SHORELINE COMMUNITY COLLEGE
CLEAN ENERGY TECHNOLOGY & ENTREPRENEURSHIP
PROGRAM REVIEW
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EXECUTIVE SUMMARY AND PRIORITY SUGGESTIONS

Overall Observations

In 2014, the CET program hired a program coordinator who has made critical revisions to make the program relevant and vibrant, including creating a program advisory committee. She also led faculty to revise certificate and degree options, update program outcomes, and improve online learning capabilities. This is reflected by strong reviews from current students, who were quite likely to recommend this program to others, giving it a 4.6 on a scale of 1 (definitely not) to 5 (definitely) (N=10).

Recently, the program submitted a National Science Foundation (NSF) grant that has been recommended for approval by NSF staff. This grant will allow the program to continue updating the program and provide multiple enhancements (described below).

The program provides one certificates and an associate degree. Student enrollment in the program is somewhat low. In AY 2015-16, CET had 20.2 FTE and 86 students.

Employment prospects for future graduates of this program are strong. Occupations that could be a fit to graduates of this program are largely expected to grow faster than average and generate 6,500 openings in King and Snohomish County by 2024. Employers on the advisory committee believed these figures to be an under-estimate of the actual market as it is growing exponentially each year. Employment of program completers, available through AY 2012-13, supports the curriculum revision and need for continuing vigilance to keep the program relevant. Employment of completers versus leavers was strong in 2010-11 (92 percent vs 54 percent for leavers) but those results eroded over time. By 2012-13 only 73 percent of completers were employed compared to 66 percent of leavers.

Priority Suggestion 1: Continue Seeking Opportunities to Keep the Program Relevant in a Rapidly Changing Industry

This industry is changing rapidly as new technologies become available and developers and the consulting firms that serve them incorporate these new technologies to improve efficiencies. For example, solar technologies considered state of the art five years ago are not even used any longer and considered outdated. As a result, faculty agreed that program learning outcomes revised in 2015 now require updates to keep the program relevant. The anticipated NSF grant will provide needed resources to maintain this edge, but is only a first step in a much longer process.

Suggestions

1.1 Future staffing decisions should maintain the maximum amount of flexibility to allow the CET administrator to engage with industry and keep the program relevant.

1.2 Recruiting firms for the excellent program advisory committee continues to be a priority, especially using all strategies available to attract the larger firms that can offer important resources such as equipment, expertise, and student internships and shadowing opportunities.

1.3 Implementing the NSF grant will be critical to keeping the program relevant. Though highly unlikely, if the grant is not acquired, additional outside funding should be sought to achieve the grant objectives.

Priority Suggestion #2: Recruiting Younger Students

The average age of students in the CET program (37) is older than the average of all of Shoreline's professional-technical programs (29). To a certain extent, this is expected. This program attracts a portion of students in physical construction jobs wishing to switch to less physical jobs as they age. Additionally, the field is less well known among high school students, so exposure is a problem compared to more well-known and understood construction careers.

However, faculty and staff appropriately recognize an opportunity to boost enrollment and reduce their average age by creating opportunities to familiarize high school students with this growing industry. The NSF grant will allow them to take important steps in this direction by offering a summer training opportunities to high school teachers to allow them to incorporate applied learning opportunities related to CET into their STEM curriculum.

Suggestion

2.1 Implementing the NSF grant will be critical to exposing youth to this field. Though highly unlikely, if the grant is not acquired, additional outside funding should be sought to achieve the grant objectives.

2.2 Exposing students to this field is will not necessarily result in increased youth enrollment. To achieve this, marketing materials should be developed that describe the field and earning potential, and offer high school students hard entry points. This could include information on Running Start including sample course plans and enrollment information. It could also include developing a program with a CTE program.

Priority Suggestion #3: Develop a Technology Plan

CET is a technology-heavy department. Industry requires students be familiar with a variety of hardware and software solutions, requiring the program to purchase and incorporate these technologies. Many of the hardware technologies are housed in the Zero Energy House, which has some structural deficiencies, is not ADA

compliant, and is not actually "zero energy." A consultant estimated $200,000 was required to fix the deficiencies, make it ADA compliant, and make the building zero energy again.

Suggestions

3.1 The program should develop a technology plan. This plan should describe:

- The existing needed technologies used in teaching;
- The most efficient place to house these technologies;
- Future resources required to maintain the technologies and purchase new technologies.

<u>Findings</u>

School-wide Findings
1. Shoreline Community College should develop a system for collecting contact information from graduating students. This information could be used by the Foundation for fundraising, as well as by individual departments to assess alumni satisfaction and the degree to which alumni achieved program outcomes. (p. 8)

Program Level Findings
1. As described in the NSF grant, industry should play a leadership role in the process to identify needed skills and career paths (p. 10).
2. Curriculum mapping should occur. Planning for this process should ensure that the changes planned in the NSF grant are captured in the mapping, or a new map will need to be completed after the NSF grant changes are implemented (p. 10).

Employment Findings
1. Alumni employment data support the curriculum revisions that occurred in 2015, and make the case that continued curriculum revisions should be planned on a regular basis (p. 12).
2. Employment projections and program advisory committee comments indicate that this field is growing (p. 12 and 21).

Student/Course Level Findings
1. Because of the improving economy, CET headcount enrollment has declined at levels similar to all of Shoreline's professional-technical programs (p. 12).
2. The program coordinator is doing an excellent job of marketing her program to potential groups of new students including incumbent workers, youth, and military groups (p. 13).
3. Marketing materials presented to the program advisory committee had a printing defect rendering them illegible. Even without the defect, they

appeared busy and difficult to quickly understand. It's recommended that they be redesigned by Shoreline's marketing department (p. 13).

4. CET's recently submitted NSF grant will develop workshops for high school teachers to help them develop clean energy concepts in STEM courses, expanding awareness of the field. Building awareness of the profession is important and should be continued (p. 13).

5. To boost youth enrollment in a more measurable way, the program should develop pathways for high school students to pursue credentials and/or degrees while in high school, such as using Running Start or partnerships with CTE programs (p. 13).

6. CET student diversity is better than CET industry diversity. These gains can be built upon by seeking qualified people of color and/or women for open teaching positions (p. 14).

7. CET completion ratios declined in 2013 as the multiple certificate options were phased out in response to industry demand. They have been stable since (p. 14).

8. CET does not have a significant waitlist problem. Some course capacity numbers were set several years ago and need to be re-examined to ensure they accurately reflect pedagogical needs (pp. 15-16).

Curriculum Findings

1. The 2015 revisions improved the program's relevancy (p. 16).

2. At about the same time, faculty converted most of the program to online or hybrid, effectively improving access for their many students who work at least part-time while taking classes (p. 16).

3. Faculty acknowledged that some of the 2015 revisions are outdated and a new process needs to occur. The NSF grant will help provide needed resources to conduct this review. Because this industry is quickly evolving, the program will need to prepare to conduct similar reviews on a somewhat regular basis (p. 16).

Faculty Findings

1. The faculty are engaged, thoughtful, and had a good understanding of the needs of students and employers. (p. 17)

2. CET has no full-time faculty and more part-time faculty than its peer programs. The lack of a full-time faculty member decreases program stability but provides more administrative flexibility to meet the demands of the program (p. 17)

3. Student to faculty ratio is low (1:13 in Fall 2015). (p. 18)

4. Most faculty do not have a background in education, and are instead practitioners. While this is a positive, some faculty indicated a desire to improve their knowledge and skills with regard to adult education. Because of their work schedules, CET faculty are rarely free at the same time. The

program should consider offering a half-day paid training during breaks to improve faculty teaching skills (p. 18).

Resource Findings

1. The Zero Energy House is used for teaching critical components of the program. It has some structural issues, is not ADA compliant, and is not zero energy. Of these issues, not being ADA compliant is the biggest issue and should be remedied immediately (p. 19).
2. CET is a technology dependent program, using both software and hardware to teach students. For this reason, the program should develop a technology plan to identify resources necessary to maintain existing and purchase new equipment (p. 19).

Partnerships

1. The program advisory committee is one of the strongest this reviewer has seen. Of note: the program coordinator uses small groups to effectively solicit needed input; committee meetings are rotated throughout the community to expose members and faculty of a variety of buildings and organizations; she reserves 15 minutes at the end of each meeting so members may network; and the committee chair framed the role of the committee at the beginning of the meeting. This advisory committee is a best practice and these should be shared with other committee coordinators (p. 19).
2. Providing internships is a challenge as most of the connected companies are too small to offer internships at all (or at scale). To compensate, the program has developed job shadow opportunities for students. It is recommended that the coordinator continue to find opportunities to connect larger companies to the program and use these connections to develop new internship opportunities (p. 20).

Program Services

1. Students, alumni, and program advisory committee members all agreed that more hand-on time and project-based learning would benefit the program. The NSF grant will help provide these opportunities (p. 20).

INTRODUCTION

In an effort to maintain the highest quality post-secondary education and meet regulatory requirement, Shoreline Community College hired Phippen Consulting, LLC in winter of 2017 to conduct a program review of its Clean Energy Technology program (CET).

METHODOLOGY

Meetings
- One one-hour meeting with Division Dean, program chair, and Institutional Review staff to identify major issues of focus.
- Two two-hour meetings with staff and faculty to discuss all aspects of their program.
- One one-hour meeting with the CET Program Advisory Committee to discuss the relevance of this program.

Documents Reviewed
- One survey of current students (n=12)
- One survey of alumni covering (n=19)
- Student demographic data
- Class cancellation and waitlists
- Student completion data
- Student completion ratios for CET, Shoreline, and the state
- Student grade distributions
- Comparative data on student-faculty ratios
- Comparative data on full-time to part-time faculty ratios
- Program and course level fill rates
- Labor market data
- Job openings data from EMSI
- Program level learning outcomes
- College and program website and planning guides
- Annualized FTES, headcount, and percent of enrollment by program and by certificate/degree)

Surveys

The program instituted an alumni and current student survey this year (see Appendix A for a copy of the survey results). Surveys were distributed by Shoreline's Marketing and Communications Department using MailChimp and Survey Monkey. One email and one follow-up email was sent to both current and former students resulting in a response rate of 25 percent for current students and 14 percent to former students. The former student survey response could be improved by collecting contact information for graduating students.

ASSESSING STUDENT LEARNING

Program Outcomes

Three years ago, Shoreline Community College hired a program coordinator for CET. The program coordinator recruited new members for the program advisory committee. In 2015, the coordinator facilitated a faculty-led process to revise the program. Because faculty are so closely tied to industry (all work in industry), a faculty-led process was deemed appropriate at the time. This process resulted in the elimination of multiple short-term certificates and a revision of the program outcomes.

The CET 45 credit certificate has 8 learning outcomes, listed below.

- Apply a knowledge of mathematics, building science and electricity to practical problems in the clean energy field.
- Read, visualize and interpret building plans and models including architectural, structural, mechanical and electrical components that affect building energy requirements.
- Utilize building energy calculations and economic tools to inform decision making and design for clean energy technologies.
- Complete an energy analysis of a building including benchmarking, envelope, heating, cooling, ventilating, lighting, service water, plug loads and renewable energy systems.
- Identify, describe and analyze common solar PV, solar thermal, heating, cooling, lighting and service water processes for commonly applied technologies.
- Layout, size, model and specify system components to meet design requirements for clean energy technologies.
- Utilize virtual design and modeling techniques to model, design and create construction documents for clean energy technology systems.
- Understand the applied code, safety, associated equipment and performance parameters and attributes required for the design, installation and maintenance of clean energy technologies.

The 90 credit AAAS incorporates the certificate outcomes and includes two additional outcomes:
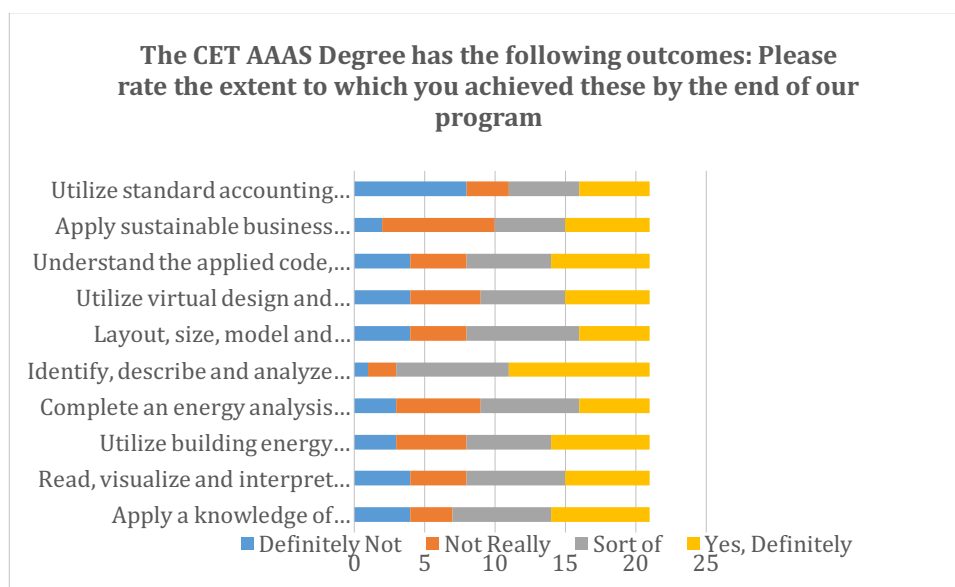
- Apply sustainable business practices to clean energy technology business models.
- Utilize standard accounting practices, project management skills, a knowledge of business law and other business practices to support clean energy technology businesses.

Faculty report that the industry has shifted enough that these outcomes need revision once more. The NSF grant will help them conduct a more thorough process in revising these outcomes, including the involvement of industry. It is recommended that industry play a leadership role in this NSF process, as written into the NSF grant.

Following this program review, the department will engage in a curriculum mapping process to connect these outcomes to the existing courses. This process will help identify gaps, overlaps, and misalignments between the program outcomes and existing courses. This process should occur in a manner that incorporates the changes planned through the NSF grant (e.g., either wait and do this after the NSF grant, do it during the NSF grant to ensure changes are incorporated in the mapping, or do it now and then do it again after the NSF grant changes are implemented).

The alumni survey asked participants to indicate the degree or certificate they completed at Shoreline, and to evaluate the extent to which they felt they achieved the program's learning outcomes. The results are reported below, however an analysis of the complete survey leads this reviewer and Shoreline Institutional Assessment staff to believe that the majority of respondents to the alumni survey graduated prior to the 2015 program revisions.

Of the 19 respondents to the alumni survey, 7 stated they had completed the AAAS. The following chart shows that alumni of this program responding to the survey rated their achieving the ten program outcomes for the CET AAAS on a scale of 1 (definitely not) to 4 (yes, definitely).

The CET AAAS Degree has the following outcomes: Please rate the extent to which you achieved these by the end of our program

<u>Meeting Individual Learning Needs</u>

On a scale of 1 (poor) to 5 (excellent), current students (n=12) gave this department a strong 4.4 on its ability to meet individual learning needs.
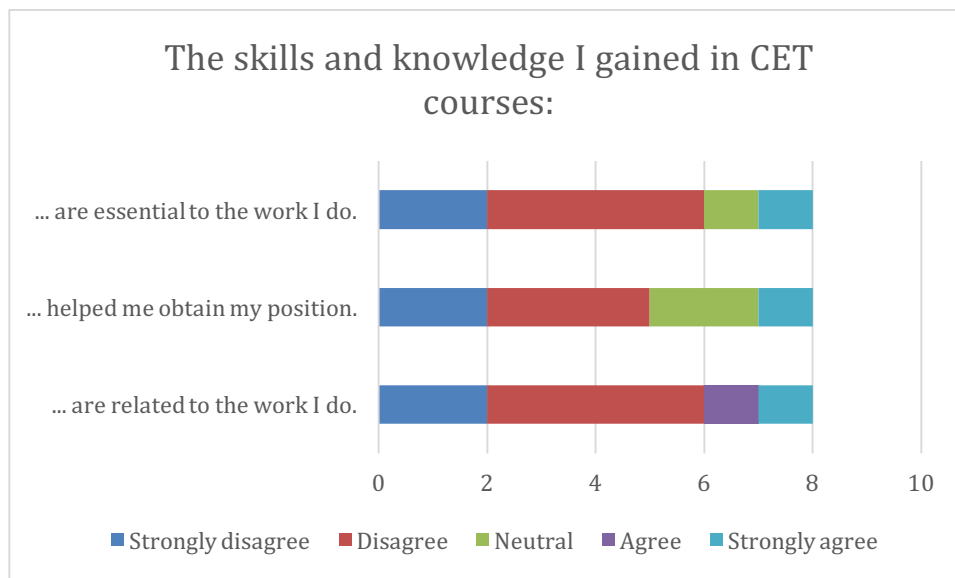
<u>Grade Distributions</u>

CET grade distributions were briefly examined but the small size of the CET program made the results difficult to interpret. There were some variations year-over-year, but it is difficult to know if these variations were due to assigned grades or changes in the student body.

EMPLOYMENT OUTCOMES

To understand employment outcomes, two data sources were used. First, CET alumni who responded to the survey reported their employment status. There were few responses to employment-related questions (between 8 to 16). Unfortunately, the survey neglected to ask when they graduated. However, based on analysis of responses to this and other questions, it appears that respondents to this survey may be weighted towards of alumni who completed the program prior to the redesign conducted three years ago. Thus these results likely do not accurately describe the current program.

Nine out of 16 respondents work full- or part-time. The majority of respondents (9 out of 13) felt like their degree was not related to the work they do. Slightly less than half (3 out of 8) felt their degree helped them gain their position or was essential to their work.

The skills and knowledge I gained in CET courses:

The second data source is the Data Linking for Outcomes Assessment database compiled by the Washington State Board for Community Colleges linking program outcomes and employment data. This data shows the employment outcomes for alumni that completed their degree or certificate compared to those who did not (i.e., "Leavers").[1] The data does not show what jobs these individuals have.

Completers	Leavers
2010-11: 92%	2010-11: 54%
2011-12: 60%	2011-12: 59%
2012-13: 73%	2012-13: 66%

While completers gained employment at a significantly higher rate than leavers in 2010-11, the gains evaporated in subsequent years. Both the survey and Completers/Leavers data provide some justification for the revisions that occurred in 2014 to ensure more relevancy in the program design.
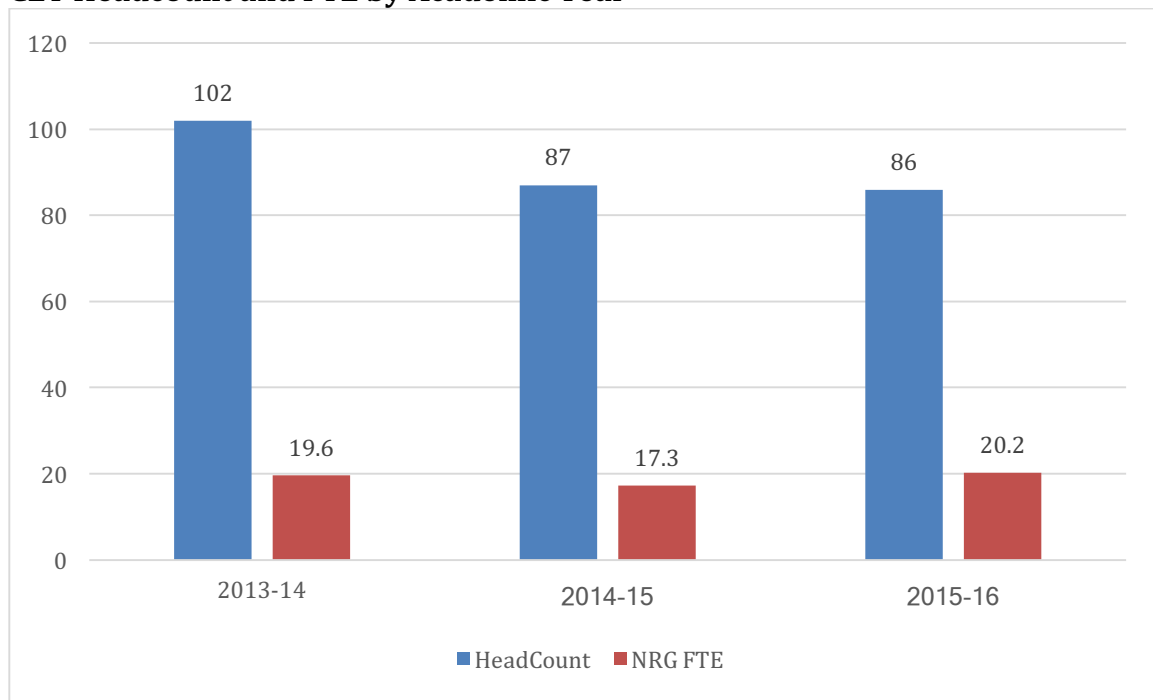
STUDENT DATA TRENDS

Enrollment

CET headcount enrollment has declined as the economy improved and the program moved away from multiple short-term certificates, better preparing students for employment but reducing enrollment slightly. FTE increased slightly in 2015-16, a result of a few students taking more courses. Shoreline's CET program is outperforming the statewide average CET FTE enrollment, which averaged a 13.4 percent decrease during the same time period.

Headcount enrollment for all of Shoreline's professional-technical programs decreased by 12 percent since 2013-14, compared to CET's decline of 16 percent over the same period. These are expected trends due largely to the improving economy and experienced generally by all community colleges in Washington. The following histogram shows enrollment fluctuations by CET over the past three years.

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[1] The data includes alumni who have not enrolled in another Washington State community or state college or university for at least one year (i.e., so recent graduates are not included). It does not include alumni who do not have a social security number. For these reasons it may be an undercount of actual employment.

CET Headcount and FTE by Academic Year

Louise is doing an excellent job of marketing her program to potential groups of new students.   She estimates she spends approximately 30 percent of her time in marketing activities and focuses on incumbent workers, youth, and military groups. Marketing materials distributed at the program advisory committee suffered from a printing defect making them unreadable. They also appeared too busy and would have been an effort to read and identify important information. It's recommended that they be redesigned by Shoreline's Marketing department to make them more pleasing to the eye and to eliminate printing defects.

CET recently submitted a National Science Foundation grant that would, among other things, develop workshops for high school teachers to provide opportunities to introduce clean energy building management concepts in relevant STEM high school classes. Building exposure to clean building industry is a critical component to improving youth interest in the field and should be continued. However, it is worth noting that measuring this impact on enrollment will be difficult to track.

To boost youth enrollment in a more measurable way, Shoreline should consider developing and marketing a program focused specifically on high school students, such as Running Start or dual credit. A dual credit program for high school students (for example, by developing strong connections to an existing high-school technical education program) would allow students to satisfy high school graduation requirements through the CET program. Specific collateral materials around CET Running Start could be developed that help engage students in practical ways to help speed their entry into the field. These could include career pathway and salary samples, clear information about who this program could benefit (e.g., those looking

for work directly upon high school graduation, not those wishing to attend college), and a sample course plan for high school students.

Student Demographics

CET student demographics are largely reflective of the occupation as a whole, mostly white and male. CET students are relatively older, on average, than Shoreline's professional-technical students. CET students had a mean age of 37 in 2015-16, compared to 28.8 for Shoreline's professional-technical mean. The number of students in the program was too small to analyze grades or pass rates based on race/ethnicity or gender.

Improving the diversity of this program would benefit students, Shoreline, employers, and the greater community. While it is unreasonable to hold a small program accountable for diverse outcomes that the industry is unable to achieve, it is worth noting that recruiting more diverse faculty has a positive correlation with recruiting and retaining a more diverse student population. To that end, it is extremely helpful to currently have a female leader for the program, another female faculty person, and one male person of color. Program diversity will continue to improve if program administrators identify people of color and female candidates for new teaching positions.

Completion Data

Over the three-year study period, the 2014-15 academic year had a bolus of students complete the AAAS degree. Faculty attribute this to the small number of students and the two years it takes to complete the AAAS.

Academic Year	All Completions	AAAS Completions
2013-14	8	7
2014-15	17	12
2015-16	12	6

When comparing CET completion ratios to Shoreline Community College and statewide ratios, this small program does not maintain the Shoreline and statewide completion rates. Again, because enrollment is low, a small change in the number of students completing degrees and/or certificates would change the ratios significantly.

CET Technology Completion Ratios Compared to State and Shoreline

All Workforce Certificates and Degrees		2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
State	*Ratio*	*Unavail.*	*20%*	*20%*	*20%*	*Unavial.*	*Unavial.*
Shoreline	Completions	641	626	694	652	702	545
	Headcount	2262	2110	2331	2156	2075	1854
	Ratio	*28%*	*30%*	*30%*	*30%*	*34%*	*29%*
All Clean Energy Tech	Completions	23	30	9	7	10	8
	Headcount	47	58	67	62	41	52
	Ratio	*49%*	*52%*	*13%*	*11%*	*24%*	*15%*

Workforce Degrees Only		2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Shoreline	Completions	251	194	206	203	208	181
	Headcount	1798	1616	1786	1643	1534	1389
	Ratio	*14%*	*12%*	*12%*	*12%*	*14%*	*13%*
All Clean Energy Tech	Completions	1	14	5	7	8	4
	Headcount	25	42	63	62	39	48
	Ratio	*4%*	*33%*	*8%*	*11%*	*21%*	*8%*

<u>Waitlists and Fill Rates</u>

Shoreline Community College's Institutional Review Department (IRD) studies waitlist data for the college, analyzing number of seats waitlisted by course and quarter, in addition to several additional factors of importance. This analysis flags courses that have 16 or more seats waitlisted.

There were no courses with chronic waitlist problems during the three-year study period.

Fill rates are determined by comparing the number of students enrolled in a course during an academic year, with that course's capacity for the year. Analyzing fill rates identified several courses where the fill rate is consistently low, and one course, NRG 110, where the fill rate is consistently over 100 percent. Those that were consistently low include:

- NRG 102
- NRG 105
- NRG 120
- NRG 123

- NRG 180
- NRG 201
- NRG 202

- NRG 220
- NRG 225
- NRG 290

It is recommended that administrators review the pedagogical needs for the courses and ensure capacity numbers accurately reflect those needs.

CURRICULUM

Recent Revisions Result in Big Improvements
Three years ago, the program hired a coordinator, Louise Petruzzella, with the goal of improving the program's relevancy. Louise recruited a program advisory committee and through some excellent facilitation, engaged them in an improvement process. These efforts resulted in eliminating several of the short-term certificates and revising and updating the curriculum. The program shifted from being mostly a solar-focused program, to one that provides a broad foundation in multiple aspects of clean energy including the analytical skills needed to help design and/or retrofit buildings to improve their energy usage. To date, this program provides one 45-credit certificate and the AAAS degree and results in a deeper and more relevant education for students.

A Push to Improve Access for Working Adults
In recognition that many of their students work at least part-time while attending school, faculty converted the majority of their programs to online or hybrid. Further modifications, such as compressing courses, could help improve accessibility. These improvements could be marketed to help boost enrollment.

Remaining Relevant
The challenge for this program moving forward is that it prepares graduates for a rapidly evolving field. Previously, the program was focused on preparing technicians who can install, maintain, or repair commercial building energy machinery. However, industry is demanding a new and higher skilled worker who can program automated control systems, interpret energy blueprints, and use software to design energy systems.

To address these and other emerging needs, Shoreline recently applied for a NSF grant to provide it with the resources necessary to produce graduates with relevant skills. Among other things, the grant will allow Shoreline to conduct a job task analysis and market survey to identify emerging skills in the field. This work will allow Shoreline to update its curriculum to continue to meet industry's evolving needs through a DACUM process.

Of course, the challenge for Shoreline is that the industry will not stop evolving after this process (or indeed, even during the year long process). To ensure that the program continues to graduate workers with industry-required skills it must

continue to develop its advisory committee, keep advisory committee members engaged, identify the maximum amount of administrative time possible for the program coordinator, and continue to identify external resources so that she (or he) can continue to identify opportunities to keep the program relevant with this rapidly evolving industry.

FACULTY

The faculty participating in the program review were engaged, thoughtful, and had a strong understanding of the needs of students and employers.

<u>Faculty Workload</u>

The following table highlights the number of sections taught by different types of faculty. CET has no full-time faculty and more part-time faculty than its peer programs. The program coordinator noted that this creates some instability in the program. However, it also provides the program with the needed administrative flexibility to allow the coordinator to spend a maximum amount of time engaging with the industry and marketing the program – this time is critical to the future growth of the program. It is recommended that future decisions around staffing this department maintain the maximum amount of flexibility necessary to continue the critical support required while ensuring long-term stability.

Academic Year	Employment Status ID	NRG	CHEM	BIOL	SME*	PROF TECH	SHORELINE
2012-2013	CONTRACT				2%	1%	1%
	FULL-TIME		45%	32%	36%	37%	36%
	MOONLIGHT		3%		2%	8%	5%
	PART-TIME	92%	50%	67%	58%	54%	56%
	VOLUNTEER	8%	2%	1%	2%	1%	1%
2013-2014	CONTRACT		2%		2%	5%	3%
	FULL-TIME		44%	30%	31%	36%	33%
	MOONLIGHT		2%		3%	5%	4%
	PART-TIME	100%	52%	70%	63%	54%	59%
	VOLUNTEER				1%	0%	1%
2014-2015	CONTRACT	18%	1%		2%	3%	2%
	FULL-TIME		49%	37%	36%	38%	36%
	MOONLIGHT			2%	3%	7%	5%
	PART-TIME	82%	50%	61%	59%	52%	57%

		NRG	CHEM	BIOL	SME*	PROFTECH	SHORELINE
	VOLUNTEER				1%	1%	1%
2015-2016	CONTRACT	38%		8%	5%	20%	8%
	FULL-TIME		39%	22%	26%	32%	29%
	MOONLIGHT				1%	4%	3%
	PART-TIME	63%	61%	69%	68%	44%	60%
	VOLUNTEER						1%

*Science, Math, and Engineering

CET operates at a lower student to faculty ratio than its peer departments and quite close to the statewide average for all community college programs. Increasing enrollment will help keep these levels competitive with the rest of the college and peer programs.

Quarter	NRG	CHEM	BIOL	SME*	PROFTECH	SHORELINE	STATE (NRG)
Fall 2010	1:37	1:19	1:18	1:24	1:16	1:21	1:32
Fall 2011	1:20	1:19	1:17	1:23	1:14	1:20	1:16
Fall 2012	1:19	1:19	1:16	1:23	1:15	1:20	1:15
Fall 2013	1:13	1:19	1:15	1:22	1:15	1:20	1:12
Fall 2014	1:11	1:16	1:14	1:20	1:13	1:19	1:11
Fall 2015	1:13	1:17	1:14	1:20	1:13	1:19	1:15

*Science, Math and Engineering

Professional Development

CET faculty all work in the field and use these work experiences to stay relevant, identify new trends, and otherwise keep their practical skills up to date. That they all practice the field they teach is an incredible asset to this program, and was noted favorably on the student evaluation.

However, because their background and academic preparation is in practice, focusing professional development opportunities on improving pedagogical skills would be prudent. The evaluation also noted deficiencies using Canvas as well as understanding and using basic Shoreline systems (e.g., getting a book in the book store).

The challenge with this faculty is that because they all hold outside jobs, they have little free time and are rarely free at the same time.   Asynchronous online modalities were noted that could be useful (including a recently developed

orientation for new faculty). Existing teacher training resources offered by Shoreline occur during times when CET faculty are unavailable. The program could be improved by once each year offering a paid, half-day faculty training focused on improving pedagogical skills during breaks.

RESOURCES

This is a technology-dependent program which teaches students to use much of the equipment and computer programs found in the field. This includes a variety of energy systems (e.g., solar arrays, high performing HVAC, ventilation), modeling software, design software, and assessment tools.

Some of this technology is found in the Zero Energy House and Solar Training Center. This building houses some of the energy systems and meeting and classroom space. It is in disrepair and requires improvements to maintain its efficacy. An engineering firm recently estimated the cost to repair the building at $81,000. To make it "zero energy" would require an additional $110,000. The program administrators should resolve the ADA compliance issues with this house. They should also determine what the program needs to effectively teach students and develop a capital and technology plan to identify the needed equipment. This may or may not include updating the Zero Energy House.

PARTNERSHIPS

Active Partners

The Program Advisory Committee, composed of at least a dozen different organizations, is one of the strongest this reviewer has seen. It is robust and engaged and provides critical leadership to keep the program relevant. Of note, Louise has effectively used small group work to help the committee evaluate some of the more complex components of the program. She also rotates program advisory committee meetings to other relevant organizations throughout the city. Louise understands one of the values she can offer committee members is time to network, and so she reserves 15 minutes at the end of each meeting to that end. The chair of the committee noted at the beginning of the meeting what the role of the committee is. This is an important and often overlooked committee stewardship that helps focus members on their roles and hold them accountable when they start moving away from that role. These are all promising practices and contribute to keeping the committee engaged and should be shared with other program advisory committee administrators.

The program hosts several relevant events at Shoreline including Solar Fest and the Northwest Solar Summit. The program receives scholarship funds from the local chapter of the American Society of Heating and Refrigeration Engineers.

One challenge for this program is its ability to offer internships to existing students. Most of the companies represented on the advisory committee are small- to medium-sized firms without the internal resources necessary to effectively offer internships. The program has compensated by offering half-day job shadows instead. They have attempted to recruit larger firms to their advisory committee, but have yet to experience success.

To address this challenge, staff and faculty should continue to work to recruit the larger firms to its advisory committee, or at least, to encourage them to offer internships to Shoreline students. In doing so, it is important to focus on the value of internships to employers: an opportunity to evaluate students for future employment.

PROGRAM SERVICES

Current students were surveyed regarding their opinions of CET's program services. They were asked to rate each component on a scale of 1 (poor) to 5 (excellent). Their responses were:

Program Element	Rating	N
Helpful program information	4.25	12
Effective curriculum structure	4.0	8
Support individual learning needs	4.4	10
Adequate preparation for employment	4.6	7
Adequate guidance for career planning	4.5	6
Adequate program resources	4.0	12
Class schedule meets student needs	4.3	11
Academic advising meets student needs	4.6	9
Effectiveness of other support services	4.2	10

Overall, responses were positive. Current students gave Shoreline's program resources (e.g., technology, equipment) and curriculum structure the lowest ranking of all program services. Students providing comments to these two areas requested more hands-on time and project-based learning to help incorporate the higher-level skills they believe they will need in the workforce. The above-mentioned NSF grant deliverables include creating more project-based learning opportunities, which will help address these student concerns.

COMPETITION

Shoreline's CET program is fairly unique amongst community college programs. There are several programs that have similar CIP codes, but upon deeper exploration it is apparent that they focus on a different area of clean energy

technology. For example, Central Community College offers a large program focused on employment in the power generation industry.

However, current students were asked what other programs they considered before selecting Shoreline and their responses indicated that Shoreline competes with several different public and private programs in Washington and across the country including:

- Cascadia College
- Lake Washington Technical College
- Bellingham Technical College
- Walla Walla Community College
- Lane Community College (Oregon)
- Portland College (Oregon)
- Bismark College (North Dakota)
- San Francisco City College (California)
- Laney Community College (California)
- Solar Energy International (Colorado)

Students are quite likely to recommend this program to others, giving it a 4.6 on a scale of 1 (definitely not) to 5 (definitely) (N=10).

LABOR MARKET OPPORTUNITIES

Job growth for the occupations this program is targeting is forecasted to increase significantly over the next 10 years, growing faster than the national average for these occupations. Median earnings are also strong in these occupations.

The program advisory committee believes these forecasts could be underestimates as demand currently outpaces supply and both the market and the regulatory environment is driving developers and building operators to improve building efficiency.

LABOR MARKET DATA – King & Snohomish Counties

Occupation	2014 Jobs	2016 Jobs	2024 Jobs	Change	% Change	Median Earnings
Commercial and Industrial Designers (SOC 27-1021)	364	400 (15% above National Average)	468	104	28.6% (Nation 9.9%)	$34.68/hr (National $30.83/hr)
Engineering	5,470	5,513	6,034	564	10.30%	$31.17/hr

Technicians, Except Drafters (SOC 17-3020)		(11% above National Average)			(Nation 6.9%)	(National $27.03/hr)

Shoreline College Clean Energy Technology Program Review – Winter 2017

Student/Alumni Survey Response

Alumni Survey

Response

- 1 email sent by Marketing to Alumni database under Bayta's name
- 1 follow-up email sent under Louise's name
- 19 responses

1. What led you to enroll in Clean Energy Technology & Entrepreneurship courses at Shoreline Community College? (select all that apply)

4 - I was enrolled in the AAAS program in Clean Energy Technology & Entrepreneurship at SCC.

3 – I was enrolled in a different program at SCC

7 – I wanted to gain some new skills

1 – I wanted to brush up on some skills I already had

6 – I was unemployed and seeking employment

4 – I was already employed (self or with a company) and wanted to gain new skills

2. Which degrees and/or certificates did you complete in the Clean Energy Technology & Entrepreneurship program (check all that apply)

7 - AAAS In Clean Energy Technology & Entrepreneurship

5 - Certificate of Proficiency in Clean Energy Technology & Entrepreneurship
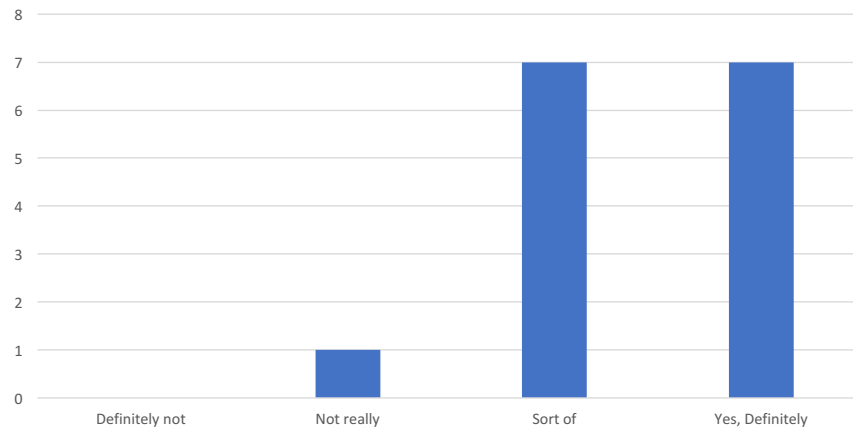
8 – None

3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Apply a knowledge of mathematics, building science and electricity to practical problems in the clean energy field.
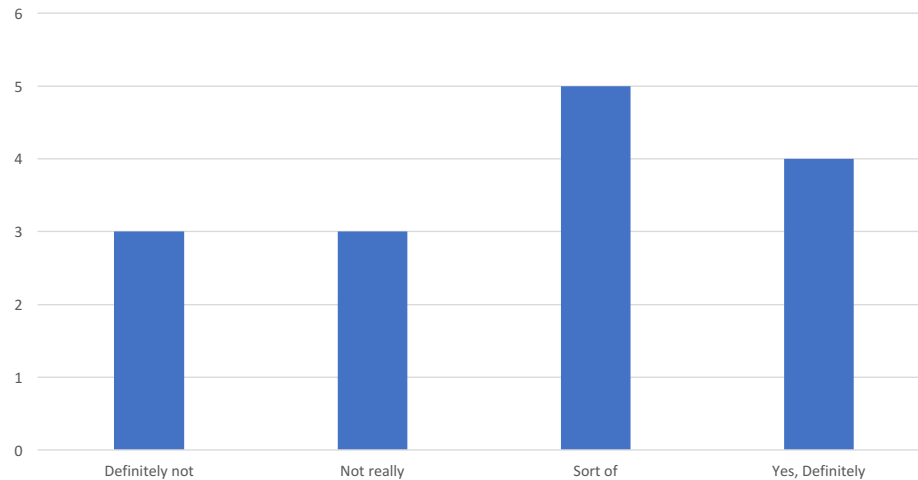
3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Read, visualize and interpret building plans and models including architectural, structural, mechanical and electrical components that affect building energy requirements.
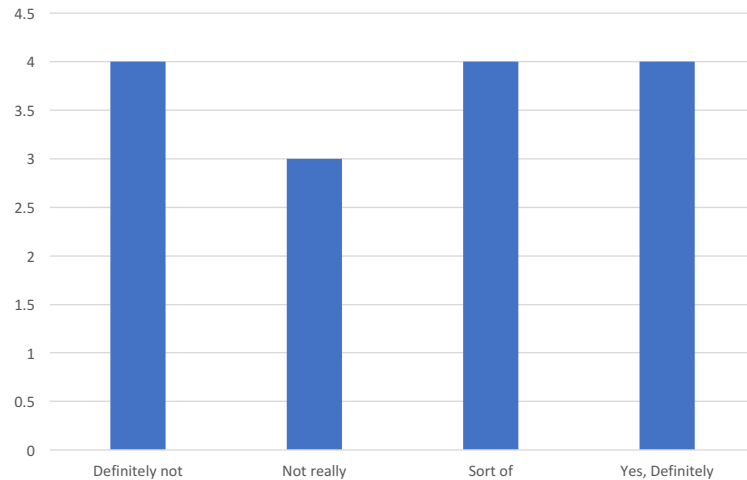
3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Utilize building energy calculations and economic tools to inform decision making and design for clean energy technologies

3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Identify, describe and analyze common solar PV, solar thermal, heating, cooling, lighting and service water processes for commonly applied technologies.
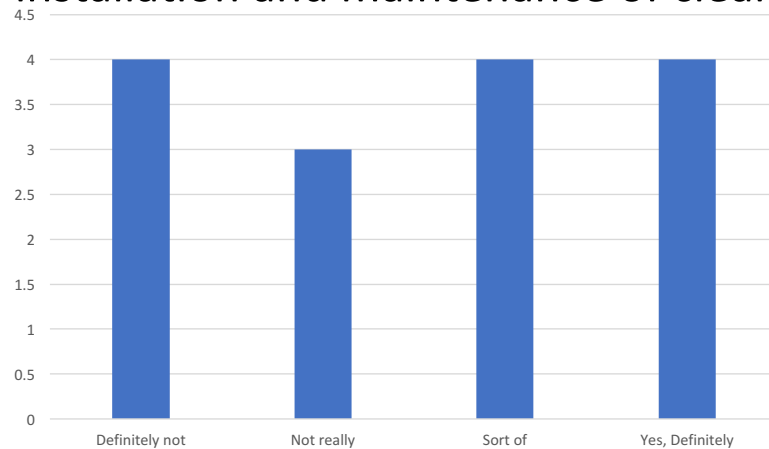
3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Layout, size, model and specify system components to meet design requirements for clean energy technologies.
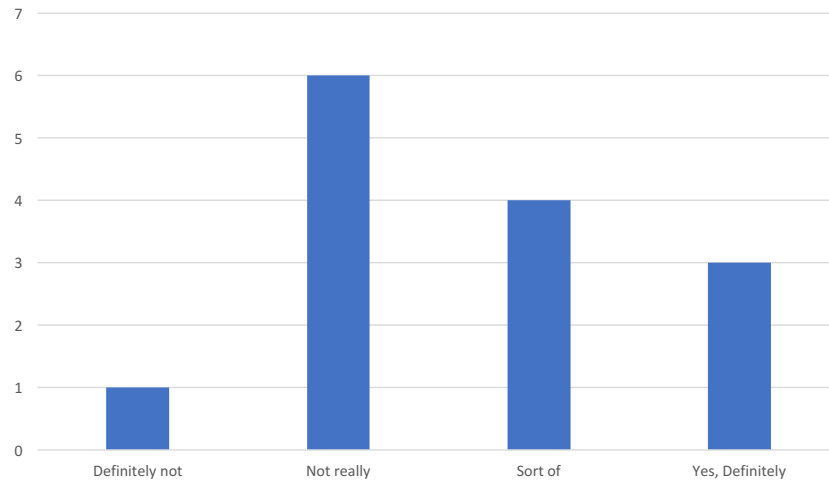
3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Utilize virtual design and modeling techniques to model, design and create construction documents for clean energy technology systems.

3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Understand the applied code, safety, associated equipment and performance parameters and attributes required for the design, installation and maintenance of clean energy technologies.
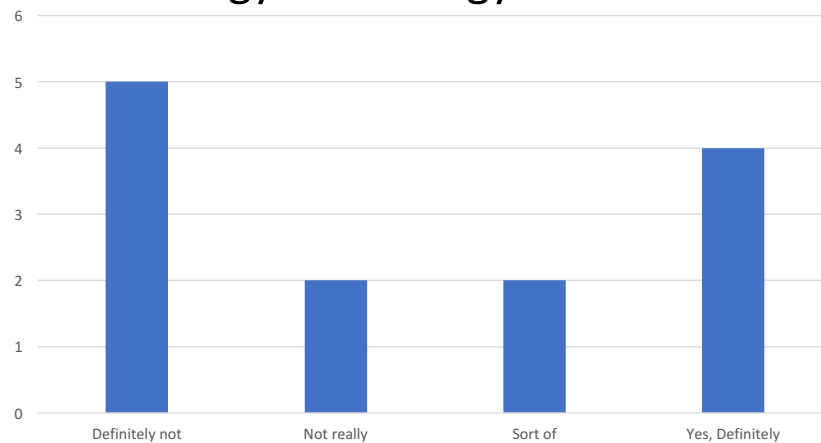
3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Apply sustainable business practices to clean energy technology business models.

3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Utilize standard accounting practices, project management skills, a knowledge of business law and other business practices to support clean energy technology businesses.

4. Please list any other AAAS degrees you received from Shoreline Community College.

- I have not received any AAAS degrees
- Associates of Arts.
- None
- none at Shoreline, However, completed BS degree WWU

5. Have you completed any other degrees since leaving Shoreline Community College?

14 – No

2 -   Yes

5a. What degree(s) have you received?

- Associates of Arts.
- I am enrolled in the MPA Tribal Governance Program at the Evergreen State College

5b. What school did you receive your degree(s) from?

- Shoreline Community College.

5c. If applicable, please describe how this/these degree(s) relates to your course work in Clean Energy Technology

- Backs up my understanding of electrons, molecules, and other scientific terms.
- I want to become a lobbyist ,build an affordable passive solar home as a demonstration project. I want to educate others on the advantages of an energy efficient home and answer any questions they may have. Too many times, energy efficient homes are luxury homes or too high tech for low income to middle income families and individuals.
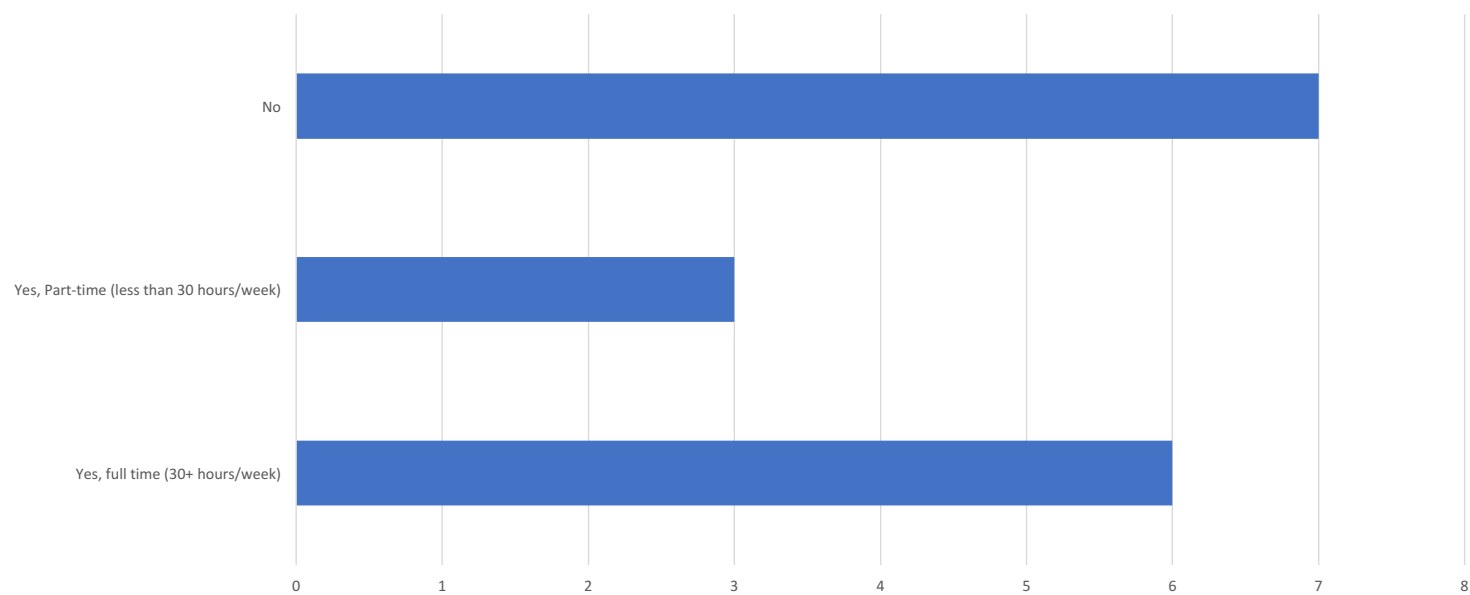
6a. Please describe the degree program in which you are enrolled.

• certification

Name of program/major and school. Is it related to your course work in CET?

- GST General Service Tech – Automotives - No
- Japanese – University of Washington - No

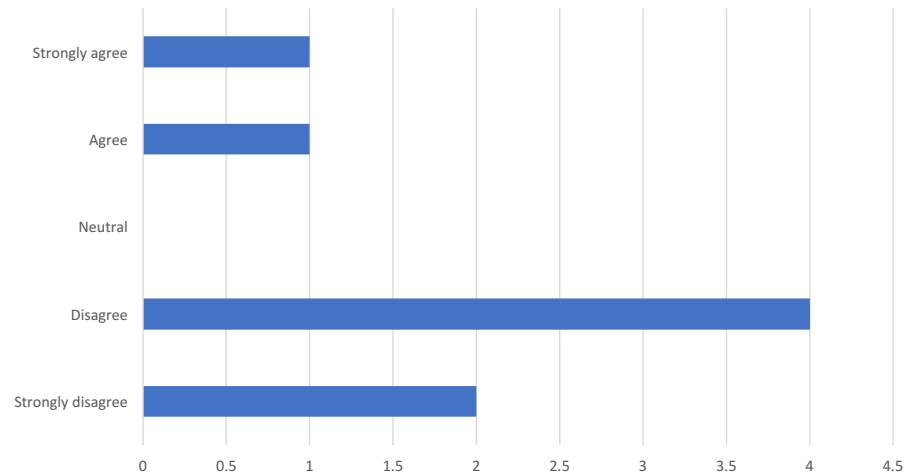## 7. Are you currently employed (for pay)?

Please provide your company name, position, and duties

- Hargis Engineers - Energy Analyst - Energy Modeling
- XX - Account Manager - Manufacturer Representative
- NW Ceiling Lifts - Project Manager - Designing, purchasing, scheduling installation of ceiling lifts
- XX - project manager - manage construction projects
- Boys and Girls Club- XX - XX
- Costco - Front end/ Cashier assistant - assist cashiers loading carts, help members locate items, return carts to warehouse from parking lot
- King County Library System - Library Technical Assistant - circulation, materials handling, customer service, etc

7b. Please indicate the extent to which you agree or disagree with the following statements about your current work with this company or organization. The skills and knowledge I gained in SCC Clean Energy Technology courses …

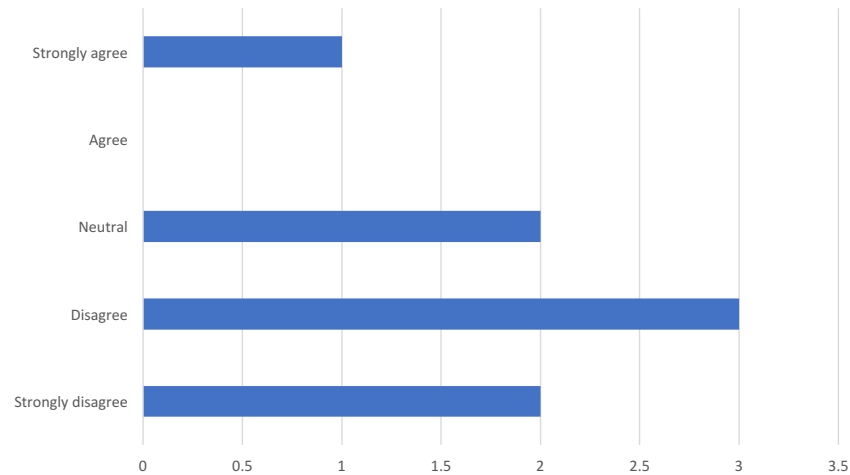## … are related to the work I do.

7b. Please indicate the extent to which you agree or disagree with the following statements about your current work with this company or organization. The skills and knowledge I gained in SCC Clean Energy Technology courses ...
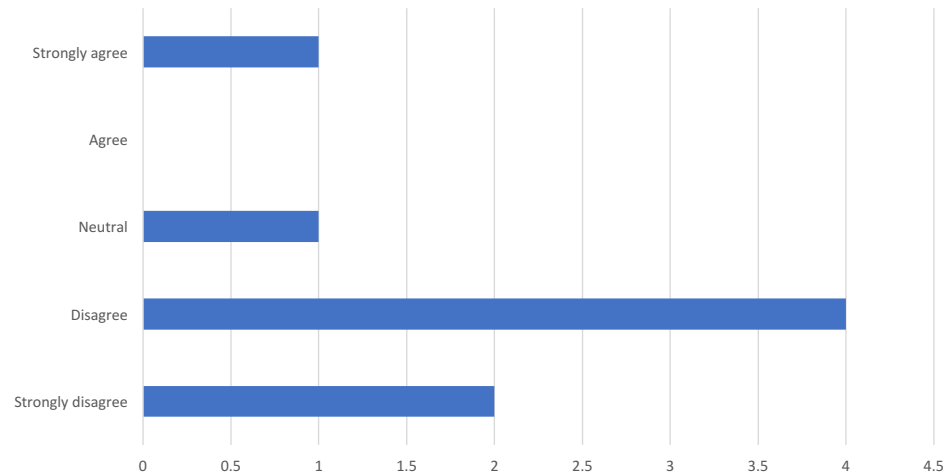
... Helped me obtain my position.

7b. Please indicate the extent to which you agree or disagree with the following statements about your current work with this company or organization. The skills and knowledge I gained in SCC Clean Energy Technology courses ...

... Are essential to the work I do.

7c. Do you think your employer would consider providing an unpaid internship to an SCC Clean Energy Technology student?

1 – Probably

6 – Probably not

1 – Definitely not

8. What specific skills did you gain in your Clean Energy Technology courses that helped you get and/or keep jobs?

- None
- I only took one class, I learned a ton and it was great introduction, but it has not been applied to any forms of employment.
- It enhanced by knowledge basis. I am confortable about talking to others about clean energy.
- none have been useful to me so far. maybe google sketchup could be useful, but not all by itself.

9. Please describe what additional skills should be taught in Clean Energy Technology courses to make students more competitive in the job market.

- Kinetic energy should be emphasized on as it can be a useful form of energy harnessing.
- I would strongly recommend a few courses in hydroelectric, specifically micro-hydro. Given the geography and climate of the PNC, this might prove more practical and profitable.
- Couldn't say.
- Entraprenuership and self-sovereignty.
- we skimmed the surface on a lot of the important and useful skills that I had hoped to learn.   1. learn shade analysis with a solmetric sun eye, not a 30 year old tripod, solar path finder 2. in the entire program I only touched equipment two times. 3. the blower door testing is a major skill to learn, and we only did it for one class, and it was not an organized or useful demonstration so I still have no idea how to actually use it. partially because of a junky fan box, but also because the inefficient ventilation in the classroom made it impossible to accurately use the blower door.   3. we talked about wiring solar components, but we never actually touched or saw a solar panel, or any other system component.   I HONESTLY FEEL THAT I WASTED MY TIME AT S.C.C. WITH THIS PROGRAM. I learned much more from an "alternative energy for dummies" book.   p.s. this degree with the skills that they are teaching now is worthless in the job market today. more of an interactive program is needed, field work is essential to any job that this program hopes to steer students towards.

10. Overall, how would you describe the impact of your experience in the Shoreline CC Clean Energy Technology & Entrepreneurship program on your educational and/or professional career.

- I've learned so much from all of my wonderful instructors.

- The classes i took gave me a good understanding for applying renewable energy in a residential market.

- Very impactful. I am inspired to look into furthering my education in clean energy and exploring the possibilities of obtaining a career in solar.

- I had fun learning.

- It was a waste of my G.I.Bill, I am back to welding again.

11. What, if anything, did you find most valuable about your experience with the Shoreline CC Energy Technology & Entrepreneurship program?

- Set at a good pace and reviewed in a timely fashion.
- The solar design course was awesome. I would strongly encourage parallel courses in microhydro and geothermal.
- The information and comparisons of several different types of renewable and clean energies and the effects they have on the environment.
- The quality and caring of the instructors.
- the required books are good material.

12. How, if at all, could your experience with the Shoreline CC Energy Technology & Entrepreneurship program have been improved?

- Extra credit would be nice. Some kind of project based extra credit.
- Hydro…. Micro-hydro…
- I think my experience would have been improved by actually taking the course on campus instead of online. Hands on studies would have been very interesting.
- I was accepted in the Evergreen MPA Tribal Governance Program.
- we skimmed the surface on a lot of the important and useful skills that I had hoped to learn.   1. learn shade analysis with a solmetric sun eye, not a 30 year old tripod, solar path finder 2. in the entire program I only touched equipment two times. 3. the blower door testing is a major skill to learn, and we only did it for one class, and it was not an organized or useful demonstration so I still have no idea how to actually use it. partially because of a junky fan box, but also because the inefficient ventilation in the classroom made it impossible to accurately use the blower door.   3. we talked about wiring solar components, but we never actually touched or saw a solar panel, or any other system component.   I HONESTLY FEEL THAT I WASTED MY TIME AT S.C.C. WITH THIS PROGRAM. I learned much more from an "alternative energy for dummies" book.   p.s. this degree with the skills that they are teaching now is worthless in the job market today. more of an interactive program is needed, field work is essential to any job that this program hopes to steer students towards.
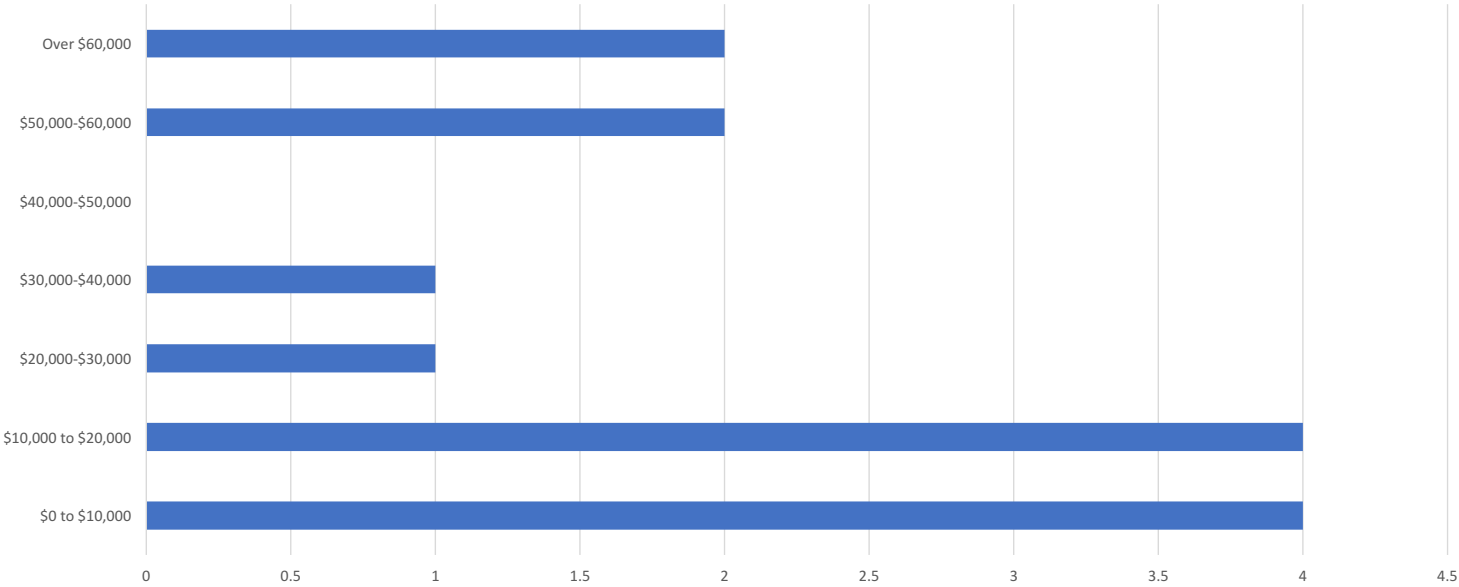
13. Would you recommend (or have you recommended) the Clean Energy Technology & Entrepreneurship program to prospective students?

- Yes
- Yes
- Absolutely
- Yes
- only to senior citizens that only want to learn the basics, and can take the class for free.

Additional comments?

- Keep up the good teaching!
- Thanks for having this program!
- Thanks for making attending SCC a great experience.
- I had so much hope for this program. I was very passionate about the alternative energy techniques. in the end, I was very let down once i understood how pointless and narrow this program focus is. PLEASE LET ME KNOW IF YOU GIVE REFUNDS! I FEEL AS IF I WASTED MY HARD EARNED MILITARY BENEFITS ON THIS PROGRAM. your V.A. reps are fantastic though.

14. What is your approximate gross annual income?

14a. Are you employed in Washington State?

7 – Yes

7 - No

Current Student Survey

Survey response

- 1 email sent under Bayta's name
- 1 follow-up email sent under Louise's name
- 12 responses

Approximately how many Clean Energy Technology courses have you taken BEFORE this quarter (Winter 2017)?

4 – 0 (this is my first course)
5 – 5 or more

Which of the following best describes your ultimate academic goal with regards to Clean Energy Technology?

11 - Complete the Clean Energy Technology & Entrepreneurship AAAS

1 - Take Clean Energy Technology classes to build skills

Would you say that you are taking Clean Energy Technology courses to help you with employment (to get a job or to get a better job)?

11 – yes, definitely

1 – yes, sort of

If applicable, please describe how your Clean Energy Technology courses might help you with employment.

- Learn about industry and possible entry points into industries, Solar or sustainable buildings.
- I am considering going into the Clean Tech./Environmental Science fields and I feel that having these courses on my resume would make me a prime candidate for jobs and also give me the knowledge I need to feel confident in my abilities in these fields
- Switching from traditional power plants to a more sustainable way of powering ourselves. Trying to my part in making sure my Grandkids have clean air and water.
- I will be promoted when I finish my aaas. Where I currently work. We are planning our first solar community now
- This program is well known among the renewable energy community across the nation, therefore graduates have a better chance to find a job.
- Changing career and degree fields, intending to apply for Sustainable Urban Design masters programs down the line.

Rate the Clean Energy Technology Program on each of the items below:

- Helpful program information on college website and printed materials:

4 – Excellent

7 – Good

1 – Fair

I love that the Clean Energy program even has their own facebook page. This is a great place for students and teachers to share information about what's happening in the industry.

Rate the Clean Energy Technology Program on each of the items below:

- Effective curriculum structure: Did the sequence of courses make sense? Did the skills you learned in one class transfer to the next class?

2 – Excellent

4 – Good

2 – Fair

4 – N/A

- I would like to have more actual hands on experance
- A lot of crossover from one class to the next
- I said na because i am a returning student it is far better now then before I took my classes out of order they where still being developed
- I had some issues in the beginning with taking a class my first quarter that I should of taken later but I learned a lot and it all came together after a few more classes.

Rate the Clean Energy Technology Program on each of the items below:

- Support of individual learning needs

5 – Excellent

4 – Good

1 – Fair

2 – N/A

- I have not met my teacher in person.
- Very impressed by the staff of this program.
- When you put effort in and ask it is great
- when I didn't have the ability to use a computer at home my teacher made sure the program I needed for my class was made available in the library computer lab.

Rate the Clean Energy Technology Program on each of the items below:

- Adequate preparation for employment (knowledge and skills for the field)

4 – Excellent

3 – Good

5 – N/A

- I just started the course, we'll see.
- Not sure yet still working to complete degree
- It is very helpful having teachers in the industry
- Teachers are very knowledgeable since most teachers I've met work in the industry right now.
- Still to early to see

Rate the Clean Energy Technology Program on each of the items below:

- Adequate guidance for career planning:
3 – Excellent
3 – Good
4 – N/A
- None thus far.
- Not sure yet still working to complete degree
- Louise is heavily involved with her students and industry in this aspect.
- I did not use this
- I'm about to complete my Clean Energy certificate and have already been contacted by the on campus Workforce department inquiring about how they could help me.

Rate the Clean Energy Technology Program on each of the items below:

- Adequate program resources (information technology, equipment, space, supplies):

3 – Excellent

7 – Good

1 – Fair

1 – Not so good

- Would love to see more hands on experiments with PV and 3D printing
- OK would love to see more actual application and more hands on pratical
- More hands on is always better

Rate the Clean Energy Technology Program on each of the items below:

- Class schedules meet student needs:

5 – Excellent

4 – Good

2 – Fair

- It is good, I would like the option to have more in seat classesx
- I really like the night classes I am able to work and school
- Would like more in class full time options

Rate the Clean Energy Technology Program on each of the items below:

- Academic advising meets student needs:

5 – Excellent

3 – Good

3 – N/A

- Haven't received any advice really.

- Great

- I was able to make Louise the head of the program my adviser, she has been extremely helpful due to the fact she was a student in the program.

Rate the Clean Energy Technology Program on each of the items below:

- Effectiveness of other support services (tutoring, financial aid, counselling etc.):
3 – Excellent
6 – Good
1 – Fair
2 – N/A

- I know the course seeks tutors
- I have not used any of these services
- I've utalized many of the programs on campus and feel very grateful they are offered.
- HAve not had to use yet

How likely are you to recommend the Clean Energy Technology program?

8 – Definitely

2 – Not sure

- As this is my first quarter it's really hard to get a clear picture of just where I am going
- Probably, likely when I'm through. I hear there is cool lab, but never been. I'm focusing on prerequisites and enjoying the course.
- It is a good well rounded program the onlt thing I would love to have is more hands on practical application related to the lessons
- As stated earlier I am highly impressed with this program and the people running it. As a point of reference I am 49 years old with a lot of professional experience.
- I have recommended the program and will in the future.

How did you learn about the clean energy technology field?

- Have had an interest for a long time
- through my L&I inquires
- I wanted to study this field, so I researched local schools on the internet.
- Through a Professor at SCC
- Google search
- I did lots of research online for colleges that offered programs in solar. Not very many community colleges and almost none at the time in Washington except Shoreline
- Internet research into fields of study in this field. Came from a background of working in traditional power plants.
- Councillor
- From my college navigator provided to me by Goodwill Industries
- Advisor
- I found the program when I was researching schools In Washington State that offers an associate's level college degree programs. At the time Shorelines was one of the few and it was abroad program that offered flexibility not just in solar but a well rounded program.

What about the clean energy technology field was interesting to you?

- Living sustainably and minimizing environmental impact
- I think it aligns with my current ideals
- It's dedication to clean energy and helping students find employment
- The idea of learning more about what I can do as an individual to help our planet and make our built environment more Earth friendly and sustainable
- My own power and control in the inventive field. However, educating a larger audience is key and implementation of policy and procedures. The satisfaction of seeking a thoughtful, innovative process, whether political, or other, can make the world a better place through incremental changes in fundamental human focused development and understanding, of present day climate change and the decision making affecting it.
- I like the technology of renewable energy. I like being able to take my electrical skills and use them in a way that is beneficial
- That I could still be involved in helping to power ourselves in a much more ecologically sustainable way.
- Solar
- I was interested in bio-fuels as an alternative resource for energy.
- I'm mostly interested in solar power. I like to be part of an uprising industry that is capable to make a difference
- I am interested in either solar design or energy auditing. I like the new technology and the ability to pair it with the skills I learned while in the military as an electrician's MAte in the Coast Guard

How did you hear about this program?

6 – Website
3 – Advisor
2 – Other

- Women's nutrition Professor
- My college navigator from Goodwill thought it was a good fit for me.

Did you consider other schools when applying to Shoreline?

6 – Yes

5 – No

- several programs at Lake Washington Tech
- Cascadia College in Bothell
- Lane Community college Eugene OR   Bellingham Technical College San Francisco City College Laney Community College Oakland CA
- OIT renewable energy engineering program Walla Walla CC wind program
- Bellingham Technical College   Lane Community College in Eugene OR Portland College   Bismark College North Dakota SEI in colorado

Why did you choose to attend Shoreline? (Select all that apply.)

8 – Location

3 – Quality/reputation

3 – Cost/value

2 – Recommendation

- CET program

- in part the location, but also tha campus as well as the program

- Running Start

- Clean Energy Program, those specific words...Entrepreneur?..i'm not sure anymore, would be nice to be innovative with technology, but now I don't think that is as important to me.

- I liked it well rounded program

- The program

- I had attended Shoreline 12 years prior and was looking to finish my degree in Entrepreneurship and I just love the campus

What changes would improve the program or service to students?

- Lab Assignments on projects. Have students partner up on specific projects.
- No complaints so far
- It's too early for me to tell, ask me in a few months.   Companies that are dealing with clean technology issues are where we all need to be at, or political change is the only other way?
- More hands on and maybe more project with people that are working in the field. maybe more on micro hydro and wind. Not sure. Better networking with local industry. some were aware of the program and other not. I think this would help when people are interested in the field renewable energy so they could recommend Shoreline for training.
- Being able to physically build a system from the beginning to end and maintain same system by the students.
- More hands on learning it makes understanding easier
- I'd like to see more internship availability. Maybe a clearer outline of what classes to take if you are interested in a specific field in clean energy. Like these classes are better suited for a career path in solar, these are better suited for sales and design.
- I would like more in seat hands on classes. It gets hard for students who use VA to pay for classes as to get the most benefit money they require one in seat class as a full time student

What are the program strengths?

- Excellent instructors and leadership

- The information provided. So much material to cover and it's radically helping people see the damages of climate change. It's also motivating people to fight the problem.

- Louise is a fantastic instructor. She encourages discussion and debate about how issues should be handled.

- Headed for Solar ad PV installation territory, not my interest, but good to know and necessary to compliment any education, but as far as I can tell, a book called The Energy Reader, which is very helpful at this point in the course. Ask me in a few months where we are at. I might switch to something more appropriate in the fight against climate change.

- It is well rounded in renewable as well as energy efficiency

- Dedicated and knowledgeable staff truly interested in your development and job placement.

- The networking of the teachers. And how one class now builds on the next whoever is the teacher

- The strengths I see is that our teachers are actively working in the industry, some are former students giving us a real world perspective by bringing their experience to the table not just teaching out of a book. Along with that they also bring a greater connection to the industry by being in the know how of what's happening now in the industry. They truly care about this program and want us to be successful, utilizing all their connections in the industry to help meet potential employers and get our foot in the door.

- It is very divers and offers a little of every thing related to energy not just solar. It would be nice to maybe have some in depth class on other energy sources such as wind, Hydro

What could Shoreline College do to make the CET program more attractive to prospective students?

- More focus on career entry points after exiting program
- Keep delivering on the promises it already makes. (i.e) job security and the promise that this technology won't dwindle in the forth coming years.
- Make it more visible. Advertise more and make it more attractive to all students, young and old.
- SCREAM SHOUT HOLLA AND LET THEM ALL KNOW ITS AT SHORELINE. Include sustainability in the title? I know Cascade have a sustainability program. Ours is also sustainable, only we focus on getting a good job? I want to focus on industry and a degree to back up my big talk!
- Perhaps allow satellite classes at some other colleges as this field of study has programs at few facilities as of right now.
- Na
- I would like to see more stories of the success of this program by sharing the stories of the students that have moved on from the program. Share how they have become our teachers, program director, and the ones I know of that have found employment in the industry before they even completed their degrees.
- I am not sure. I think that maybe getting the word out about the program and what it covers. This program attracts students that are interested in solar or renewable energy, or have strong environmental views, or are interested in energy efficacy building practices.

Are you currently employed? In what industry and occupation?

4 – Yes

6 – No

- Pet Care. It's an outdoor daycare facility for dogs. A job so I can pay for school, etc. However, I've been on job interviews (as a result of this program) for Solar and Science based companies.

- General Contractor

- Construction residential

- I work for the Home Depot Corporation I am an Merchandise Executive.

Any additional comments?

- I really appreciate the program's commitment to helping students find employment. (job shadows and facility tours) Please keep offering this.
- I hope to continue working within the CET program! Thanks so much!
- I have faith the timing is right for this course and to earn a degree. So, I'm placing a lot of faith in the course to prepare for the clean energy marketplace or associated fields in climate change.
- Overall I am impressed and quite pleased to have joined this program. With my background I thought it would be easy, but I've learned a great deal and have worked much harder than anticipated, but this is a good thing as nothing worthwhile is easy.
- Na
- I would love to see this program grow but I do enjoy the fact that we really get to know each other student to student because we end up sharing a lot of same classes together.
- I wish that there was more of a working relation ship with the employers in the region where students could work and learn. similar to an apprenticeship program. For me the struggle is more with working and providing for family then it is for funding of school. I think a lot of good learning comes from in the field paired with school.

SHORELINE COMMUNITY COLLEGE
CLEAN ENERGY TECHNOLOGY & ENTREPRENEURSHIP
PROGRAM REVIEW
MARCH 15, 2017

BY ED PHIPPEN
PHIPPEN CONSULTING, LLC

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EXECUTIVE SUMMARY AND PRIORITY SUGGESTIONS

Overall Observations

In 2014, the CET program hired a program coordinator who has made critical revisions to make the program relevant and vibrant, including creating a program advisory committee. She also led faculty to revise certificate and degree options, update program outcomes, and improve online learning capabilities. This is reflected by strong reviews from current students, who were quite likely to recommend this program to others, giving it a 4.6 on a scale of 1 (definitely not) to 5 (definitely) (N=10).

Recently, the program submitted a National Science Foundation (NSF) grant that has been recommended for approval by NSF staff. This grant will allow the program to continue updating the program and provide multiple enhancements (described below).

The program provides one certificates and an associate degree. Student enrollment in the program is somewhat low. In AY 2015-16, CET had 20.2 FTE and 86 students.

Employment prospects for future graduates of this program are strong. Occupations that could be a fit to graduates of this program are largely expected to grow faster than average and generate 6,500 openings in King and Snohomish County by 2024. Employers on the advisory committee believed these figures to be an under-estimate of the actual market as it is growing exponentially each year. Employment of program completers, available through AY 2012-13, supports the curriculum revision and need for continuing vigilance to keep the program relevant. Employment of completers versus leavers was strong in 2010-11 (92 percent vs 54 percent for leavers) but those results eroded over time. By 2012-13 only 73 percent of completers were employed compared to 66 percent of leavers.

Priority Suggestion 1: Continue Seeking Opportunities to Keep the Program Relevant in a Rapidly Changing Industry

This industry is changing rapidly as new technologies become available and developers and the consulting firms that serve them incorporate these new technologies to improve efficiencies. For example, solar technologies considered state of the art five years ago are not even used any longer and considered outdated. As a result, faculty agreed that program learning outcomes revised in 2015 now require updates to keep the program relevant. The anticipated NSF grant will provide needed resources to maintain this edge, but is only a first step in a much longer process.

Suggestions

1.1 Future staffing decisions should maintain the maximum amount of flexibility to allow the CET administrator to engage with industry and keep the program relevant.

1.2 Recruiting firms for the excellent program advisory committee continues to be a priority, especially using all strategies available to attract the larger firms that can offer important resources such as equipment, expertise, and student internships and shadowing opportunities.

1.3 Implementing the NSF grant will be critical to keeping the program relevant. Though highly unlikely, if the grant is not acquired, additional outside funding should be sought to achieve the grant objectives.

Priority Suggestion #2: Recruiting Younger Students

The average age of students in the CET program (37) is older than the average of all of Shoreline's professional-technical programs (29). To a certain extent, this is expected. This program attracts a portion of students in physical construction jobs wishing to switch to less physical jobs as they age. Additionally, the field is less well known among high school students, so exposure is a problem compared to more well-known and understood construction careers.

However, faculty and staff appropriately recognize an opportunity to boost enrollment and reduce their average age by creating opportunities to familiarize high school students with this growing industry. The NSF grant will allow them to take important steps in this direction by offering a summer training opportunities to high school teachers to allow them to incorporate applied learning opportunities related to CET into their STEM curriculum.

Suggestion

2.1 Implementing the NSF grant will be critical to exposing youth to this field. Though highly unlikely, if the grant is not acquired, additional outside funding should be sought to achieve the grant objectives.

2.2 Exposing students to this field is will not necessarily result in increased youth enrollment. To achieve this, marketing materials should be developed that describe the field and earning potential, and offer high school students hard entry points. This could include information on Running Start including sample course plans and enrollment information. It could also include developing a program with a CTE program.

Priority Suggestion #3: Develop a Technology Plan

CET is a technology-heavy department. Industry requires students be familiar with a variety of hardware and software solutions, requiring the program to purchase and incorporate these technologies. Many of the hardware technologies are housed in the Zero Energy House, which has some structural deficiencies, is not ADA

compliant, and is not actually "zero energy." A consultant estimated $200,000 was required to fix the deficiencies, make it ADA compliant, and make the building zero energy again.

Suggestions

3.1 The program should develop a technology plan. This plan should describe:

- The existing needed technologies used in teaching;
- The most efficient place to house these technologies;
- Future resources required to maintain the technologies and purchase new technologies.

<u>Findings</u>

School-wide Findings
1. Shoreline Community College should develop a system for collecting contact information from graduating students. This information could be used by the Foundation for fundraising, as well as by individual departments to assess alumni satisfaction and the degree to which alumni achieved program outcomes. (p. 8)

Program Level Findings
1. As described in the NSF grant, industry should play a leadership role in the process to identify needed skills and career paths (p. 10).
2. Curriculum mapping should occur. Planning for this process should ensure that the changes planned in the NSF grant are captured in the mapping, or a new map will need to be completed after the NSF grant changes are implemented (p. 10).

Employment Findings
1. Alumni employment data support the curriculum revisions that occurred in 2015, and make the case that continued curriculum revisions should be planned on a regular basis (p. 12).
2. Employment projections and program advisory committee comments indicate that this field is growing (p. 12 and 21).

Student/Course Level Findings
1. Because of the improving economy, CET headcount enrollment has declined at levels similar to all of Shoreline's professional-technical programs (p. 12).
2. The program coordinator is doing an excellent job of marketing her program to potential groups of new students including incumbent workers, youth, and military groups (p. 13).
3. Marketing materials presented to the program advisory committee had a printing defect rendering them illegible. Even without the defect, they

appeared busy and difficult to quickly understand. It's recommended that they be redesigned by Shoreline's marketing department (p. 13).

4. CET's recently submitted NSF grant will develop workshops for high school teachers to help them develop clean energy concepts in STEM courses, expanding awareness of the field. Building awareness of the profession is important and should be continued (p. 13).

5. To boost youth enrollment in a more measurable way, the program should develop pathways for high school students to pursue credentials and/or degrees while in high school, such as using Running Start or partnerships with CTE programs (p. 13).

6. CET student diversity is better than CET industry diversity. These gains can be built upon by seeking qualified people of color and/or women for open teaching positions (p. 14).

7. CET completion ratios declined in 2013 as the multiple certificate options were phased out in response to industry demand. They have been stable since (p. 14).

8. CET does not have a significant waitlist problem. Some course capacity numbers were set several years ago and need to be re-examined to ensure they accurately reflect pedagogical needs (pp. 15-16).

Curriculum Findings

1. The 2015 revisions improved the program's relevancy (p. 16).

2. At about the same time, faculty converted most of the program to online or hybrid, effectively improving access for their many students who work at least part-time while taking classes (p. 16).

3. Faculty acknowledged that some of the 2015 revisions are outdated and a new process needs to occur. The NSF grant will help provide needed resources to conduct this review. Because this industry is quickly evolving, the program will need to prepare to conduct similar reviews on a somewhat regular basis (p. 16).

Faculty Findings

1. The faculty are engaged, thoughtful, and had a good understanding of the needs of students and employers. (p. 17)

2. CET has no full-time faculty and more part-time faculty than its peer programs. The lack of a full-time faculty member decreases program stability but provides more administrative flexibility to meet the demands of the program (p. 17)

3. Student to faculty ratio is low (1:13 in Fall 2015). (p. 18)

4. Most faculty do not have a background in education, and are instead practitioners. While this is a positive, some faculty indicated a desire to improve their knowledge and skills with regard to adult education. Because of their work schedules, CET faculty are rarely free at the same time. The

program should consider offering a half-day paid training during breaks to improve faculty teaching skills (p. 18).

Resource Findings

1. The Zero Energy House is used for teaching critical components of the program. It has some structural issues, is not ADA compliant, and is not zero energy. Of these issues, not being ADA compliant is the biggest issue and should be remedied immediately (p. 19).
2. CET is a technology dependent program, using both software and hardware to teach students. For this reason, the program should develop a technology plan to identify resources necessary to maintain existing and purchase new equipment (p. 19).

Partnerships

1. The program advisory committee is one of the strongest this reviewer has seen. Of note: the program coordinator uses small groups to effectively solicit needed input; committee meetings are rotated throughout the community to expose members and faculty of a variety of buildings and organizations; she reserves 15 minutes at the end of each meeting so members may network; and the committee chair framed the role of the committee at the beginning of the meeting. This advisory committee is a best practice and these should be shared with other committee coordinators (p. 19).
2. Providing internships is a challenge as most of the connected companies are too small to offer internships at all (or at scale). To compensate, the program has developed job shadow opportunities for students. It is recommended that the coordinator continue to find opportunities to connect larger companies to the program and use these connections to develop new internship opportunities (p. 20).

Program Services

1. Students, alumni, and program advisory committee members all agreed that more hand-on time and project-based learning would benefit the program. The NSF grant will help provide these opportunities (p. 20).

INTRODUCTION

In an effort to maintain the highest quality post-secondary education and meet regulatory requirement, Shoreline Community College hired Phippen Consulting, LLC in winter of 2017 to conduct a program review of its Clean Energy Technology program (CET).

METHODOLOGY

Meetings
- One one-hour meeting with Division Dean, program chair, and Institutional Review staff to identify major issues of focus.
- Two two-hour meetings with staff and faculty to discuss all aspects of their program.
- One one-hour meeting with the CET Program Advisory Committee to discuss the relevance of this program.

Documents Reviewed
- One survey of current students (n=12)
- One survey of alumni covering (n=19)
- Student demographic data
- Class cancellation and waitlists
- Student completion data
- Student completion ratios for CET, Shoreline, and the state
- Student grade distributions
- Comparative data on student-faculty ratios
- Comparative data on full-time to part-time faculty ratios
- Program and course level fill rates
- Labor market data
- Job openings data from EMSI
- Program level learning outcomes
- College and program website and planning guides
- Annualized FTES, headcount, and percent of enrollment by program and by certificate/degree)

Surveys

The program instituted an alumni and current student survey this year (see Appendix A for a copy of the survey results). Surveys were distributed by Shoreline's Marketing and Communications Department using MailChimp and Survey Monkey. One email and one follow-up email was sent to both current and former students resulting in a response rate of 25 percent for current students and 14 percent to former students. The former student survey response could be improved by collecting contact information for graduating students.

ASSESSING STUDENT LEARNING

Program Outcomes

Three years ago, Shoreline Community College hired a program coordinator for CET. The program coordinator recruited new members for the program advisory committee. In 2015, the coordinator facilitated a faculty-led process to revise the program. Because faculty are so closely tied to industry (all work in industry), a faculty-led process was deemed appropriate at the time. This process resulted in the elimination of multiple short-term certificates and a revision of the program outcomes.

The CET 45 credit certificate has 8 learning outcomes, listed below.

- Apply a knowledge of mathematics, building science and electricity to practical problems in the clean energy field.
- Read, visualize and interpret building plans and models including architectural, structural, mechanical and electrical components that affect building energy requirements.
- Utilize building energy calculations and economic tools to inform decision making and design for clean energy technologies.
- Complete an energy analysis of a building including benchmarking, envelope, heating, cooling, ventilating, lighting, service water, plug loads and renewable energy systems.
- Identify, describe and analyze common solar PV, solar thermal, heating, cooling, lighting and service water processes for commonly applied technologies.
- Layout, size, model and specify system components to meet design requirements for clean energy technologies.
- Utilize virtual design and modeling techniques to model, design and create construction documents for clean energy technology systems.
- Understand the applied code, safety, associated equipment and performance parameters and attributes required for the design, installation and maintenance of clean energy technologies.

The 90 credit AAAS incorporates the certificate outcomes and includes two additional outcomes:
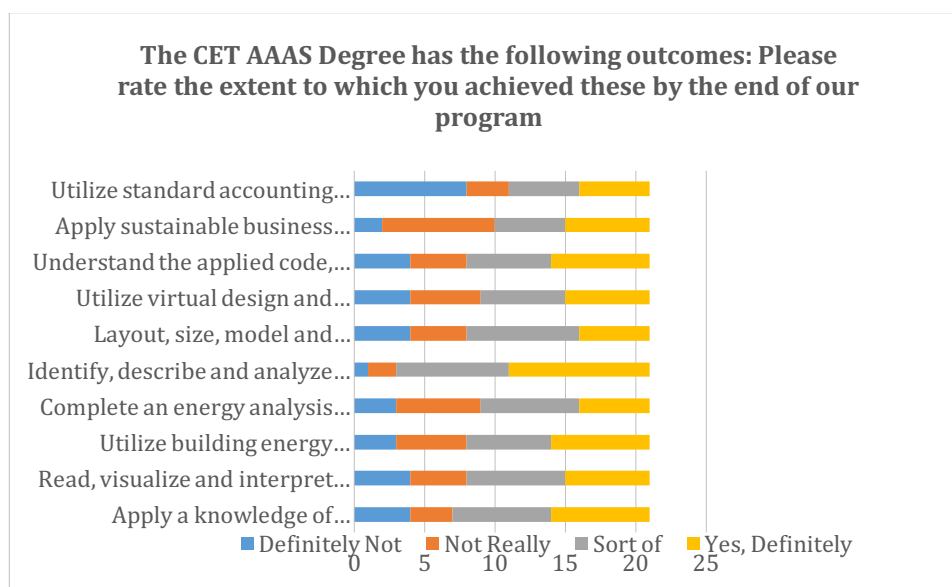
- Apply sustainable business practices to clean energy technology business models.
- Utilize standard accounting practices, project management skills, a knowledge of business law and other business practices to support clean energy technology businesses.

Faculty report that the industry has shifted enough that these outcomes need revision once more. The NSF grant will help them conduct a more thorough process in revising these outcomes, including the involvement of industry. It is recommended that industry play a leadership role in this NSF process, as written into the NSF grant.

Following this program review, the department will engage in a curriculum mapping process to connect these outcomes to the existing courses. This process will help identify gaps, overlaps, and misalignments between the program outcomes and existing courses. This process should occur in a manner that incorporates the changes planned through the NSF grant (e.g., either wait and do this after the NSF grant, do it during the NSF grant to ensure changes are incorporated in the mapping, or do it now and then do it again after the NSF grant changes are implemented).

The alumni survey asked participants to indicate the degree or certificate they completed at Shoreline, and to evaluate the extent to which they felt they achieved the program's learning outcomes. The results are reported below, however an analysis of the complete survey leads this reviewer and Shoreline Institutional Assessment staff to believe that the majority of respondents to the alumni survey graduated prior to the 2015 program revisions.

Of the 19 respondents to the alumni survey, 7 stated they had completed the AAAS. The following chart shows that alumni of this program responding to the survey rated their achieving the ten program outcomes for the CET AAAS on a scale of 1 (definitely not) to 4 (yes, definitely).

The CET AAAS Degree has the following outcomes: Please rate the extent to which you achieved these by the end of our program

<u>Meeting Individual Learning Needs</u>

On a scale of 1 (poor) to 5 (excellent), current students (n=12) gave this department a strong 4.4 on its ability to meet individual learning needs.
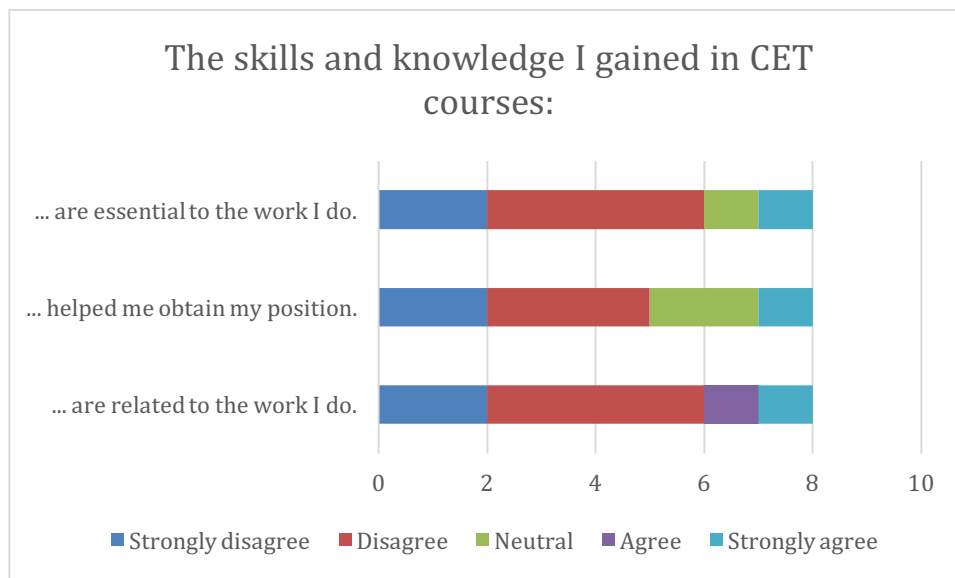
<u>Grade Distributions</u>

CET grade distributions were briefly examined but the small size of the CET program made the results difficult to interpret. There were some variations year-over-year, but it is difficult to know if these variations were due to assigned grades or changes in the student body.

EMPLOYMENT OUTCOMES

To understand employment outcomes, two data sources were used. First, CET alumni who responded to the survey reported their employment status. There were few responses to employment-related questions (between 8 to 16). Unfortunately, the survey neglected to ask when they graduated. However, based on analysis of responses to this and other questions, it appears that respondents to this survey may be weighted towards of alumni who completed the program prior to the redesign conducted three years ago. Thus these results likely do not accurately describe the current program.

Nine out of 16 respondents work full- or part-time. The majority of respondents (9 out of 13) felt like their degree was not related to the work they do. Slightly less than half (3 out of 8) felt their degree helped them gain their position or was essential to their work.

The skills and knowledge I gained in CET courses:

-11-

The second data source is the Data Linking for Outcomes Assessment database compiled by the Washington State Board for Community Colleges linking program outcomes and employment data. This data shows the employment outcomes for alumni that completed their degree or certificate compared to those who did not (i.e., "Leavers").[1] The data does not show what jobs these individuals have.

Completers	Leavers
2010-11: 92%	2010-11: 54%
2011-12: 60%	2011-12: 59%
2012-13: 73%	2012-13: 66%

While completers gained employment at a significantly higher rate than leavers in 2010-11, the gains evaporated in subsequent years. Both the survey and Completers/Leavers data provide some justification for the revisions that occurred in 2014 to ensure more relevancy in the program design.
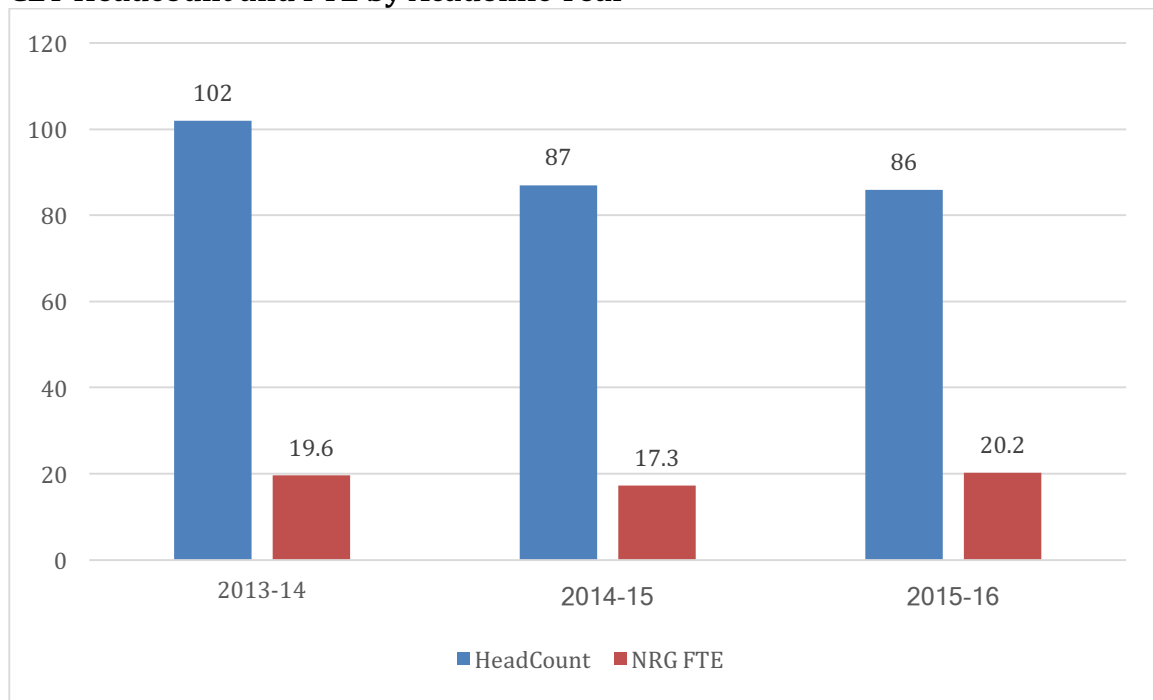
STUDENT DATA TRENDS

Enrollment

CET headcount enrollment has declined as the economy improved and the program moved away from multiple short-term certificates, better preparing students for employment but reducing enrollment slightly. FTE increased slightly in 2015-16, a result of a few students taking more courses. Shoreline's CET program is outperforming the statewide average CET FTE enrollment, which averaged a 13.4 percent decrease during the same time period.

Headcount enrollment for all of Shoreline's professional-technical programs decreased by 12 percent since 2013-14, compared to CET's decline of 16 percent over the same period. These are expected trends due largely to the improving economy and experienced generally by all community colleges in Washington. The following histogram shows enrollment fluctuations by CET over the past three years.

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[1] The data includes alumni who have not enrolled in another Washington State community or state college or university for at least one year (i.e., so recent graduates are not included). It does not include alumni who do not have a social security number. For these reasons it may be an undercount of actual employment.

CET Headcount and FTE by Academic Year

Louise is doing an excellent job of marketing her program to potential groups of new students. She estimates she spends approximately 30 percent of her time in marketing activities and focuses on incumbent workers, youth, and military groups. Marketing materials distributed at the program advisory committee suffered from a printing defect making them unreadable. They also appeared too busy and would have been an effort to read and identify important information. It's recommended that they be redesigned by Shoreline's Marketing department to make them more pleasing to the eye and to eliminate printing defects.

CET recently submitted a National Science Foundation grant that would, among other things, develop workshops for high school teachers to provide opportunities to introduce clean energy building management concepts in relevant STEM high school classes. Building exposure to clean building industry is a critical component to improving youth interest in the field and should be continued. However, it is worth noting that measuring this impact on enrollment will be difficult to track.

To boost youth enrollment in a more measurable way, Shoreline should consider developing and marketing a program focused specifically on high school students, such as Running Start or dual credit. A dual credit program for high school students (for example, by developing strong connections to an existing high-school technical education program) would allow students to satisfy high school graduation requirements through the CET program. Specific collateral materials around CET Running Start could be developed that help engage students in practical ways to help speed their entry into the field. These could include career pathway and salary samples, clear information about who this program could benefit (e.g., those looking

for work directly upon high school graduation, not those wishing to attend college), and a sample course plan for high school students.

Student Demographics

CET student demographics are largely reflective of the occupation as a whole, mostly white and male. CET students are relatively older, on average, than Shoreline's professional-technical students. CET students had a mean age of 37 in 2015-16, compared to 28.8 for Shoreline's professional-technical mean. The number of students in the program was too small to analyze grades or pass rates based on race/ethnicity or gender.

Improving the diversity of this program would benefit students, Shoreline, employers, and the greater community. While it is unreasonable to hold a small program accountable for diverse outcomes that the industry is unable to achieve, it is worth noting that recruiting more diverse faculty has a positive correlation with recruiting and retaining a more diverse student population. To that end, it is extremely helpful to currently have a female leader for the program, another female faculty person, and one male person of color. Program diversity will continue to improve if program administrators identify people of color and female candidates for new teaching positions.

Completion Data

Over the three-year study period, the 2014-15 academic year had a bolus of students complete the AAAS degree. Faculty attribute this to the small number of students and the two years it takes to complete the AAAS.

Academic Year	All Completions	AAAS Completions
2013-14	8	7
2014-15	17	12
2015-16	12	6

When comparing CET completion ratios to Shoreline Community College and statewide ratios, this small program does not maintain the Shoreline and statewide completion rates. Again, because enrollment is low, a small change in the number of students completing degrees and/or certificates would change the ratios significantly.

CET Technology Completion Ratios Compared to State and Shoreline

All Workforce Certificates and Degrees		2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
State	*Ratio*	*Unavail.*	*20%*	*20%*	*20%*	*Unavial.*	*Unavial.*
Shoreline	Completions	641	626	694	652	702	545
	Headcount	2262	2110	2331	2156	2075	1854
	Ratio	*28%*	*30%*	*30%*	*30%*	*34%*	*29%*
All Clean Energy Tech	Completions	23	30	9	7	10	8
	Headcount	47	58	67	62	41	52
	Ratio	*49%*	*52%*	*13%*	*11%*	*24%*	*15%*

Workforce Degrees Only		2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Shoreline	Completions	251	194	206	203	208	181
	Headcount	1798	1616	1786	1643	1534	1389
	Ratio	*14%*	*12%*	*12%*	*12%*	*14%*	*13%*
All Clean Energy Tech	Completions	1	14	5	7	8	4
	Headcount	25	42	63	62	39	48
	Ratio	*4%*	*33%*	*8%*	*11%*	*21%*	*8%*

Waitlists and Fill Rates

Shoreline Community College's Institutional Review Department (IRD) studies waitlist data for the college, analyzing number of seats waitlisted by course and quarter, in addition to several additional factors of importance. This analysis flags courses that have 16 or more seats waitlisted.

There were no courses with chronic waitlist problems during the three-year study period.

Fill rates are determined by comparing the number of students enrolled in a course during an academic year, with that course's capacity for the year. Analyzing fill rates identified several courses where the fill rate is consistently low, and one course, NRG 110, where the fill rate is consistently over 100 percent. Those that were consistently low include:

- NRG 102
- NRG 105
- NRG 120
- NRG 123

- NRG 180
- NRG 201
- NRG 202

- NRG 220
- NRG 225
- NRG 290

It is recommended that administrators review the pedagogical needs for the courses and ensure capacity numbers accurately reflect those needs.

CURRICULUM

Recent Revisions Result in Big Improvements
Three years ago, the program hired a coordinator, Louise Petruzzella, with the goal of improving the program's relevancy. Louise recruited a program advisory committee and through some excellent facilitation, engaged them in an improvement process. These efforts resulted in eliminating several of the short-term certificates and revising and updating the curriculum. The program shifted from being mostly a solar-focused program, to one that provides a broad foundation in multiple aspects of clean energy including the analytical skills needed to help design and/or retrofit buildings to improve their energy usage. To date, this program provides one 45-credit certificate and the AAAS degree and results in a deeper and more relevant education for students.

A Push to Improve Access for Working Adults
In recognition that many of their students work at least part-time while attending school, faculty converted the majority of their programs to online or hybrid. Further modifications, such as compressing courses, could help improve accessibility. These improvements could be marketed to help boost enrollment.

Remaining Relevant
The challenge for this program moving forward is that it prepares graduates for a rapidly evolving field. Previously, the program was focused on preparing technicians who can install, maintain, or repair commercial building energy machinery. However, industry is demanding a new and higher skilled worker who can program automated control systems, interpret energy blueprints, and use software to design energy systems.

To address these and other emerging needs, Shoreline recently applied for a NSF grant to provide it with the resources necessary to produce graduates with relevant skills. Among other things, the grant will allow Shoreline to conduct a job task analysis and market survey to identify emerging skills in the field. This work will allow Shoreline to update its curriculum to continue to meet industry's evolving needs through a DACUM process.

Of course, the challenge for Shoreline is that the industry will not stop evolving after this process (or indeed, even during the year long process). To ensure that the program continues to graduate workers with industry-required skills it must

continue to develop its advisory committee, keep advisory committee members engaged, identify the maximum amount of administrative time possible for the program coordinator, and continue to identify external resources so that she (or he) can continue to identify opportunities to keep the program relevant with this rapidly evolving industry.

FACULTY

The faculty participating in the program review were engaged, thoughtful, and had a strong understanding of the needs of students and employers.

<u>Faculty Workload</u>

The following table highlights the number of sections taught by different types of faculty. CET has no full-time faculty and more part-time faculty than its peer programs. The program coordinator noted that this creates some instability in the program. However, it also provides the program with the needed administrative flexibility to allow the coordinator to spend a maximum amount of time engaging with the industry and marketing the program – this time is critical to the future growth of the program. It is recommended that future decisions around staffing this department maintain the maximum amount of flexibility necessary to continue the critical support required while ensuring long-term stability.

Academic Year	Employment Status ID	NRG	CHEM	BIOL	SME*	PROF TECH	SHORELINE
2012-2013	CONTRACT				2%	1%	1%
	FULL-TIME		45%	32%	36%	37%	36%
	MOONLIGHT		3%		2%	8%	5%
	PART-TIME	92%	50%	67%	58%	54%	56%
	VOLUNTEER	8%	2%	1%	2%	1%	1%
2013-2014	CONTRACT		2%		2%	5%	3%
	FULL-TIME		44%	30%	31%	36%	33%
	MOONLIGHT		2%		3%	5%	4%
	PART-TIME	100%	52%	70%	63%	54%	59%
	VOLUNTEER				1%	0%	1%
2014-2015	CONTRACT	18%	1%		2%	3%	2%
	FULL-TIME		49%	37%	36%	38%	36%
	MOONLIGHT			2%	3%	7%	5%
	PART-TIME	82%	50%	61%	59%	52%	57%

2015-2016	Category						
	VOLUNTEER				1%	1%	1%
	CONTRACT	38%		8%	5%	20%	8%
	FULL-TIME		39%	22%	26%	32%	29%
	MOONLIGHT				1%	4%	3%
	PART-TIME	63%	61%	69%	68%	44%	60%
	VOLUNTEER						1%

*Science, Math, and Engineering

CET operates at a lower student to faculty ratio than its peer departments and quite close to the statewide average for all community college programs. Increasing enrollment will help keep these levels competitive with the rest of the college and peer programs.

Quarter	NRG	CHEM	BIOL	SME*	PROFTECH	SHORELINE	STATE (NRG)
Fall 2010	1:37	1:19	1:18	1:24	1:16	1:21	1:32
Fall 2011	1:20	1:19	1:17	1:23	1:14	1:20	1:16
Fall 2012	1:19	1:19	1:16	1:23	1:15	1:20	1:15
Fall 2013	1:13	1:19	1:15	1:22	1:15	1:20	1:12
Fall 2014	1:11	1:16	1:14	1:20	1:13	1:19	1:11
Fall 2015	1:13	1:17	1:14	1:20	1:13	1:19	1:15

*Science, Math and Engineering

Professional Development

CET faculty all work in the field and use these work experiences to stay relevant, identify new trends, and otherwise keep their practical skills up to date. That they all practice the field they teach is an incredible asset to this program, and was noted favorably on the student evaluation.

However, because their background and academic preparation is in practice, focusing professional development opportunities on improving pedagogical skills would be prudent. The evaluation also noted deficiencies using Canvas as well as understanding and using basic Shoreline systems (e.g., getting a book in the book store).

The challenge with this faculty is that because they all hold outside jobs, they have little free time and are rarely free at the same time.   Asynchronous online modalities were noted that could be useful (including a recently developed

orientation for new faculty). Existing teacher training resources offered by Shoreline occur during times when CET faculty are unavailable. The program could be improved by once each year offering a paid, half-day faculty training focused on improving pedagogical skills during breaks.

RESOURCES

This is a technology-dependent program which teaches students to use much of the equipment and computer programs found in the field. This includes a variety of energy systems (e.g., solar arrays, high performing HVAC, ventilation), modeling software, design software, and assessment tools.

Some of this technology is found in the Zero Energy House and Solar Training Center. This building houses some of the energy systems and meeting and classroom space. It is in disrepair and requires improvements to maintain its efficacy. An engineering firm recently estimated the cost to repair the building at $81,000. To make it "zero energy" would require an additional $110,000. The program administrators should resolve the ADA compliance issues with this house. They should also determine what the program needs to effectively teach students and develop a capital and technology plan to identify the needed equipment. This may or may not include updating the Zero Energy House.

PARTNERSHIPS

<u>Active Partners</u>

The Program Advisory Committee, composed of at least a dozen different organizations, is one of the strongest this reviewer has seen. It is robust and engaged and provides critical leadership to keep the program relevant. Of note, Louise has effectively used small group work to help the committee evaluate some of the more complex components of the program. She also rotates program advisory committee meetings to other relevant organizations throughout the city. Louise understands one of the values she can offer committee members is time to network, and so she reserves 15 minutes at the end of each meeting to that end. The chair of the committee noted at the beginning of the meeting what the role of the committee is. This is an important and often overlooked committee stewardship that helps focus members on their roles and hold them accountable when they start moving away from that role. These are all promising practices and contribute to keeping the committee engaged and should be shared with other program advisory committee administrators.

The program hosts several relevant events at Shoreline including Solar Fest and the Northwest Solar Summit. The program receives scholarship funds from the local chapter of the American Society of Heating and Refrigeration Engineers.

One challenge for this program is its ability to offer internships to existing students. Most of the companies represented on the advisory committee are small- to medium-sized firms without the internal resources necessary to effectively offer internships. The program has compensated by offering half-day job shadows instead. They have attempted to recruit larger firms to their advisory committee, but have yet to experience success.

To address this challenge, staff and faculty should continue to work to recruit the larger firms to its advisory committee, or at least, to encourage them to offer internships to Shoreline students. In doing so, it is important to focus on the value of internships to employers: an opportunity to evaluate students for future employment.

PROGRAM SERVICES

Current students were surveyed regarding their opinions of CET's program services. They were asked to rate each component on a scale of 1 (poor) to 5 (excellent). Their responses were:

Program Element	Rating	N
Helpful program information	4.25	12
Effective curriculum structure	4.0	8
Support individual learning needs	4.4	10
Adequate preparation for employment	4.6	7
Adequate guidance for career planning	4.5	6
Adequate program resources	4.0	12
Class schedule meets student needs	4.3	11
Academic advising meets student needs	4.6	9
Effectiveness of other support services	4.2	10

Overall, responses were positive. Current students gave Shoreline's program resources (e.g., technology, equipment) and curriculum structure the lowest ranking of all program services. Students providing comments to these two areas requested more hands-on time and project-based learning to help incorporate the higher-level skills they believe they will need in the workforce. The above-mentioned NSF grant deliverables include creating more project-based learning opportunities, which will help address these student concerns.

COMPETITION

Shoreline's CET program is fairly unique amongst community college programs. There are several programs that have similar CIP codes, but upon deeper exploration it is apparent that they focus on a different area of clean energy

technology. For example, Central Community College offers a large program focused on employment in the power generation industry.

However, current students were asked what other programs they considered before selecting Shoreline and their responses indicated that Shoreline competes with several different public and private programs in Washington and across the country including:

- Cascadia College
- Lake Washington Technical College
- Bellingham Technical College
- Walla Walla Community College
- Lane Community College (Oregon)
- Portland College (Oregon)
- Bismark College (North Dakota)
- San Francisco City College (California)
- Laney Community College (California)
- Solar Energy International (Colorado)

Students are quite likely to recommend this program to others, giving it a 4.6 on a scale of 1 (definitely not) to 5 (definitely) (N=10).

LABOR MARKET OPPORTUNITIES

Job growth for the occupations this program is targeting is forecasted to increase significantly over the next 10 years, growing faster than the national average for these occupations. Median earnings are also strong in these occupations.

The program advisory committee believes these forecasts could be underestimates as demand currently outpaces supply and both the market and the regulatory environment is driving developers and building operators to improve building efficiency.

LABOR MARKET DATA – King & Snohomish Counties

Occupation	2014 Jobs	2016 Jobs	2024 Jobs	Change	% Change	Median Earnings
Commercial and Industrial Designers (SOC 27-1021)	364	400 (15% above National Average)	468	104	28.6% (Nation 9.9%)	$34.68/hr (National $30.83/hr)
Engineering	5,470	5,513	6,034	564	10.30%	$31.17/hr

Technicians, Except Drafters (SOC 17-3020)		(11% above National Average)			(Nation 6.9%)	(National $27.03/hr)

Shoreline College Clean Energy Technology Program Review – Winter 2017

Student/Alumni Survey Response

Alumni Survey

Response

- 1 email sent by Marketing to Alumni database under Bayta's name
- 1 follow-up email sent under Louise's name
- 19 responses

1. What led you to enroll in Clean Energy Technology & Entrepreneurship courses at Shoreline Community College? (select all that apply)

4 - I was enrolled in the AAAS program in Clean Energy Technology & Entrepreneurship at SCC.

3 – I was enrolled in a different program at SCC

7 – I wanted to gain some new skills

1 – I wanted to brush up on some skills I already had

6 – I was unemployed and seeking employment

4 – I was already employed (self or with a company) and wanted to gain new skills

2. Which degrees and/or certificates did you complete in the Clean Energy Technology & Entrepreneurship program (check all that apply)

7 - AAAS In Clean Energy Technology & Entrepreneurship

5 - Certificate of Proficiency in Clean Energy Technology & Entrepreneurship
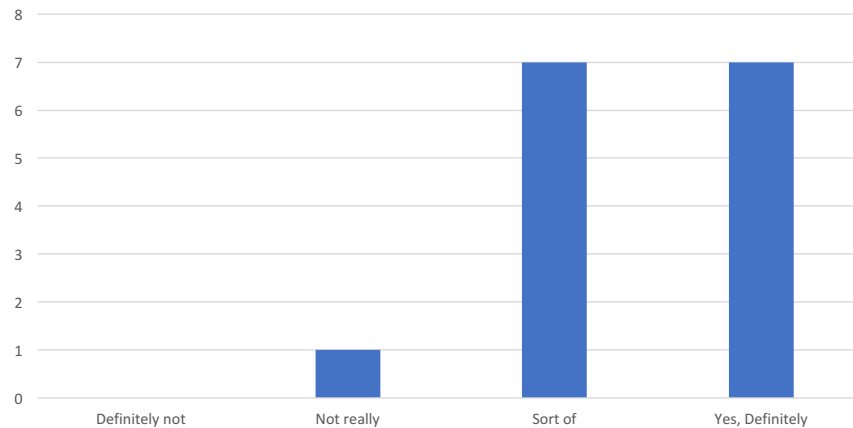
8 – None

3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Apply a knowledge of mathematics, building science and electricity to practical problems in the clean energy field.
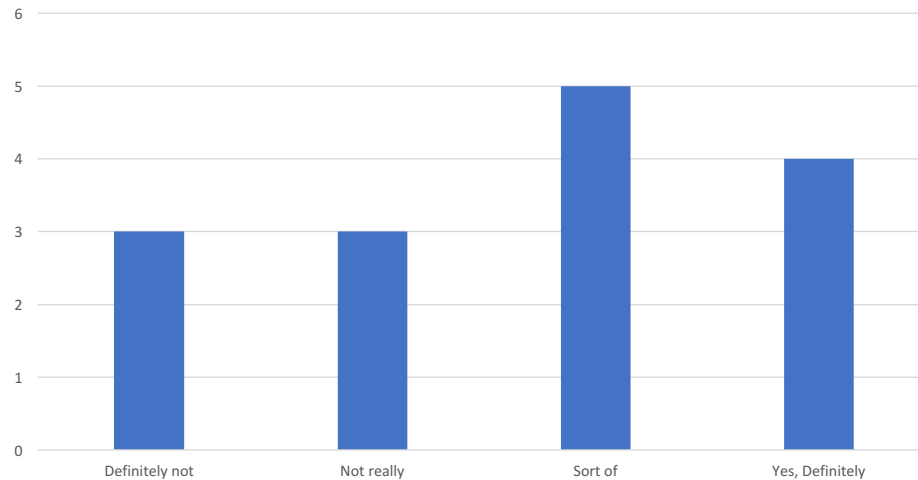
3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Read, visualize and interpret building plans and models including architectural, structural, mechanical and electrical components that affect building energy requirements.
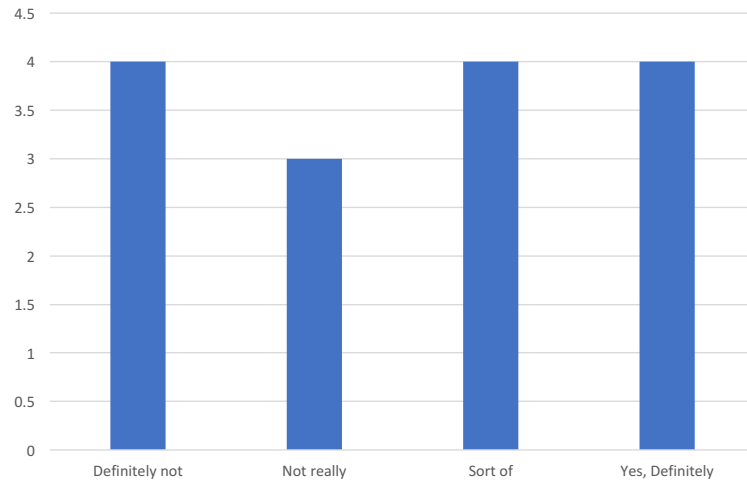
3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Utilize building energy calculations and economic tools to inform decision making and design for clean energy technologies
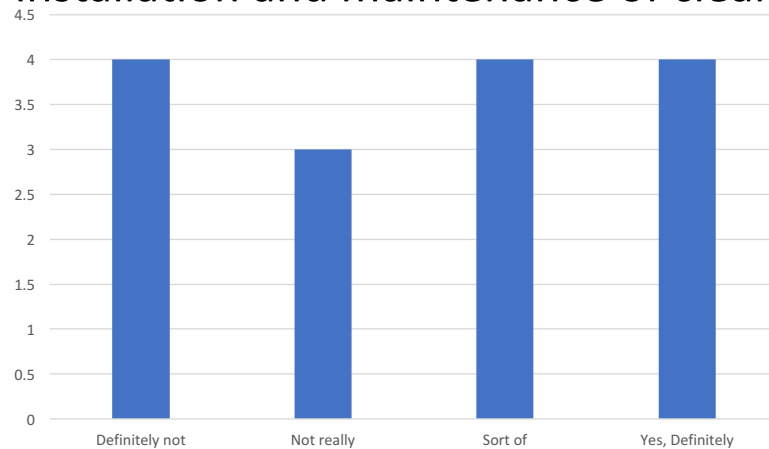
3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Identify, describe and analyze common solar PV, solar thermal, heating, cooling, lighting and service water processes for commonly applied technologies.

3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Layout, size, model and specify system components to meet design requirements for clean energy technologies.
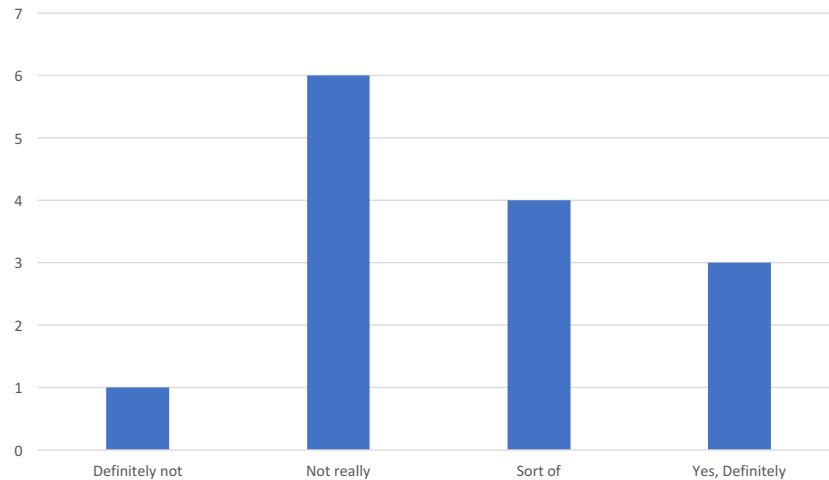
3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Utilize virtual design and modeling techniques to model, design and create construction documents for clean energy technology systems.
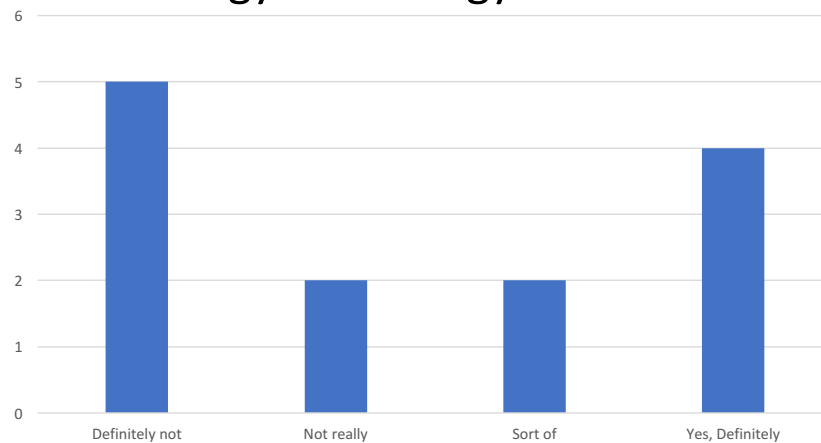
3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Understand the applied code, safety, associated equipment and performance parameters and attributes required for the design, installation and maintenance of clean energy technologies.

3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Apply sustainable business practices to clean energy technology business models.

3. The Clean Energy Technology & Entrepreneurship AAAS degree has the following program outcomes. Please rate the extent to which, by the end of your program, you were able to do the following:

Utilize standard accounting practices, project management skills, a knowledge of business law and other business practices to support clean energy technology businesses.

4. Please list any other AAAS degrees you received from Shoreline Community College.

- I have not received any AAAS degrees
- Associates of Arts.
- None
- none at Shoreline, However, completed BS degree WWU

5. Have you completed any other degrees since leaving Shoreline Community College?

14 – No

2 -   Yes

5a. What degree(s) have you received?

- Associates of Arts.
- I am enrolled in the MPA Tribal Governance Program at the Evergreen State College

5b. What school did you receive your degree(s) from?

- Shoreline Community College.

5c. If applicable, please describe how this/these degree(s) relates to your course work in Clean Energy Technology

- Backs up my understanding of electrons, molecules, and other scientific terms.
- I want to become a lobbyist ,build an affordable passive solar home as a demonstration project. I want to educate others on the advantages of an energy efficient home and answer any questions they may have. Too many times, energy efficient homes are luxury homes or too high tech for low income to middle income families and individuals.
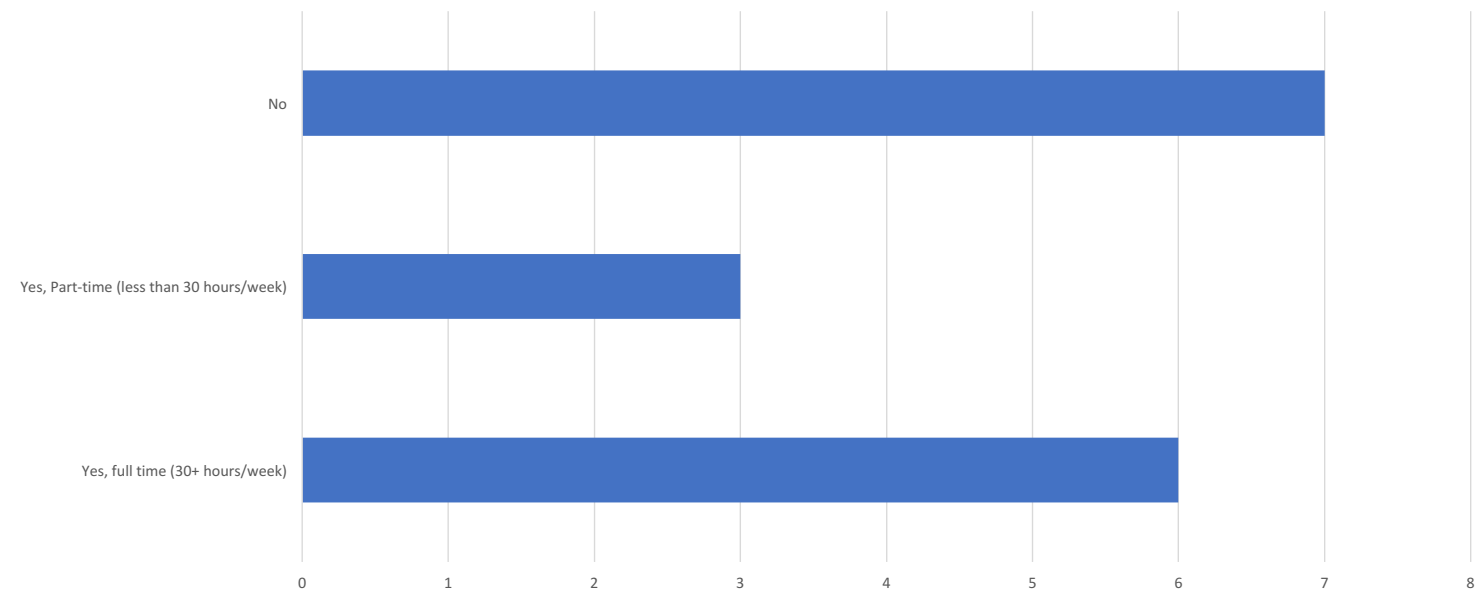
6a. Please describe the degree program in which you are enrolled.

- certification

Name of program/major and school. Is it related to your course work in CET?

- GST General Service Tech – Automotives - No
- Japanese – University of Washington - No

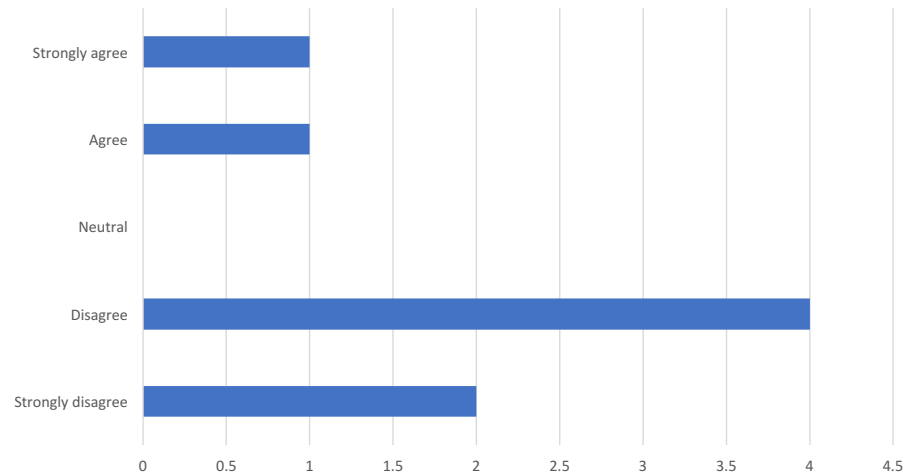7. Are you currently employed (for pay)?

Please provide your company name, position, and duties

- Hargis Engineers - Energy Analyst - Energy Modeling
- XX - Account Manager - Manufacturer Representative
- NW Ceiling Lifts - Project Manager - Designing, purchasing, scheduling installation of ceiling lifts
- XX - project manager - manage construction projects
- Boys and Girls Club- XX - XX
- Costco - Front end/ Cashier assistant - assist cashiers loading carts, help members locate items, return carts to warehouse from parking lot
- King County Library System - Library Technical Assistant - circulation, materials handling, customer service, etc

7b. Please indicate the extent to which you agree or disagree with the following statements about your current work with this company or organization. The skills and knowledge I gained in SCC Clean Energy Technology courses …

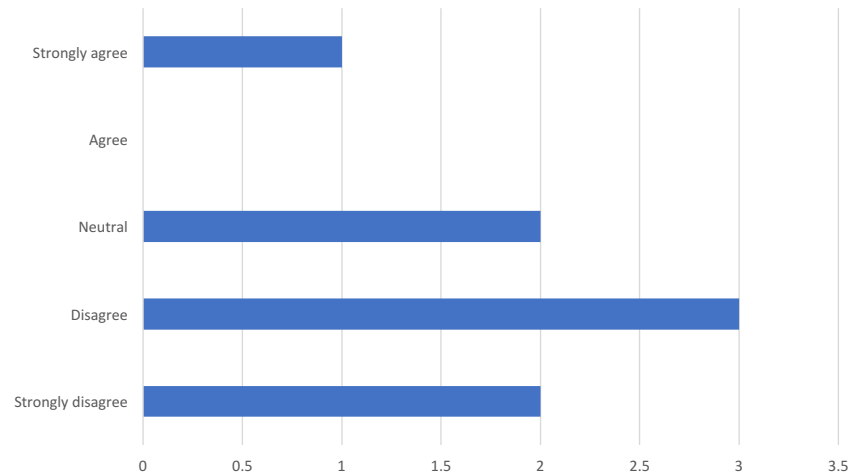## … are related to the work I do.

7b. Please indicate the extent to which you agree or disagree with the following statements about your current work with this company or organization. The skills and knowledge I gained in SCC Clean Energy Technology courses ...
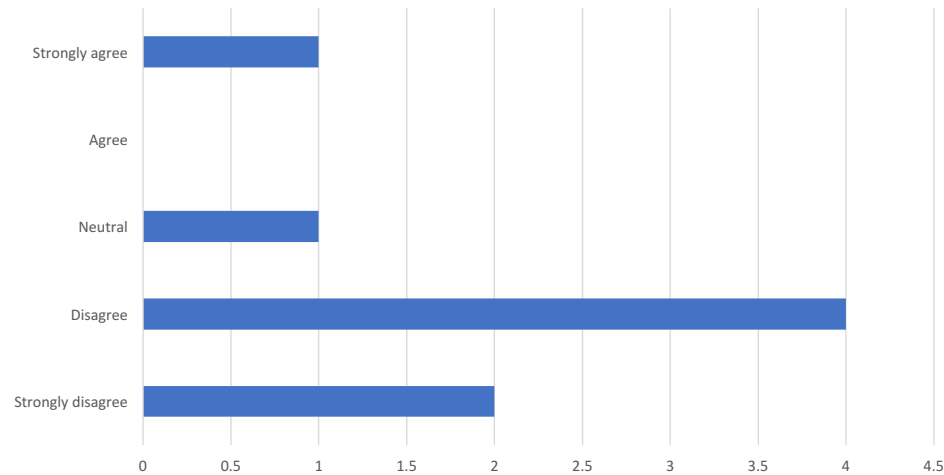
... Helped me obtain my position.

7b. Please indicate the extent to which you agree or disagree with the following statements about your current work with this company or organization. The skills and knowledge I gained in SCC Clean Energy Technology courses …

… Are essential to the work I do.

7c. Do you think your employer would consider providing an unpaid internship to an SCC Clean Energy Technology student?

1 – Probably

6 – Probably not

1 – Definitely not

8. What specific skills did you gain in your Clean Energy Technology courses that helped you get and/or keep jobs?

- None

- I only took one class, I learned a ton and it was great introduction, but it has not been applied to any forms of employment.

- It enhanced by knowledge basis. I am confortable about talking to others about clean energy.

- none have been useful to me so far. maybe google sketchup could be useful, but not all by itself.

9. Please describe what additional skills should be taught in Clean Energy Technology courses to make students more competitive in the job market.

- Kinetic energy should be emphasized on as it can be a useful form of energy harnessing.
- I would strongly recommend a few courses in hydroelectric, specifically micro-hydro. Given the geography and climate of the PNC, this might prove more practical and profitable.
- Couldn't say.
- Entraprenuership and self-sovereignty.
- we skimmed the surface on a lot of the important and useful skills that I had hoped to learn.   1. learn shade analysis with a solmetric sun eye, not a 30 year old tripod, solar path finder 2. in the entire program I only touched equipment two times. 3. the blower door testing is a major skill to learn, and we only did it for one class, and it was not an organized or useful demonstration so I still have no idea how to actually use it. partially because of a junky fan box, but also because the inefficient ventilation in the classroom made it impossible to accurately use the blower door.   3. we talked about wiring solar components, but we never actually touched or saw a solar panel, or any other system component.   I HONESTLY FEEL THAT I WASTED MY TIME AT S.C.C. WITH THIS PROGRAM. I learned much more from an "alternative energy for dummies" book.   p.s. this degree with the skills that they are teaching now is worthless in the job market today. more of an interactive program is needed, field work is essential to any job that this program hopes to steer students towards.

10. Overall, how would you describe the impact of your experience in the Shoreline CC Clean Energy Technology & Entrepreneurship program on your educational and/or professional career.

- I've learned so much from all of my wonderful instructors.
- The classes i took gave me a good understanding for applying renewable energy in a residential market.
- Very impactful. I am inspired to look into furthering my education in clean energy and exploring the possibilities of obtaining a career in solar.
- I had fun learning.
- It was a waste of my G.I.Bill, I am back to welding again.

11. What, if anything, did you find most valuable about your experience with the Shoreline CC Energy Technology & Entrepreneurship program?

- Set at a good pace and reviewed in a timely fashion.
- The solar design course was awesome. I would strongly encourage parallel courses in microhydro and geothermal.
- The information and comparisons of several different types of renewable and clean energies and the effects they have on the environment.
- The quality and caring of the instructors.
- the required books are good material.

12. How, if at all, could your experience with the Shoreline CC Energy Technology & Entrepreneurship program have been improved?

- Extra credit would be nice. Some kind of project based extra credit.
- Hydro.... Micro-hydro...
- I think my experience would have been improved by actually taking the course on campus instead of online. Hands on studies would have been very interesting.
- I was accepted in the Evergreen MPA Tribal Governance Program.
- we skimmed the surface on a lot of the important and useful skills that I had hoped to learn.   1. learn shade analysis with a solmetric sun eye, not a 30 year old tripod, solar path finder 2. in the entire program I only touched equipment two times. 3. the blower door testing is a major skill to learn, and we only did it for one class, and it was not an organized or useful demonstration so I still have no idea how to actually use it. partially because of a junky fan box, but also because the inefficient ventilation in the classroom made it impossible to accurately use the blower door.   3. we talked about wiring solar components, but we never actually touched or saw a solar panel, or any other system component.   I HONESTLY FEEL THAT I WASTED MY TIME AT S.C.C. WITH THIS PROGRAM. I learned much more from an "alternative energy for dummies" book.   p.s. this degree with the skills that they are teaching now is worthless in the job market today. more of an interactive program is needed, field work is essential to any job that this program hopes to steer students towards.
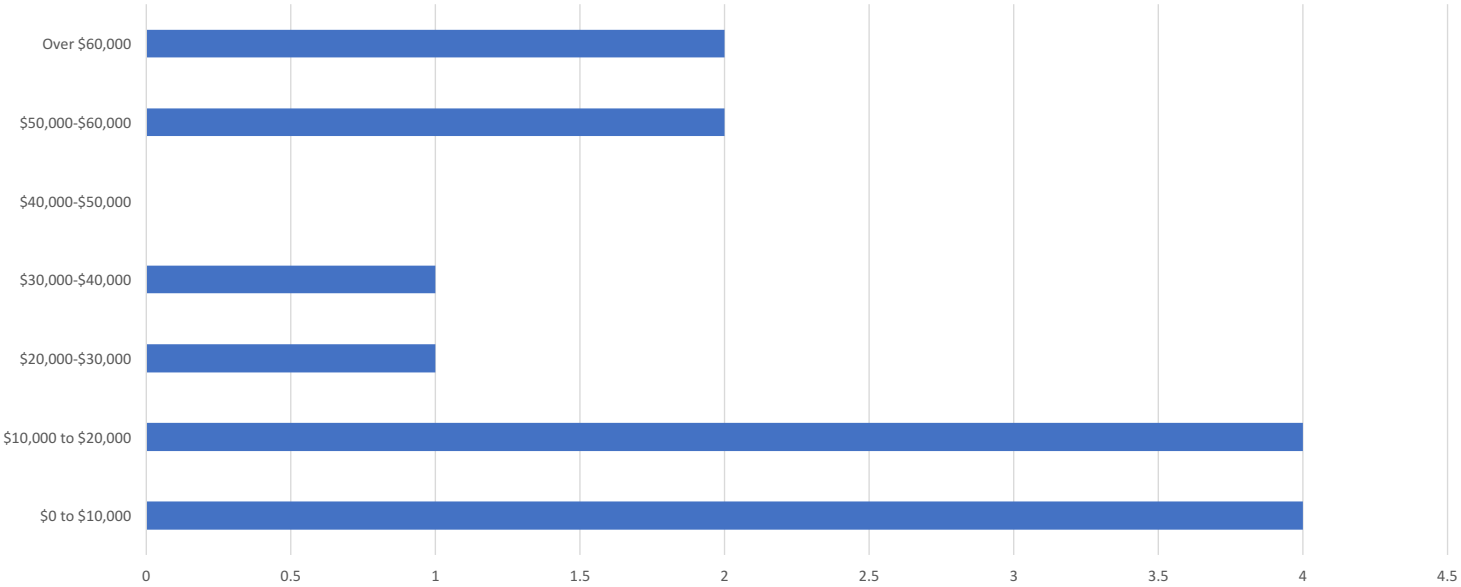
13. Would you recommend (or have you recommended) the Clean Energy Technology & Entrepreneurship program to prospective students?

- Yes
- Yes
- Absolutely
- Yes
- only to senior citizens that only want to learn the basics, and can take the class for free.

Additional comments?

- Keep up the good teaching!
- Thanks for having this program!
- Thanks for making attending SCC a great experience.
- I had so much hope for this program. I was very passionate about the alternative energy techniques. in the end, I was very let down once i understood how pointless and narrow this program focus is. PLEASE LET ME KNOW IF YOU GIVE REFUNDS! I FEEL AS IF I WASTED MY HARD EARNED MILITARY BENEFITS ON THIS PROGRAM. your V.A. reps are fantastic though.

14. What is your approximate gross annual income?

14a. Are you employed in Washington State?

7 – Yes

7 - No

Current Student Survey

Survey response

- 1 email sent under Bayta's name
- 1 follow-up email sent under Louise's name
- 12 responses

Approximately how many Clean Energy Technology courses have you taken BEFORE this quarter (Winter 2017)?

4 – 0 (this is my first course)
5 – 5 or more

Which of the following best describes your ultimate academic goal with regards to Clean Energy Technology?

11 - Complete the Clean Energy Technology & Entrepreneurship AAAS

1 - Take Clean Energy Technology classes to build skills

Would you say that you are taking Clean Energy Technology courses to help you with employment (to get a job or to get a better job)?

11 – yes, definitely

1 – yes, sort of

If applicable, please describe how your Clean Energy Technology courses might help you with employment.

- Learn about industry and possible entry points into industries, Solar or sustainable buildings.
- I am considering going into the Clean Tech./Environmental Science fields and I feel that having these courses on my resume would make me a prime candidate for jobs and also give me the knowledge I need to feel confident in my abilities in these fields
- Switching from traditional power plants to a more sustainable way of powering ourselves. Trying to my part in making sure my Grandkids have clean air and water.
- I will be promoted when I finish my aaas. Where I currently work. We are planning our first solar community now
- This program is well known among the renewable energy community across the nation, therefore graduates have a better chance to find a job.
- Changing career and degree fields, intending to apply for Sustainable Urban Design masters programs down the line.

Rate the Clean Energy Technology Program on each of the items below:

- Helpful program information on college website and printed materials:

4 – Excellent

7 – Good

1 – Fair

I love that the Clean Energy program even has their own facebook page. This is a great place for students and teachers to share information about what's happening in the industry.

Rate the Clean Energy Technology Program on each of the items below:

- Effective curriculum structure: Did the sequence of courses make sense? Did the skills you learned in one class transfer to the next class?

2 – Excellent

4 – Good

2 – Fair

4 – N/A

- I would like to have more actual hands on experance
- A lot of crossover from one class to the next
- I said na because i am a returning student it is far better now then before I took my classes out of order they where still being developed
- I had some issues in the beginning with taking a class my first quarter that I should of taken later but I learned a lot and it all came together after a few more classes.

Rate the Clean Energy Technology Program on each of the items below:

- Support of individual learning needs

5 – Excellent

4 – Good

1 – Fair

2 – N/A

- I have not met my teacher in person.
- Very impressed by the staff of this program.
- When you put effort in and ask it is great
- when I didn't have the ability to use a computer at home my teacher made sure the program I needed for my class was made available in the library computer lab.

Rate the Clean Energy Technology Program on each of the items below:

- Adequate preparation for employment (knowledge and skills for the field)

4 – Excellent

3 – Good

5 – N/A

- I just started the course, we'll see.
- Not sure yet still working to complete degree
- It is very helpful having teachers in the industry
- Teachers are very knowledgeable since most teachers I've met work in the industry right now.
- Still to early to see

Rate the Clean Energy Technology Program on each of the items below:

- Adequate guidance for career planning:
3 – Excellent
3 – Good
4 – N/A
- None thus far.
- Not sure yet still working to complete degree
- Louise is heavily involved with her students and industry in this aspect.
- I did not use this
- I'm about to complete my Clean Energy certificate and have already been contacted by the on campus Workforce department inquiring about how they could help me.

Rate the Clean Energy Technology Program on each of the items below:

- Adequate program resources (information technology, equipment, space, supplies):

3 – Excellent

7 – Good

1 – Fair

1 – Not so good

- Would love to see more hands on experiments with PV and 3D printing
- OK would love to see more actual application and more hands on pratical
- More hands on is always better

Rate the Clean Energy Technology Program on each of the items below:

- Class schedules meet student needs:

5 – Excellent

4 – Good

2 – Fair

- It is good, I would like the option to have more in seat classesx
- I really like the night classes I am able to work and school
- Would like more in class full time options

Rate the Clean Energy Technology Program on each of the items below:

- Academic advising meets student needs:

5 – Excellent

3 – Good

3 – N/A

- Haven't received any advice really.

- Great

- I was able to make Louise the head of the program my adviser, she has been extremely helpful due to the fact she was a student in the program.

Rate the Clean Energy Technology Program on each of the items below:

- Effectiveness of other support services (tutoring, financial aid, counselling etc.):

3 – Excellent

6 – Good

1 – Fair

2 – N/A

- I know the course seeks tutors
- I have not used any of these services
- I've utalized many of the programs on campus and feel very grateful they are offered.
- HAve not had to use yet

How likely are you to recommend the Clean Energy Technology program?

8 – Definitely

2 – Not sure

- As this is my first quarter it's really hard to get a clear picture of just where I am going
- Probably, likely when I'm through. I hear there is cool lab, but never been. I'm focusing on prerequisites and enjoying the course.
- It is a good well rounded program the onlt thing I would love to have is more hands on practical application related to the lessons
- As stated earlier I am highly impressed with this program and the people running it. As a point of reference I am 49 years old with a lot of professional experience.
- I have recommended the program and will in the future.

How did you learn about the clean energy technology field?

- Have had an interest for a long time
- through my L&I inquires
- I wanted to study this field, so I researched local schools on the internet.
- Through a Professor at SCC
- Google search
- I did lots of research online for colleges that offered programs in solar. Not very many community colleges and almost none at the time in Washington except Shoreline
- Internet research into fields of study in this field. Came from a background of working in traditional power plants.
- Councillor
- From my college navigator provided to me by Goodwill Industries
- Advisor
- I found the program when I was researching schools In Washington State that offers an associate's level college degree programs. At the time Shorelines was one of the few and it was abroad program that offered flexibility not just in solar but a well rounded program.

What about the clean energy technology field was interesting to you?

- Living sustainably and minimizing environmental impact
- I think it aligns with my current ideals
- It's dedication to clean energy and helping students find employment
- The idea of learning more about what I can do as an individual to help our planet and make our built environment more Earth friendly and sustainable
- My own power and control in the inventive field. However, educating a larger audience is key and implementation of policy and procedures. The satisfaction of seeking a thoughtful, innovative process, whether political, or other, can make the world a better place through incremental changes in fundamental human focused development and understanding, of present day climate change and the decision making affecting it.
- I like the technology of renewable energy. I like being able to take my electrical skills and use them in a way that is beneficial
- That I could still be involved in helping to power ourselves in a much more ecologically sustainable way.
- Solar
- I was interested in bio-fuels as an alternative resource for energy.
- I'm mostly interested in solar power. I like to be part of an uprising industry that is capable to make a difference
- I am interested in either solar design or energy auditing. I like the new technology and the ability to pair it with the skills I learned while in the military as an electrician's MAte in the Coast Guard

How did you hear about this program?

6 – Website
3 – Advisor
2 – Other

- Women's nutrition Professor
- My college navigator from Goodwill thought it was a good fit for me.

Did you consider other schools when applying to Shoreline?

6 – Yes

5 – No

- several programs at Lake Washington Tech
- Cascadia College in Bothell
- Lane Community college Eugene OR   Bellingham Technical College San Francisco City College Laney Community College Oakland CA
- OIT renewable energy engineering program Walla Walla CC wind program
- Bellingham Technical College   Lane Community College in Eugene OR Portland College   Bismark College North Dakota SEI in colorado

Why did you choose to attend Shoreline? (Select all that apply.)

8 – Location

3 – Quality/reputation

3 – Cost/value

2 – Recommendation

- CET program

- in part the location, but also tha campus as well as the program

- Running Start

- Clean Energy Program, those specific words...Entrepreneur?..i'm not sure anymore, would be nice to be innovative with technology, but now I don't think that is as important to me.

- I liked it well rounded program

- The program

- I had attended Shoreline 12 years prior and was looking to finish my degree in Entrepreneurship and I just love the campus

What changes would improve the program or service to students?

- Lab Assignments on projects. Have students partner up on specific projects.
- No complaints so far
- It's too early for me to tell, ask me in a few months.   Companies that are dealing with clean technology issues are where we all need to be at, or political change is the only other way?
- More hands on and maybe more project with people that are working in the field. maybe more on micro hydro and wind. Not sure. Better networking with local industry. some were aware of the program and other not. I think this would help when people are interested in the field renewable energy so they could recommend Shoreline for training.
- Being able to physically build a system from the beginning to end and maintain same system by the students.
- More hands on learning it makes understanding easier
- I'd like to see more internship availability. Maybe a clearer outline of what classes to take if you are interested in a specific field in clean energy. Like these classes are better suited for a career path in solar, these are better suited for sales and design.
- I would like more in seat hands on classes. It gets hard for students who use VA to pay for classes as to get the most benefit money they require one in seat class as a full time student

What are the program strengths?

- Excellent instructors and leadership

- The information provided. So much material to cover and it's radically helping people see the damages of climate change. It's also motivating people to fight the problem.

- Louise is a fantastic instructor. She encourages discussion and debate about how issues should be handled.

- Headed for Solar ad PV installation territory, not my interest, but good to know and necessary to compliment any education, but as far as I can tell, a book called The Energy Reader, which is very helpful at this point in the course. Ask me in a few months where we are at. I might switch to something more appropriate in the fight against climate change.

- It is well rounded in renewable as well as energy efficiency

- Dedicated and knowledgeable staff truly interested in your development and job placement.

- The networking of the teachers. And how one class now builds on the next whoever is the teacher

- The strengths I see is that our teachers are actively working in the industry, some are former students giving us a real world perspective by bringing their experience to the table not just teaching out of a book. Along with that they also bring a greater connection to the industry by being in the know how of what's happening now in the industry. They truly care about this program and want us to be successful, utilizing all their connections in the industry to help meet potential employers and get our foot in the door.

- It is very divers and offers a little of every thing related to energy not just solar. It would be nice to maybe have some in depth class on other energy sources such as wind, Hydro

What could Shoreline College do to make the CET program more attractive to prospective students?

- More focus on career entry points after exiting program
- Keep delivering on the promises it already makes. (i.e) job security and the promise that this technology won't dwindle in the forth coming years.
- Make it more visible. Advertise more and make it more attractive to all students, young and old.
- SCREAM SHOUT HOLLA AND LET THEM ALL KNOW ITS AT SHORELINE. Include sustainability in the title? I know Cascade have a sustainability program. Ours is also sustainable, only we focus on getting a good job? I want to focus on industry and a degree to back up my big talk!
- Perhaps allow satellite classes at some other colleges as this field of study has programs at few facilities as of right now.
- Na
- I would like to see more stories of the success of this program by sharing the stories of the students that have moved on from the program. Share how they have become our teachers, program director, and the ones I know of that have found employment in the industry before they even completed their degrees.
- I am not sure. I think that maybe getting the word out about the program and what it covers. This program attracts students that are interested in solar or renewable energy, or have strong environmental views, or are interested in energy efficacy building practices.

Are you currently employed? In what industry and occupation?

4 – Yes

6 – No

- Pet Care. It's an outdoor daycare facility for dogs. A job so I can pay for school, etc. However, I've been on job interviews (as a result of this program) for Solar and Science based companies.

- General Contractor

- Construction residential

- I work for the Home Depot Corporation I am an Merchandise Executive.

Any additional comments?

- I really appreciate the program's commitment to helping students find employment. (job shadows and facility tours) Please keep offering this.

- I hope to continue working within the CET program! Thanks so much!

- I have faith the timing is right for this course and to earn a degree. So, I'm placing a lot of faith in the course to prepare for the clean energy marketplace or associated fields in climate change.

- Overall I am impressed and quite pleased to have joined this program. With my background I thought it would be easy, but I've learned a great deal and have worked much harder than anticipated, but this is a good thing as nothing worthwhile is easy.

- Na

- I would love to see this program grow but I do enjoy the fact that we really get to know each other student to student because we end up sharing a lot of same classes together.

- I wish that there was more of a working relation ship with the employers in the region where students could work and learn. similar to an apprenticeship program. For me the struggle is more with working and providing for family then it is for funding of school. I think a lot of good learning comes from in the field paired with school.