of the Pacific Northwest Center of Excellence for Clean Energy, “A Centralia College Partnership” (PNCECE or Center) for the period from approximately summer 2010 and spring 2012. This document is not intended to present a summative quantitative evaluation of PNCECE, particularly since that effort would duplicate numerous government compliance and institutional accountability measures already in place.

## Disclaimer



## Audience for this Evaluation

This report may be useful to:

- PNCECE’s educational and industry partners
- Community and technical colleges
- Other educators in the region who wish to model their efforts on this work
- Industry-educator organizations that are looking for effective operational models of industry/education partnerships
- Stakeholders and contributors supporting workforce development

## Background Briefing

The energy sector is facing a workforce crisis for two main reasons.

1. Estimates provided by some northwest regional utilities suggest that in critical technical occupations, 50 percent of the workforce will be eligible for retirement within five years. The Washington State University Extension Energy Program found that when craft replacements and new jobs in energy efficiency are considered, the number of needed workers could quadruple over the same time period.
2. New digital and interactive technologies aimed at improving distribution efficiency, leveling power demand, and improving the security and reliability of the distribution system (considered together under the term “smart grid”) will require re-skilling incumbent workers and revising the training and education materials for preparatory workers.

This isn’t only about new technology for distributing electricity. One big value of smart grid is gathering and analyzing data on user behavior, particularly patterns of energy usage; and then working with users to alter usage patterns to flatten peaks to better moderate the overall electricity demand.

These changes imply not only filling the pipeline with individuals trained in customary technical work and new technologies, but also developing individuals with analytical talent and customer-facing skills.

In August 2010, the U.S. Department of Energy (DOE) awarded the Center of Excellence for Energy (now known as PNCECE) and Centralia College a grant of $4,998,859 to develop, extend and deliver smart grid training for utilities, businesses and consumers. The Center’s principal focus: delivering or extending smart grid training for utility workers in a five-state region consisting of Idaho, Montana, Oregon, Utah and Washington. This was one of 49 awards made by DOE to support workforce training in the electric power sector.

PNCECE estimates the total value of the award exceeds $12 million, including leverage from an NSF/ATE grant operated by a sister community college, direct support from the institution and the State Board for Community and Technical Colleges, and extensive and varied in-kind and indirect support.

The Center has established high-level strategic partnerships with the regional utilities within its footprint, including the Washington State Labor Council and craft union representatives that support the energy sector workforce. These partnerships have provided advice and governance as well as expert contributors to help the Center develop skill standards and instructional elements which are the necessary precursors to preparatory training programs and incumbent worker retraining and up-skilling.

The purpose of this evaluation is:

- to help describe how and why the Center has been successful
- to help describe the impact and effectiveness of PNCECE's work to date
- to offer constructive advice that may be instrumental in examining future courses of action for the Center.

This report is unique because it does not duplicate the quantitative data required by the funder, the State Board for Community and Technical Colleges (SBCTC), or any of the partner institutions. Instead, this report focuses on viewing and describing the impact of the Center through a qualitative lens using the vision and voices of the major stakeholders.

The SBCTC established Centers of Excellence in emerging technologies and in economic sectors critical to Washington's economy. There are 10 centers in occupations as diverse as Allied Health, IT and Computing, and Construction Trades, to name a few.

Center status is earned by leading community colleges that have shown a consistent record of building and sustaining programs that help maintain Washington's competitive advantage. A given center focuses on a targeted industry that drives the state's economy -- one that is strategic to the economic growth of a region or the state. The concept is that other community colleges, secondary educators, and 4-year institutions can all gain from the knowledge and instructional products developed by each center. These products (and in some cases services) vary widely but generally include career pathway mapping, current educational opportunities, information on apprenticeship, certification and specialized training, model curriculum, and skill standards.

Centers are expected to develop and maintain close ties with industry representatives at operational and strategic levels, and to lead collaborative and coordinated statewide education and training efforts to build a robust and competitive workforce. In this sense, centers broker both immediate and longer-term needs of industry along with instructional models and best practices to all levels of education, focused on community colleges but including secondary education and universities.

Since energy is both regional and fungible, PNCECE must take a regional approach that is congruent with the electrical energy generation and distribution grid. Hence, there is a broad footprint for this Center.

Washington is considered a model for effective industry/education partnerships due in part to a coherent education and training vision shaped by state lawmakers, university policy centers, regional employers, and the State Board. PNCECE extends this vision to the growing energy sector.

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## Executive Summary

The evaluator met with PNCECE's Executive Director, Barbara Hins-Turner, and Dr. Alan Hardcastle, of the Washington State University Extension Energy Program in late summer 2011 to design a strategy for developing a special evaluation that would describe the impact of the Center from the viewpoint of its educational and business stakeholders. We agreed on a structured interview methodology, whereby the evaluator would engage stakeholders in telephone interviews lasting no more than one hour; using a structured interview protocol, whereby each interview subject responds to an identical set of questions. The analysis of this qualitative data consists primarily of identifying and describing patterns, and in describing whether interview subjects' responses tend to converge or diverge on particular topic areas treated in the interviews. The full report describes the questions and a brief overview of the theoretical grounding, validity, and limitations of this approach to data gathering.

Between November 21 and December 21, 2011, the evaluator completed a total of 17 one-hour telephone interviews with a set of project stakeholders identified by PNCECE's leadership team. In order to ensure maximum participation, the center obtained valid phone numbers, scheduled the appointments with the interviewees, and encouraged participation. The evaluator also conducted a series of executive interviews with a small number of institutional stakeholders.

One-hundred percent of the scheduled interviews were completed. Eight (47%) interviews were conducted with education/training entities, four (23.5%) with utilities, four (23.5%) with government/policy entities, and one (6%) with labor entities.

The structured interview protocol consisted of 11 questions, which were asked of all subjects. The questions were organized in the following categories:
a) History and vision;
b) Perceived value of PNCECE globally;
c) Perceived value of the Center's project relative to the specific needs of the subject organization's sector; and,
d) The value exchange between the specific subject organization and PNCECE.

General findings:

a) All interview subjects were able to cite multiple ways in which PNCECE was providing value to the regional electrical energy sector.
b) The most often cited indicators of mutual value included common focus on job skills definition, curricular focus for education and training, and a focus in career familiarization and educational pathway maps to facilitate entry into training for critical jobs.

c) PNCECE is seen as an effective and safe forum for sharing ideas and for developing workable strategies to meet common workforce development needs. The Center is seen as inclusive, communicating well, and providing competent leadership.
d) Many interview subjects were cheerfully able to cite one or more instances where something of value to them would not exist were it not for the Center. Most often, these citations included common frameworks for addressing problems, the career lattice, the avoidance of needless duplication in training, and, for the utilities particularly, the value of being able to voice their workforce development needs once and have them heard by educators and trainers throughout the region. Educators similarly found the “open source – common framework” approach very useful in being to identify needs and mount programs quickly.

Based on these data, we believe PNCECE is fulfilling its goals and fulfilling the broader strategic mission of a State Board Center of Excellence. We are particularly impressed with the sense of community that all stakeholders believe works to their mutual benefit. By providing a threat-free and productive forum and venue to discuss common needs and shared responses, PNCECE is seen as providing a critical benefit—one that did not exist before, and one that if lost, would severely cripple efforts to train, educate, and up-skill the workforce needed to implement smart grid and ensure the security and reliability of electrical generation and distribution for the region’s economy and households.

## About The Evaluation

In keeping with the goals of this special evaluation, we sought data and describe formatively and summatively (to the extent possible) the ways in which stakeholders and contributors interact, grow, learn, support and amplify the effectiveness of the PNCECE's work. For the summative evaluation we sought qualitative evidence of the impact the work has on teaching, student learning, and employers in the region.

### Methodology

The following methods were used to develop data and input for the report:

- Structured Interviews with Principal Investigator, Center director, Co-Principal Investigators, faculty, staff, and other appropriate industry, agency, and policy level stakeholders.
- Casual meetings with project stakeholders at major points of intersection, such as secondary schools, business, 4-year universities, and employers.
- Review of project outcomes relative to original and revised goals and priorities.
- Analysis of intended and unintended outcomes and resulting consequences revealed as part of the structured interview process.

After the initial 17 interviews with project partners were completed in late fall 2011, we performed several additional executive level interviews with selected institutional stakeholders. These interviews used a slightly different question set and were designed to provide some additional descriptive texture.

Use of structured interview protocols[1] is considered a statistically powerful quantitative technique if a tested rubric or uniform rating scale is used for each interview subject and the number of subjects is relatively large. The results of such interviews may be considered statistically valid if several raters use the same rubric and a uniform method of resolving inter-rater variances is employed. Such interviews are frequently employed in personnel selection, when awarding grant funds, and in other circumstances where individual outcomes rather than group generalization are important.

In our case, while we did have informed expectations for what we believed we'd hear, we did not use a structured rating instrument since we were not interested in *ranking* the responses; and, the evaluator was the only rater. Furthermore, since a subject's responses could lead the interview in unanticipated directions without penalty for the respondent, the results of these interviews can be considered qualitative[2]. Also, in this instance, it was impossible to know with

[1] https://apps.opm.gov/ADT/ContentFiles/SIGuide09.08.08.pdf

[2] It may be useful to think of three broad categories of data: quantitative; qualitative; and anecdotal. Quantitative data are derived from the statistical analysis of numbers. Quantitative data may describe general properties of a group but cannot be assumed to be representative of any individual. Qualitative data are derived from behavioral observation, testimony, circumstantial evidence, and

certainty what relevant issue(s) the interview subject might raise in responding to a question, and how the evaluator might need to probe to learn more. Herein lays the value of this technique, if the purpose of the interview is to find the meaning and value of a particular endeavor from the point of view of the stakeholder, contributor, or participant.
Since the format of the interview is structured but the responses are not, the interviewer must be familiar with and experienced in probing techniques (designed to elicit more information) as well as in methods to keep an interview subject on track.

Following are some examples of probing questions as well as techniques for redirecting an interview subject who has gotten off track.

- Could you please tell me more about…?
- I'm not certain what you mean by… Could you give me some examples?
- Could you tell me more about your thinking on that?
- You mentioned….Could you tell me more about that? What stands out in your mind about that?
- This is what I thought I heard…Did I understand you correctly?
- So what I hear you saying is…"
- Can you give me an example of…?
- What makes you feel that way?
- What are some of your reasons saying what you said -
    - You just told me about…. I'd also like to know about….
    - That is interesting - but I'd like you to tell me more about ……
    - Can you tie your last remark back to the question I asked about ……..

inductive methods. When derived from qualified individual under controlled circumstances, qualitative data are useful for describing the attitudes or behavior of a group. Quantitative data tell what, when, and to what extent. Qualitative data explain why and how, Anecdotes are the unqualified opinions of unselected individuals, uncorroborated by evidence.

Following is the interview protocol we used:

Structured Interview Protocol
Funded and Un-funded Partners

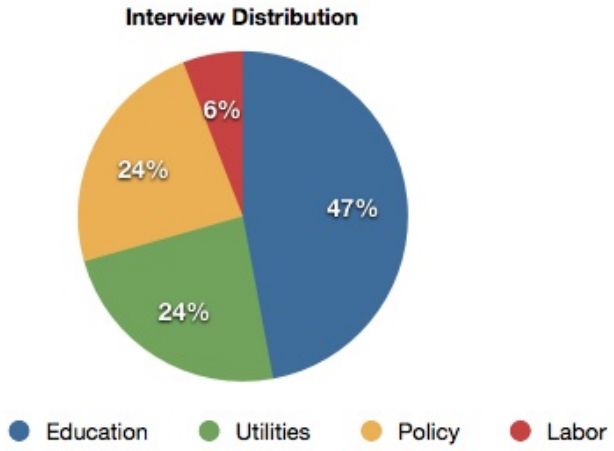
*This protocol will be used to gather qualitative data from participating partners in telephone Interviews of approximately one hour duration.*

| Question | Response |
|---|---|
| • What led you to participate in the Smart Grid project initially? | |
| 2. Tell about your involvement with the ten targeted occupations, which you are concentrating on, and how the work is going. | |
| 3. What are some of the challenges you faced in participating? | |
| 4) How are you overcoming those challenges? | |
| 5. How do you connect or collaborate with other contributors? Have you made new beneficial associations as a result of participating? Are you complimenting or supplementing with others in addressing the targeted occupations? | |
| 6. How do you see your work is contributing to achieving the overall goals of the project? What value do you perceive you are adding? | |
| 7. Tell about some examples of benefits *you* have received as a result of contributing. What value have you received? | |
| 8. How has your participation shaped or changed your practices or your institution? What is your legacy take-away? | |
| 9. What was your expectation of success when you joined the project? | |
| 10. Do you believe you have achieved the success you wanted? Why? | |
| 11. Is there anything else you wish we had talked about that I didn't touch on? | |

The evaluator telephoned each interview subject at a preset appointment time. The Center's staff set up the interview appointments. Prior to the start of the interviews there appeared to be some anxiety among some respondents with regard to the possible questions and the degree preparation. In response, the Center sent interview subjects an email that disclosed the general tone and direction of the questions, but not the questions themselves. The evaluator took accurate and detailed notes during the interview, then immediately transcribed the notes to an electronic interview report form to create a permanent record. The interviews were not voice recorded. Prior to commencing the interview, we notified each respondent that their individual responses were confidential, that the information they provided would be reported unattributably and in aggregate. In several cases we did ask several subjects for permission to quote a specific response or comment, which was always granted.

**Results and Findings**

Seventeen interviews were held by telephone between November 21 and December 21, 2011. PNCECE staff performed initial introductions by email and set the schedule for each interview according to time slots mutually agreed upon by the evaluator and the Center's staff. Each interview subject was asked the same 11 items according to the preceding exhibit. Interview subjects were distributed among the four sectors (Education, Utilities, Policy and Labor) according to the chart below:




The 11 questions were roughly organized in the following broad categories:

a) History, vision and purpose

b) Perceived value of PNCECE globally

c) Perceived value of PNCECE relative to the specific needs of the subject organization's sector

d) The value exchange between the specific subject organization and PNCECE.

This report does not present the raw data from the interviews. We summarize the frequently occurring and most often stressed responses for each question. We expected to find that each of the four main categories of respondent had different priorities, but found an unexpected degree of commonality among the responses to many of the questions, regardless of the sector represented.

***Question 1:*** ***What lead you to participate in the smart grid project initially?***

Respondents considered the aging workforce and need for advanced technical skills to be the top two reasons for partnering with the Center. Two respondents (from different sectors) likened

the labor profile to an ‘hour glass’ in that a large number of near-retirement age workers would be exiting the craft and technician workforce within three to eight years, and the following cohorts of incumbent workers were too small to make up for attrition, let alone for expansion into technical fields.

For utilities: the aging workforce issue was most frequently mentioned first and the long-term consequences of the failure to develop a qualified pool of applicants with requisite technical and customer service skills was related to several business consequences including possibility to retard rollout of smart grid technology.

For educators: the career lattice and the prospect of either developing or sharing model curriculum and skills analysis was mentioned as a major advantage - something they could not have done on their own.

We also noted that several of the partners had partnered with Centralia College on previous projects with Barbara Hins-Turner and others. From these prior associations had developed a close and trusted working relationship that made the decision to partner on the smart grid project easy.

**Question 2**: ***Describe your involvement with the ten targeted occupations and describe which ones you are concentrating on and how the work is going.***
This question refers to the career lattice and occupational descriptions described by Dr. Alan Hardcastle of Washington State University’s Extension Energy Program.

It is hard to over-estimate the value of standards and pathways, particularly for educators and those involved in career development. Respondents were able to articulate a good understanding of the basic foundation of these occupations—but the notion of ‘supply side’ and ‘demand side’ occupations was mentioned as illuminating and clarifying by several respondents.

Utilities noted that their tradition of focusing on supply-side occupations (lineman, substation operator and so on) was evolving; and that it helped to view customer facing work from the demand-side perspective. Utilities mentioned they have (or expect to have) the need to advise customers, analyze usage data and patterns, and then offer energy solution alternatives that are most cost-effective operationally or that help deliver the claimed return on investment for building modifications or other efficiency projects.

One of the most frequently occurring issues for both utilities and educators is the need for workers with better analytical skills, particularly as they pertain to trend analysis. Smart grid systems can provide refined data that is available from the current load dispatching systems. It’s

not so much about developing raw data as it is about interpreting formatted data the systems present.

Utilities mentioned that new control and distribution systems are digital, and therefore require diagnostic, calibration, and repair techniques that are very different from older systems that are rapidly being replaced. At the very least, having prepared individuals who can enter apprenticeship or training with the background to be trained on this technology is a definite plus.

Because of new technology, the need for a facility with data analysis showed up in responses on both supply-side occupations, where it is critical to smart grid operation, and demand-side occupations, where customers, whether business or residential, look to the utility to advise on solutions to contain costs and reduce energy consumption.

All interview subjects credited the Center for providing leadership and direction—for providing a common focus—for basic skills definition, suggested model curriculum, and career pathway development.

Utilities told us that older occupations, particularly meter reader, will be going away as utilities convert to smart grid. Many of these individuals might be re-skilled to work in customer service in jobs such as energy auditing. In the future, new hires will be required to perform more than one job function.

**Question 3**. ***What are some of the challenges you faced in participating?***

Utilities reported administrative difficulties had to be overcome in order to actually participate, particularly in regard to accepting funds and/or contributing time or other value. These issues arose mostly as a result of the governance or regulation of the utility, and were not caused by the project itself. Some stakeholders are funded partners (meaning the Center provides some monetary support for participating) and some are not. The interviews revealed a somewhat complex network of fiscal, in-kind, and exchange of services support, which given the number of participants is probably not unusual. PNCECE is seen as trying to help work through the unique support issues, and to its credit with one exception, none of the respondents characterized support issues negatively—it was more a case of added time to resolve administrative challenges.

Interviews with education respondents revealed that the initial notion of developing supplemental re-skilling training for utilities was the tip of a larger iceberg. In practice, educators appreciate the need for development of at least a core curriculum—whether focused on the supply or demand side (although the utilities still handle a large part of the supply-side training through various apprenticeship and union training programs). The Center is truly appreciated for its work in

bringing stakeholders together for many reasons, core curriculum being one. We were impressed with the educator's candor of there being no difference whether a class was taught before or after 5 p.m.

One common thread from educators and utilities is efficiency—and meeting the challenges of fostering a 'write once, teach many' approach to training and educating that can help everyone.

The Center has helped its constituency meet some of the biggest challenges by incentivizing the creation of a durable set of standards, career information, best practices, and curricula that can continue to be built upon and customized for years ahead. *"We wouldn't have really known where to start"* was the way one respondent put it. *"Now we see the forest and the trees."*

**Question 4: *How are you overcoming your challenges?***

The Center is seen as a major force in overcoming some of the vexing challenges in workforce training and education. Each in its own way, both education and utilities remarked about the fact that industry traditionally thinks in terms of training modules while education thinks in terms of courses and programs. We were impressed by several respondents who noted that the Center had given a vision of building for the future, not just meeting an immediately presenting need. Other respondents mentioned that PNCECE had done a good job of helping to build relationships and providing good foundations for the starting of new work.

Interestingly, when we asked this question, we expected answers to closely mesh with the issues raised in question three. While this did occur, the responses to question four brought up responses to challenges not explicitly raised in question three as problems. In particular, entities that had prior relationships with the Center's leadership said they were confident they could meet likely challenges based on the strength of these prior associations through the Center. Others volunteered that the general atmosphere of trust and cooperation they experienced in their dealings with the Center would make overcoming challenges (whatever they might be) more possible.

When we probed deeper about planting seeds, the responses most frequently mentioned included 1). open curricula: 2). the Hazard Information For Industry (HIFI) Library; 3) career pathway definition; 4). the future value of contacts and relationships.

As discussions with interviewees developed, we distilled from many comments and responses the essence that the Center is providing what we'd characterize as a 'magnetic north' for standards and career definitions, and that the Center provides a safe haven in which common interests related to education, training and workforce development could be discussed in a collegial and threat-free atmosphere.

Some angst also emerged. While many respondents (about 90%) mentioned the work they were doing with the Center was “planting seeds” there was uncertainty about how long it would take product to emerge and whether they would be in sync with the workforce needs given the realities of implementing changes, no matter how necessary or desirable those changes may be. Probing deeper, the root of the concern seems to be environmental—there are two closely regulated, conservative and risk-averse entities—education and utilities—trying to bring about changes on multiple fronts. The Center’s work is particularly appreciated in this context since there is virtually unanimous agreement that the Center is an exponent—it finds ways to facilitate changes that its individual components could not do by themselves.

**Question 5**: ***How do you connect or collaborate with other contributors? Have you made new beneficial associations as a result of participating? Are you complimenting or supplementing with others in addressing the targeted occupations?***

We received a rich fund of responses to this question. We believe one of the greatest benefits of PNCECE has been the collaborative relationships it has developed or fostered. WSU for example was cited as being especially helpful in providing skills and career information that can (in two cases) help 4-year schools partner better with community colleges. The Center has also convened meetings in different locations which not only encouraged local participation but the information exchanged also helped in terms of synergistic contributions that might not otherwise occur. For instance, the Principal Investigator of an NSF/ATE grant in clean energy at Edmonds Community College is developing a resource that catalogs current training capacity and gaps at community colleges within the Center’s footprint. One community college district with a strong instructional media program is offering to design media based content for the partner schools.

The policy category respondents all cited in one way or another how PNCECE had improved or expanded relationships with community colleges. In particular, getting granular knowledge of energy careers and training required is helping the VA to counsel returning veterans into energy careers.

One respondent at a major utility cited the leveraging of PNCECE’s partners and resources that helped develop on short notice a successful $5-million federal grant.

Since the Center integrates policy and research centers, such as Washington State University and Idaho State University, several respondents stated that curriculum and training are informed by ‘boots on the ground’ types of engineering programs, for example, those offered at Idaho State and Oregon Institute of Technology.

Apprenticeship offers a pretty narrow window and it's a fair bet that industries will not willingly expand their company sponsored training efforts except in cases of security or protection of intellectual property. This leads to the conclusion that we will likely see additional need for public community colleges and universities to provide training and education in the power generation and distribution field for preparatory and incumbent workers. This in turn would benefit from communication, connections, interaction and sharing of resources, services this Center currently provides.

We also gleaned responses to this question of collaboration involving the issue of career pathways. Several respondents noted that community colleges might benefit from knowing more about the career pathways and range of opportunities available in electric power, particularly but not only concerning smart grid. One college suggested sharing of resources including courses and courseware that would make it possible to offer programs at a scope and depth neither institution could support alone.

**Question 6:** ***How do you see your work contributing to achieving the overall goals of the project? What value do you perceive you are adding?***

The utilities believe they are contributing in material and constructive ways to the Center's work. One example: many managers come up through the craft. They do not have advanced degrees and tend to work within their traditional craft boundaries. Some of the new challenges utilities face involve more customer-facing work that requires a broader range of skills and (as mentioned before) analytical ability to varying extents. One respondent felt that although some of these positions would definitely require engineering degrees in the future, some (more than half) might (in the respondent's view) need just a community college degree. Following this thread with another respondent as well, this interviewee offered that these new positions were 'absolutely vital' to the survival of the company.

"Why is this a Center issue?" The answer: The Center focuses its efforts and that by contributing to broadening the perspective and understanding of utility work in general and smart grid implementation requirements in particular, all stakeholders benefit. I was reminded that utilities may compete to some extent for talent, but not really for customers. So while keeping good ideas to oneself might be an incentive for some companies, it's actually a detriment in this context. Another utility respondent remarked that the support of public education and training is vital not only to attract capable students to the careers. Public education also already attracts and serves targeted populations such as veterans and the underrepresented populations that can be a rich potential talent pool.

This said, PNCECE provides a single point of contact with a wide audience.

Another interesting thread that runs through the utility responses and triangulates with the prior discussion in which the notion of competition emerged, is that although they are all in the same business (they state they are), because of PNCECE, they are able to learn from each other.

We found that the issue of knowledge transfer among the utilities is a valuable contribution that the Center facilitates and could alone in their view be the reason for its existence. We hadn't expected the level of frank and open admission that the utilities traditionally had really known relatively little about each other, the challenges they faced, and the solutions that might be developed to meet them. What emerged from our interviews is that the Center provides intersections not just between major stakeholders like industry and education, but among the stakeholders in productive ways as well.

**Question 7**: ***The benefits and value received.***
With perhaps one exception, nobody felt they were putting in more than they were getting out. And what stakeholders felt they were receiving were most frequently stated in systemic rather than transactional terms. For instance, one education respondent remarked that the Center's efforts were leading community colleges out of offering just 'rote steps' training and toward a bigger picture that included relevant theory—not just 'know how' but 'know why'. He was speaking not just for himself but for his institution and for those similarly situated.

Another respondent from the policy sector suggested that smart grid is part of a much bigger picture involving a clean energy future that also attracts new, and supports existing businesses. This respondent gave the example of energy efficiency as a key component not only because it saves energy so it can be used by others, but also because it helps businesses lower their costs. This respondent stated that from a policy perspective, these issues are moving to center stage because building more power generating capacity is increasingly costly and problematic. This leaves efficiency practices as the only viable short to medium term alternative. Getting these issues on the table and pointing all stakeholders towards coordinated solutions was seen by this respondent as a key value offered by the Center. When asked how the Center did this, the interviewee cited energy summits, professional development events hosted by the Center, and numerous presentations and other service contributions made by the Center.

Several utilities offered the observation that the smart grid project would never have happened without the Center. When asked why, one frequently recurring reason was that the Center is the glue that holds a diverse constituency together. Troy Nutter, Training Manager at Puget Sound Energy, remarked that [the] "*value of having discussion among industry sector members is as valuable as the education and training initiatives themselves."* As an organization that serves 20 of Washington's 37 counties, [Nutter] "*makes sure they [community colleges with training programs] work with the Center for certainty about standardization and quality benchmarking*."[3]

Another utility offered that they believe energy management technicians and experts will be highly sought after, and the skills research and standards offered by the Center are very important resources to help this utility work with community colleges and workforce development to ensure an adequate supply of properly trained and educated workers throughout the region.

The notion of an open-source common core of skills, best practices and curricula was cited by both employers and educators as a major benefit of the Center. Having a central resource as opposed to each entity developing its own curricula and programs in isolation is appreciated as a huge benefit by the employers, who are pressed for time and see the efficiency and effectiveness of a 'say once—teach many' methodology.

We asked if respondents were seeing value or if their comments were hypothetical. Utilities and educators are seeing benefits now. The sharing of regional knowledge facilitated through the Center is producing tangible benefits, with trained individuals entering programs in community colleges and being employed throughout the region. This is in addition to the aforementioned central forum, coordination of training and sharing of standards and practices.

Educators tell a similar story from their perspective, particularly with one college that is sharing already-developed curriculum and the work product of another grant through the Center to other colleges. Another college decided to focus its program on the customer-facing work rather than trades, and is already placing graduates. The Center has influenced 24 of Washington's community and technical colleges, 12 of which attended and participated in the annual energy summit. While it is beyond the scope of this document to characterize this participation in detail, at the macro level it is certainly worth noting that this degree of cooperation is a phenomenon worth exploring in and of itself.

The Center also provides a common point of contact for career awareness and information to help students better understand career and education options in utility work. Through its website and YouTube, PNCECE offers several descriptive videos that showcase females and under-represented populations on the job. Although the viewership statistics appear very low

[3] All comments used with permission

(averaging about 45 - 50 views for each of four videos we investigated), this type of resource will prove vital to career exploration. The media make an appealing case for investigating electrical power careers.

Furthermore, two utilities we interviewed mentioned the importance of a uniform career coaching and career pathways effort, supported in part by the Center. PNCECE provides the ability to follow up with counselors and prospective students more efficiently than before.
This is an impressive list for a short period of time. Focusing effort, sharing knowledge and resources, catalyzing change, eliminating unnecessary duplication and providing uniform and high quality standards and practices are excellent examples of offering value.

**Question 8**: ***How has your participation shaped or changed your practices or your institution? What is your legacy take-away?***
By far the most frequently recurring theme is that the grant has enabled the Center to open and maintain channels of communication among all clean energy stakeholders across a large footprint. It's worth mentioning that ever-tightening educational budgets are constraining professional development and related activities.

There is something deeper here. How is the Center creating this community that in turn is shaping institutional practices for the better? One key ingredient is participation - sharing is two-way. Also, materials and resources have value when they relate to relevant needs. It's not that the Center lacks in quantities of information and spits out a work product—it's that the stakeholders affirm that the work is really developed collaboratively in an atmosphere of trust community.

For instance, one major utility stated that the development of common standards and practices has made it easier for training developers in their organization to produce company specific modules. The key to this acceptance is that the standards were openly developed in a participatory framework and the end product clearly reflects that. People will use the work when they 'see' themselves in it.

Several respondents offered that the Center's imprimatur allowed it to deal with high level executives and strategy-level people among the stakeholder group, and this in turn provided higher quality information and broader vision than would otherwise have been possible. This was also expressed as contributing to a long-range solution to a pervasive workforce problem, rather than a series of short-term "quick fixes". Our interpretation is that respondents appreciate the difference between future-active and reactive.

Commensurate with this future-active notion is one respondent's discussion of the Center as developing a 'human capital' approach to the clean energy and smart grid workforce, whereby workers are more than just a potentially expendable labor commodity that satisfies a *de-jure* need. The skill standards approach, by example, includes performance indicators not just for the technical aspects of the job but also for the professional and employability aspects as well.

One community college remarked that the previous institutional tradition had been that the college owned the training for one particular utility. Participating in this grant is changing the culture to be more collaborative and seeing opportunities differently. They also volunteered that the 'magnetic north' property referred to earlier was important for program development, and that the 'say once—teach many' aspect allowed them to satisfy their local constituencies in a time of dwindling resources. These practices and products represent efficiency also—and it's interesting that the old proprietary practices appear to have lost their luster.

Two colleges offered that they are considering building bridges between their engineering programs and technician programs based in part on the workforce research and standards developed through the Center. Standards, it turns out, can provide a common language framework that can possibly bridge 2-year technical programs and 4-year engineering programs. The building of standards based curriculum modules for the community college programs has informed this appreciation and whether it takes hold or not, the institutions are stronger because of the understanding.

Interestingly, one large utility offered that it has changed its expectation: They formerly expected that colleges would conform to any training model the company demanded. Now, this utility offered, there is more dialog and the utility admitted they appreciated the benefits that come from teaching from a broader perspective, one that was not centered just on this one enterprise.

Above and beyond transaction level, one utility offered that it approaches training and employee development differently because of the Center. They adopted the practice of skills panels, standards, more uniform rigor, and finding the best subject matter expertise to conduct training.

Another community college remarked that working with PNCECE has helped them bring 2-year and 4-year schools to the same table, along with industry associations and employers. The realization that everyone has a place and a contribution to make rather than seeing each other as competitors and rivals has opened new doors. As utilities implement smart grid and begin advising on energy management issues, the nature of the work will shift considerably to be more customer-facing. This college believes the Center is helping to create more durable and comprehensive programs that will serve students better—whether they are just starting out or changing careers.

**<u>Questions 9 and 10:</u> *Expectations of success and fulfillment.***

We asked respondents to comment on their expectations of success and on whether those expectations appeared likely to be met.

By far the largest number of responses regarding expectations gravitated toward:

- Having honest and open conversations among stakeholders
- Sharing information about what's really needed, what works and what doesn't
- Smart grid curriculum
- Common portal for information sharing, recruiting, career awareness

Interestingly, not every respondent (particularly but not exclusively utilities) claimed to have a specific expectation of success. Nevertheless we probed for additional information based on the premise that there must have been some business reason for partnering with the Center. Using this approach we did get the more taciturn respondents to talk. We found the common thread to be human factors - everyone had, when we probed, a human factors expectation. For utilities, this involves training and workforce preparation, particularly for new technologies, and for up-skilling the current workforce and meeting workforce needs arising from attrition, retirement and growth.

**Were the human factors expectations being met?**

Each utility respondent was able to cite specific examples of this easily. While we did not engage in probative discussion of numbers, since that is beyond the scope of this report, we did elicit admission that they are satisfied with the results thus far and believe very strongly in the future of the Center and its ability to rationalize the various voices and inputs into coherent products, services and practices.

We heard over and over that one of the biggest success indicators to date has been providing a safe forum where stakeholders can have the longed-for open conversations and sharing of information.

Significantly, no respondent offered an expectation of success in monetary or numerical terms.

**Were (or are) other expectations met?**

Particularly in the areas of collaboration, information gathering and information sharing, the answer is a most definite "yes." The following are some representative samples of responses to this question:

*Absolutely—the collaboration has yielded synergies, forecasted benefits, and intangible benefits that certainly make it more than worth the time and effort spent.*

*Well on the way—on track for the third quarter of 2012 for completion of internal work plans—mapped out curriculum to develop, more than 1,000 training events.*

*Expectations, with regard to establishing a valuable network of collaborators, have been exceeded.*

*Leverage that which is shared—efficiency—don't have to reinvent everything—It is "ours" not mine and yours—not losing partners but gaining partners—Thanks to strong mature partnerships, this Center produces more numbers than expected. Any curriculum that involves energy goes through the Center and is vetted by industry stakeholders and shared universally. Can't sit on each college's individual advisory committee*

*Well on the way to success—we can use and leverage the deliverables. Package for continuum of opportunities and chance to dialog with industry about future jobs—not just reactive to some industry specs but a long term and reflective approach with industry about training and workforce development.*

*Value has increased due to expansion of the number of nodes.*

The six responses are largely representative of the 17 stakeholders interviewed. We did discuss enrollment or program performance issues with a couple of respondents who wished they were further along, however these can't realistically be the responsibility of the Center.

Executive Interviews

We conducted several executive interviews with the leadership team and Dr. Walton, president of Centralia College. While the interviews were 'on the record,' we found several common threads that lend valuable perspective to the view of the Center. We derive the following significant excerpts from the stakeholder interviews.

The Center has meant quite a bit to Centralia College and has impacted the institution in several ways. Centralia has the highest unemployment in Washington state and lowest student attainment. The region has been resource extraction economy, particularly timber and some coal -- both now gone. One feature of this type of economy is that it offers fairly high paying jobs that require no advanced skills or knowledge. The population that participates in this type of economy develops a culture of low educational attainment and low expectation. When the extractive industries leave, as was the case in Centralia, the economy quickly contracts, wages and income falls, services are curtailed, and panicked people scramble to find even minimum wage work in retail and service sectors.

Centralia College accepted the challenge to change the way people in its service district engaged their futures. Although energy is big business across the Pacific Northwest, relatively few jobs are local. With this, Centralia City Light has been supportive of the Center not only because it needs the highly skilled workforce to secure its future, but also to accept the challenge to change local student expectations - even if it means to start a real career, students may have to leave the region (at least temporarily) after college.

One impact of the Center's work on the college has been to bring together some usually disparate supporters to establish a Bachelor of Applied Science degree. The support of Tacoma Power and IBEW can provide energy managers to the utility industry. This is a truly unique partnership and provides a great opportunity for students as well as a successful practices roadmap for other institutions.

We asked executive interview respondents about the longer term impact. The strongest response was from the stakeholder network. For the Center, this transcends to the energy industry since the lessons learned apply to any industry. In this way, the Center challenged the college to think bigger. The results are visible. The college was faced either with contraction as the state support diminishes, or to find ways to partner with economic development councils and other organizations and employers to get the necessary business and community support to establish viable sustaining programs without relying entirely on the state. Working with the local EDC, the college raised more than its original 'ask' to support development of the aforementioned bachelor's degree. This is vital to a region where currently, auto dealers can't even find qualified service managers.

The Center was able to leverage the nearly $5 million DOE grant to nearly $12 million (dollar match) as a condition of getting the award. Centralia College had to be seen as a strategic partner, not just to the local utility constituency (Centralia City Light and Tacoma City Light) but to the broader consortium in the five-state region.

The Center has put Centralia on the map—showcasing good works and a broad and inclusive vision for clean energy and energy workforce development. That there were more than 400 applications for the 49 Department of Energy awards and Centralia got one pretty much says it all.

**Conclusions and Recommendations**

Throughout this work of characterizing the Center, we have seen several threads emerge repeatedly but none more strongly than the common appreciation of the value of the network created by the Center.

Partnership is a buzzword and examples of industry/education partnerships abound. What makes this so special? There are several answers that all flow toward appreciating that the value of a network increases as a function of the number of nodes. Bringing together the Washington State University Extension Energy Project and the Energy Systems Technology Education at Idaho State University has provided high level research-based skills standards and uniform performance criteria to the energy technician training and education. Moreover, this work and the practical experience of the community college educational partners have mapped a new set of career pathways to attract and educate the new workforce.

Smart grid technology entails a wide range of potential occupations and has opened new opportunities on the demand side as utilities work more in partnership with businesses and individual consumers to help ensure adequate supplies of clean electrical energy into the future without the need to build new generating capacity.

The Center has definitely built its brand and established itself as a central resource and trusted venue to discuss workforce, human factors, and education issues. The utilities buy into and trust PNCECE, and they see and realize the benefits of being able to speak to all stakeholders with a common voice.

PNCECE has fulfilled the highest mission of the Washington State Center of Excellence vision. The way our respondents talked about the Center was telling. Even the less enchanted (and there were only a couple of those) were quick to admit the Center's value and impact. And to be absolutely clear, these are not 'feel good' responses. As we mentioned before - there is tangible value for educators and industry from the Center's work. Without the 'magnetic north' the high level goals and vision for smart grid and clean energy would probably devolve to a number of incoherent treatments and sporadic responses. Since energy is a compelling issue and is so vital to the region's economies, the Center's work in our view must continue beyond the current grant funding.

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