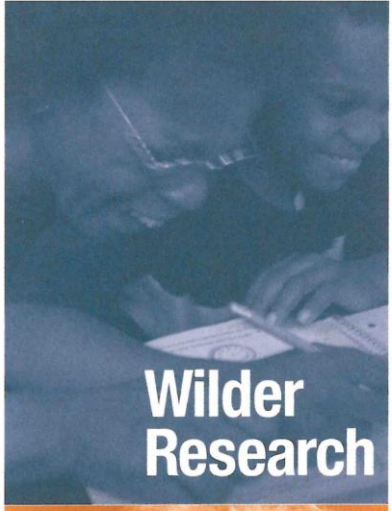

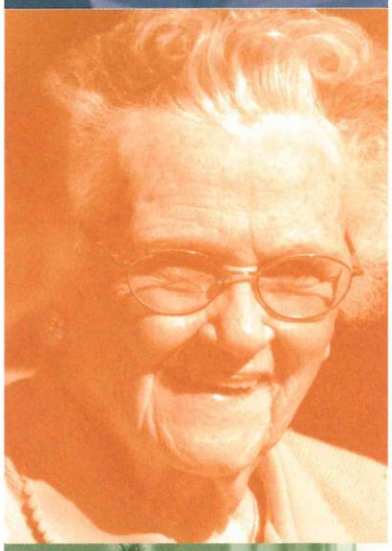

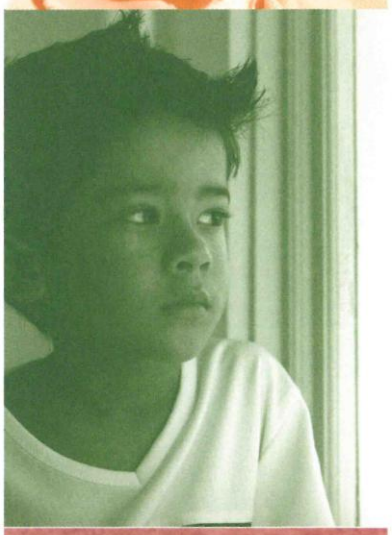

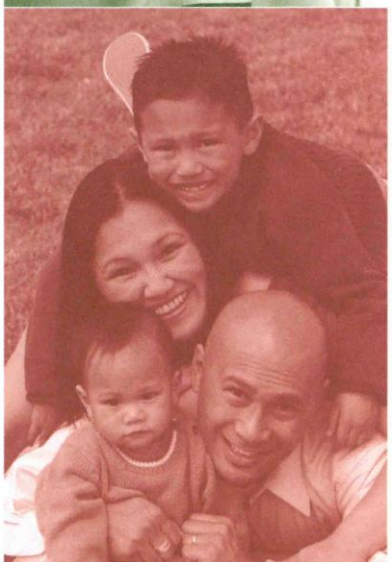

Improving and promoting energy careers training

A U.S. Department of Labor funded initiative of the Minnesota State Colleges and Universities

JULY 2011

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July 2011

Prepared by:
Brian Pittman

Wilder Research
451 Lexington Parkway North
Saint Paul, Minnesota 55104
651-280-2700
www.wilderresearch.org

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Figures

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Greg Owen
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Ellen Shelton
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Summary

The Minnesota Training Partnership for a Sustainable Energy Economy is an initiative, funded by a U.S. Department of Labor grant, to develop and improve energy-related curriculum through strategic partnership between education and industry. The initiative was also tasked with building the capacity of the programs and interest in energy careers through recruitment, faculty training, and career awareness activities.

Strategic partnership

Key informants report considerable partnership and collaboration activity. The following represent the main strategic partnership findings.

- The grant helped to establish **common goals** motivating education and industry representative to collaborate on partnership activities. These goals include developing the curriculum, meeting industry needs, and increasing awareness of energy careers.

- The grant helped to **increase collaboration** through its Implementation Team and other grant-related activities. This collaboration was primarily among MnSCU schools and between MnSCU schools and the Office of the Chancellor. Considerable collaboration between MnSCU and industry representatives was also reported.

- A **more cohesive network of connections** between education and industry representatives was a documented result of the increased collaboration. Participants also noted that these connections will be valuable for future collaborative work.

- **Successful implementation** of collaboration and partnership activities required strong communications and leadership. Communications included periodic meetings and conference calls, the direct access to education partners that was given to industry representatives, and effective use of tools like conferencing and shared desktop technologies. Successful leadership included the day-to-day management as well as grant coordination and oversight. Respondents noted that the grant could not have been successful without the strong coordination provided at both levels.

- **Barriers to implementation** were primarily related to time (lack of time, or activities taking more than expected), geography (partners were dispersed across the state), and logistics (hard to coordinate schedules).

The grant also leveraged significant resources to complete its work and outcomes. These resources were primarily in the form of the time and expenses of individuals and organizations working on grant-related activities including the Implementation Team, curriculum development, and career awareness. The grant also leveraged resources to purchase equipment for energy-related programs, provide scholarships and tuition reimbursement for students, and study the core skills needed for employment in the energy sector.

The grant's relationship with the overall MnSCU system played a key role in grant-related outcomes. The grant helped to create changes at the system level. This includes providing the Einstein Electrical Institute (EEI) pre-employment tests at Alexandria Technical College, providing online education, and helping the MnSCU system work across campuses. The grant also encountered some systemic and structural barriers mostly related to the academic approval and alignment processes involved in the development of multi-campus course offerings.

Program and pipeline development

The grant attained several significant outcomes related to curriculum development and improvement. The primary outcome for the curriculum development was the Energy Technical Specialist A.A.S. degree and the four certificates in biodiesel, ethanol, solar, and wind. The grant also developed two hands-on energy curriculum modules (in wind and biofuels) for high school students.

The grant helped to increase the quality of energy curricula delivered by MnSCU institutions. The primary result of this was that the curricula were reported to better meet industry needs for employee skills. Participants reported that much of the curriculum development work, especially the collaboration needed to do the work, would not have been likely to occur without the grant.

Grant-related capacity-building and recruitment outcomes helped to improve access to programs and increase enrollments in those programs. The grant helped to improve access to energy programs through the development of online coursework, stackable program tracks, and multi-campus articulation and program development allowing students to take courses at multiple campuses without moving. Grant-impacted courses increased enrollments each year of grant activities.

Career awareness

The primary career awareness activities related to the grant were the development of an Energy Careers website and the administration of the Renewable Energy Job Vacancy Survey. The Energy Careers website provides a web portal for people looking for jobs in energy careers. The Renewable Energy Job Survey was completed once during the first year of the grant before being expanded to include all green jobs in Minnesota. Renamed the Green Jobs Vacancy Survey, the survey is now administered bi-annually along with Minnesota's overall Job Vacancy Survey.

The primary barriers to promoting career awareness of the energy industry were the prevailing public opinion or discourse regarding the industry and the larger economic factors affecting the supply and demand for different energy jobs. This includes the public's perception of various industry sectors and real changes in the number of jobs available in certain industry sectors.

Issues to consider

The grant achieved successful implementation and outcomes that position the MnSCU system (and its partners in the energy industry) to play a substantial role in Minnesota's current and future energy economy. The grant process represents a diverse and well-aligned set of activities, and having a diverse group of partners working around a common set of goals will enable the project to continue to carry the work in to the future.

Program enrollments were slightly under the grant's established goals, but the yearly growth of enrollments and the strength of outreach provide the base for continued increases in enrollments. The project has also established an effective student tracking process that will allow it to continue to measure enrollments.

The grant outcomes pose some key considerations for the MnSCU system. The system's policy regarding cross-campus collaboration and curriculum offerings should be reviewed to ensure that it is achieving its intended outcomes of reduced duplication without impeding potential innovation in the system through collaboration. There is also opportunity for the grant partners to reach out to similar efforts in the system. These include other education-industry partnership efforts (e.g. Centers of Excellence) and other projects working with online delivery of courses (e.g. 360°'s eTECH).

Adaptability is key to ongoing success, impact, and sustainability of grant outcomes. It is important that, as the grant funding sunsets, the dynamic collaborations and connections built through the grant find a way to continue to evolve, adapt, and further the positive foundation of work already accomplished.

Introduction and background

In July 2008, the Minnesota State Colleges and Universities (MnSCU) system received a grant from the U.S. Department of Labor High Growth Job Training Initiative to form the Minnesota Training Partnership for a Sustainable Energy Economy. The period of the grant was from July 15, 2008 through July 14, 2011.

As part of the grant activities, the partnership was tasked with developing:

- A two-year Energy Technical Specialist Associate of Applied Science degree
- Four specialized certificate programs
- A web site to provide information on energy careers and education
- A survey of renewable energy jobs in Minnesota
- Hands on activities for high schools students

The partnership includes ten MnSCU schools. The MnSCU Office of the Chancellor is responsible for grant coordination and reporting to the Department of Labor.

In January 2010, MnSCU contracted with Wilder Research for evaluation services related to the grant. These services included the development of a logic model outlining grant's programmatic elements and their intended effects, data collection activities, and a summative report of grant activities and outcomes.

Methods

The following data sources were used in this evaluation.

Key informant interviews. In January and February 2011, Wilder Research data collection staff completed 21 telephone interviews with individuals who played key roles in the development, implementation, or activities related to the grant. Respondents were asked how they got involved in the grant, their expectations for the grant, and the outcomes or impact they observed as a result of the grant. The interview protocol included a mix of closed- and open-ended questions about the key activity areas of the grant. Respondents were only asked questions about the activities for which they had been directly involved. Respondents were also asked who they had worked with on grant activities, to better understand the connections developed through the grant. Key informant interview responses provide the key primary data source from which this evaluation draws a qualitative understanding of the grant's activities and outcomes.

Quarterly performance narratives. The grant administrator was tasked with submitting quarterly reports to the Department of Labor outlining the grant's activities, accomplishments, best practices utilized, lessons learned, and resources leveraged. Evaluators received 11 quarterly reports covering the grant activities from July 2008 through March 2011. The final quarterly report (June 2011) was not ready in time to include in this evaluation. The evaluation uses this self-reported program narrative as a secondary data source.

ISRS student data. Using a list of students in "grant-impacted" programs developed and tracked by the grant's program administrator, data from MnSCU's Institutional Student Record System (ISRS) were collected and analyzed as part of the evaluation. These data demographic data to describe students in the programs.

Student and graduate web survey. During May and June 2011, 216 students and graduates in the grant-impacted programs were invited to participate in a web-based survey about their experiences in their energy-related programs. Thirty-one completed surveys (14% response rate). Respondents were asked about the degrees they are pursuing or have completed, their satisfaction with curriculum and delivery, and their plans for using their degrees. Due to the low response rate on this survey, these data and findings have been used cautiously and should not be considered reflective of the grant's entire student population.

Other program input and documentation. Program staff and Implementation Team members provided evaluators with direct input during the development of the project's logic model. Project staff also provided documentation about many of the grant's activities and outcomes. These include evaluation forms completed by teachers in four high school energy module trainings; scholarship data; and web analytics provided by the website host.

Final analysis of data from all sources was completed using Statistical Package for the Social Sciences (SPSS) quantitative analysis software and Atlas.ti 6 qualitative analysis software.

Overview of grant implementation

The purpose of the Minnesota Partnership for a Sustainable Energy Economy is to:

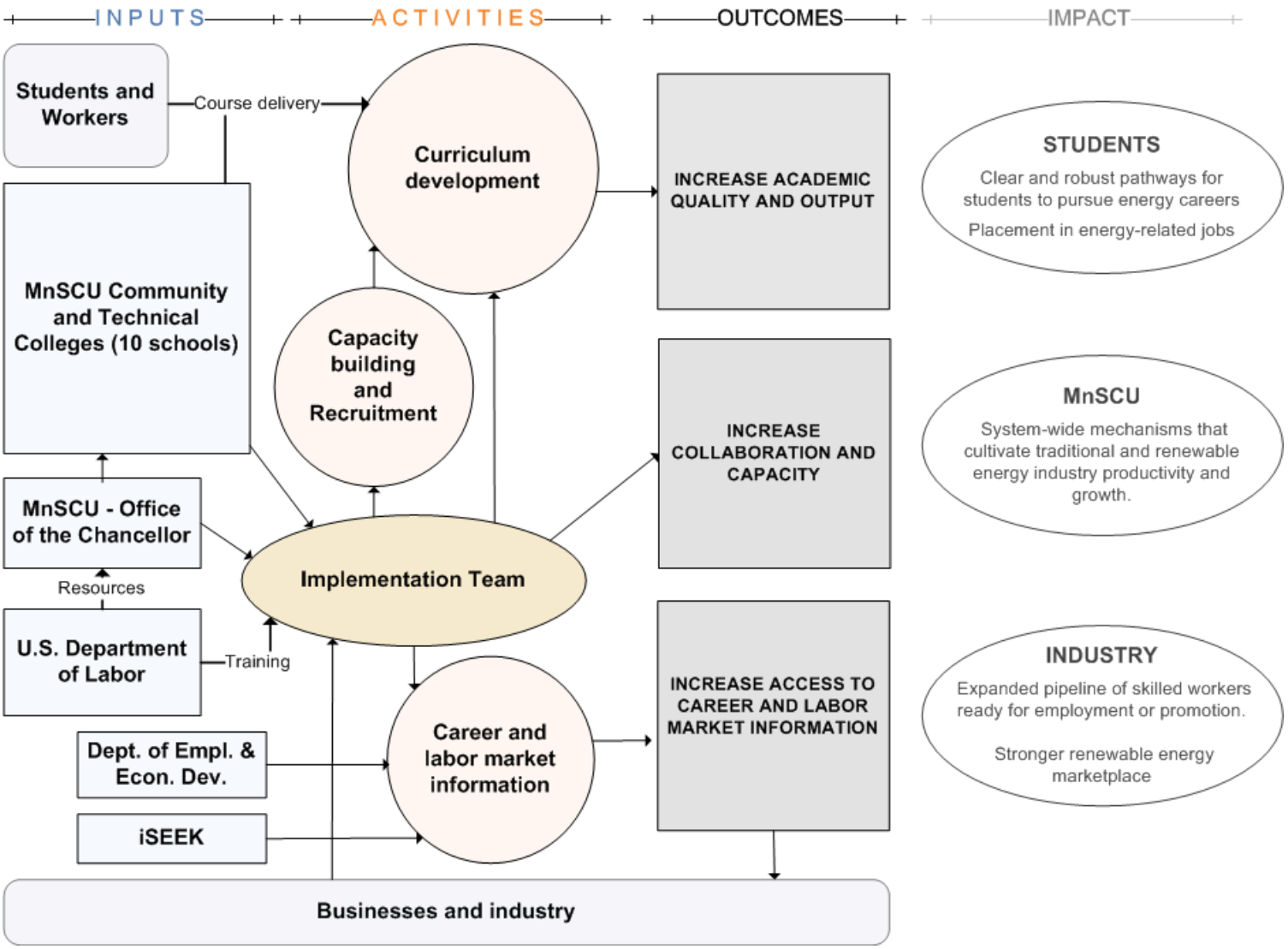
- Increase collaboration and capacity,
- Increase academic quality and output, and
- Increase access to career and labor market information.

Project structure and logic model

As part of the evaluation process, Wilder Research worked with the grant administrators and Implementation Team members to develop a logic model to reflect the project's work and goals. A slightly simplified version of the overall logic model is shown in Figure 1. Further explanation of the specific logic model elements follow the diagram.

Longer-term outcomes described in the "impact" column of the logic model are not measured as part of this evaluation, but were included in the logic model as orienting principles to why the work of the project was being pursued.

1. Logic model for Department of Labor grant



Inputs and roles

- The **MnSCU Office of the Chancellor** has a primary role in the administration and oversight of the grant.
- Ten **MnSCU Community and Technical Colleges** are involved in the partnership. A complete listing of the schools is in the appendix. College deans and faculty served on the Implementation Team and worked on specific projects related to other grant activities. Minnesota West Community & Technical College, a partner school, also housed the grant's coordinator, Shannon Fiene.

- **Business and industry** representatives are involved in the Industry Advisory Board as well as providing input to curriculum and other partnership activities.

- The **U.S. Department of Labor** provided the base funding, as well web-based and in-person trainings for the project.

- **Students and workers** are not directly involved in the work of the grant, but they provide a key input to many of the outcomes the project seeks to accomplish.

- The **Department of Employment and Economic Development (DEED)** administered the Renewable Energy Job Vacancy Survey.

- **iSEEK** developed and maintains the Energy Careers website developed as part of the grant activities.

Activities

- The **Implementation Team** acts as a dual-purpose mechanism providing input to other grant activities *and* being the main activity related to strategic partnership and collaboration outcomes.

- **Curriculum development** activities include the development of a two-year Energy Technical Specialist Associate of Applied Science (A.A.S) degree, six energy-related certificates (biodiesel, ethanol, three solar, and wind), and two hands-on energy lessons targeted at high school juniors and seniors.

- **Capacity building and recruitment** activities include professional development for high school and college faculty, purchasing of equipment or supplies, scholarships, and outreach.

- **Career and labor market information** activities include developing and implementing the Renewable Energy Job Vacancy Survey, developing and maintaining an energy careers website, and career awareness activities.

Outcomes

- **Increase collaboration and capacity** through engagement with industry, workforce centers, and education; leverage and acquire resources; utilize best practices and share curricula.

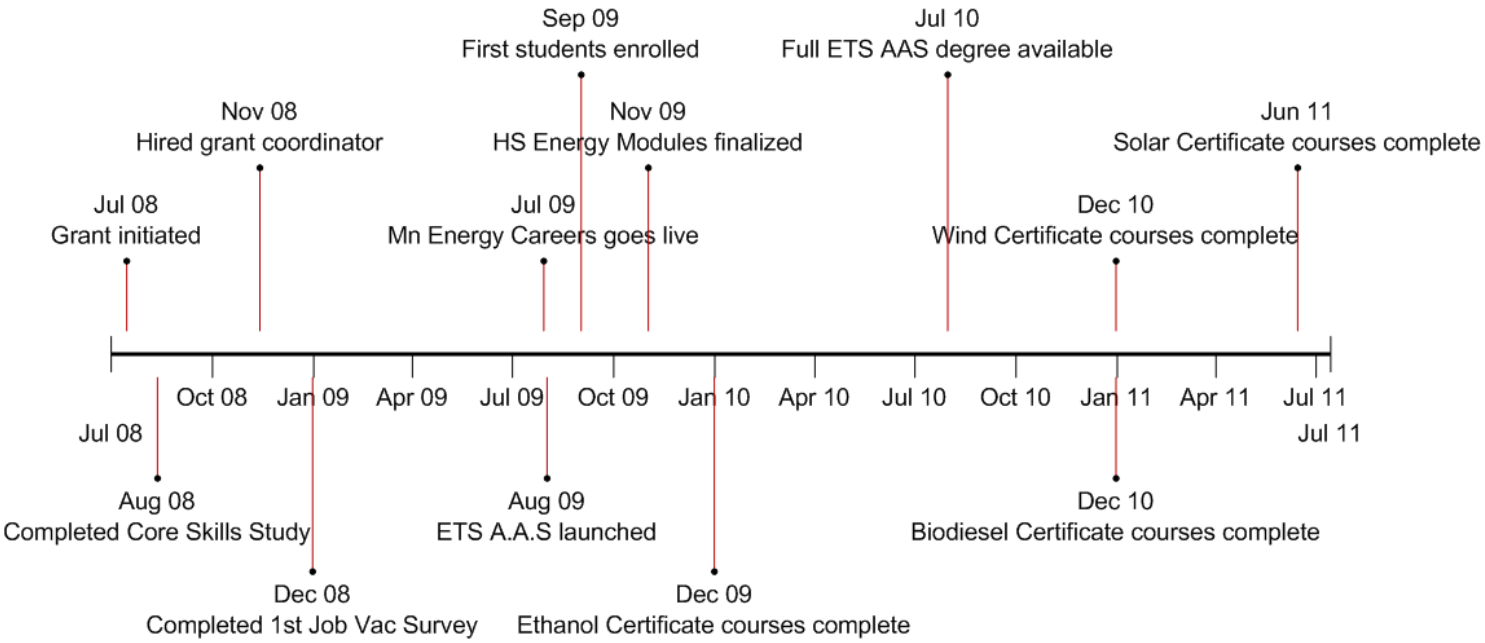
- **Increase academic quality and output** by attracting 143 new entrants to energy careers and having 172 incumbent energy employees earn certificates by the end of the grant, 80 students earn A.A.S degrees (24 by grant end), and more than 30 high schools served.

- **Increase access to career and labor market information** through the Energy Careers website, bi-annual Job Vacancy Surveys, and innovative platforms developed for new products and services.

Project milestones

Figure 2 outlines the primary implementation milestones as reported by the grant.

2. Timeline of grant milestones, July 2008 through July 2011



Source: *Grant quarterly reporting. Compiled by Wilder Research.*

Strategic partnership

...to increase collaboration and capacity

The Implementation Team was the primary method for achieving strategic partnership and collaboration outcomes. Thirteen of the key informant respondents (62%) reported being involved directly in the Implementation Team. However, this does not fully represent those engaged in strategic partnership activities, as much of the strategic partnership was manifest through the direct work on specific grant activities.

This section outlines findings related to strategic partnership through the Implementation Team directly, or engagement through specific grant-related activities.

Convening and engaging partners

Key informant respondents and grant reports show that partners organized around common goals to increase collaboration, which resulted in a more cohesive network of industry-education connections.

Partners organize around a common set of goals and expectations

One of the primary and most apparent outcomes related to grant activities is bringing MnSCU faculty and administration together with industry representatives around common goals and expectations. While the goals outlined in this section are commonly stated goals of the project, responses from industry and educational representatives have some key distinctions.

Develop new or better aligned curriculum or courses

Among key informant's initial expectations and overall goals for the project, those related to curriculum outcomes were most common among educational representatives. These outcomes include developing new programs, courses, or curricula and improving the quality or alignment of existing curricula. Key informant respondents report the development of the two-year Energy Technical Specialist A.A.S. degree and the shorter, more specialized, certificate offerings in specific energy technologies as the primary activities related to achieving these goals.

Meet industry needs or provide skilled employees

Another primary goal is to provide a workforce of skilled employees that meet the needs of businesses in the energy industry. Industry representatives were particularly interested in this goal. As one industry representative explains their initial expectations "were that [local community college] would be able to provide me with good personnel for future hiring."

Industry representatives were also likely to report that providing a skilled workforce was the current primary goal of the grant.

> [The goal of the grant is] to write and develop curriculum, by partnership with the technical colleges, that supports both the colleges' and the industry's needs. So that when students complete the program, we can hire them with advanced standing. Instead of them getting hired at our very entry level union position, they could skip that level and go directly to apprenticeship. Or perhaps, if they also had previous experience, they might qualify to go directly into a journeyman position.

Increase awareness of energy-related careers

Industry representatives responding to the key informant interview report career awareness as another primary goal of the partnership. No academic partners (faculty or administration) identified career awareness as their goals for the project. However, MnSCU representatives did report increasing enrollments in energy-related programs as a primary goal.

Increased collaboration

One of the accomplishments of the grant most commonly reported by the key informants was an increase in collaboration. This increase was mostly described as building connections and communications among MnSCU schools or between the schools and the MnSCU Office of the Chancellor. An industry representative explains the change in how the MnSCU system operates:

> I think MNSCU supporting campuses working together collaboratively is a big piece. That does not always happen. MNSCU is pretty stove piped. There is not a lot of financial incentive for campuses to work together. This was an opportunity for campuses to have some dollars to work together. It was a chance to show the Chancellor's Office that it can be done successfully. It is an opportunity that shows innovation in cooperation.

Key informant respondents also mentioned collaboration between MnSCU (schools and administration) and industry representatives. As an industry representative describes:

> Higher education is working with industry. The campuses that were involved in the grant forged relationships and are working together. Being able to develop a curriculum recognized by MnSCU that was developed by a broad coalition of campuses was a huge accomplishment.

A dean at one of the participating colleges adds that a key accomplishment has been "raising the bar of conversation between industry and higher education around the need for renewable energy education in [Minnesota], and the collaboration of the institutions within [MnSCU] around programming."

Furthermore, a high proportion of key informant respondents who were working on the Implementation Team or other partnering activities reported increased engagement with partners outside the MnSCU system. This includes 100 percent of respondents who agree (57% strongly agree) that the Department of Labor grant helped to increase engagement with industry. Respondent ratings on engagement with K12 education and workforce centers were slightly lower. See Figure 3.

3. Key informant respondent perspectives regarding collaboration outcomes

The Department of Labor grant…	N	Agree or strongly agree	Strongly agree	Don't know
Increased engagement with industry	14	100%	57%	0
Increased engagement with K12 education	13	92%	38%	1
Increased engagement with workforce centers	14	86%	50%	0

Source: *Key informant interviews conducted by Wilder Research*

Notes: *Questions only asked of respondents who had directly worked on the grants management or implementation activities.*

"Don't know" responses are not included in the total N.

A more cohesive network of industry and education representatives

As described above, a primary outcome described by key informant respondents was increased collaboration. One of the results of this increase in collaboration is a more cohesive and stronger network of industry and educational representatives working together in the field. To help understand this more cohesive network, key informants were given a list of names of the others working on grant activities and asked to identify the individuals with whom they had worked (during and before the grant). Using this

matrix of responses, we are able to plot the network of connections developed between the key informants, which are defined as key informants who report having worked with the other key informant.

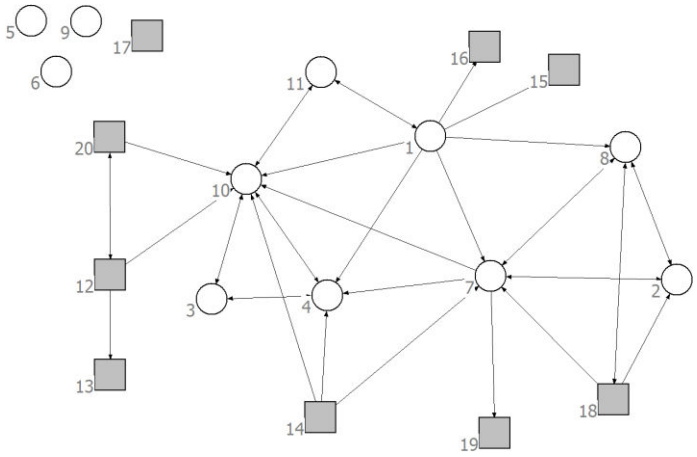
Figure 4 shows the connections between key informants before (left) and during (right) the partnership. The gray squares represent MnSCU faculty and administration and white circles show industry representatives. This visual representation shows a distinct and sharp increase in the number of connections between partners. Before the grant, there were three MnSCU representatives and one industry representative with no connections to any of the other key informants. However, after working on grant activities none of the key informants had fewer than two connections.

An educational representative noted the value in these connections by saying, "we have built relationships, both with partner colleges and industry, so that [the work of the grant] can be sustained."

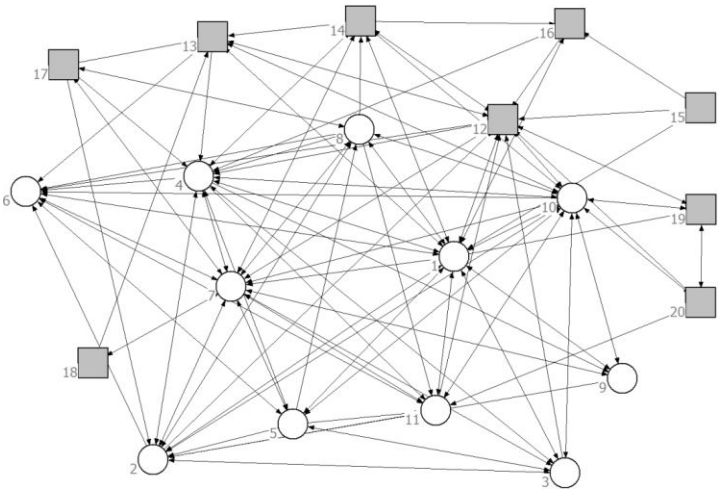
It should be noted that the networks shown do not represent the entire grant-related networks (which would be much larger), but instead provides a core sub-set of individuals engaged in the grant activities.

4. Relationships and connections of interview respondents BEFORE and AFTER the partnership

BEFORE:



AFTER:



Source: *Key informant interviews conducted by Wilder Research*

Implementation Team successes

In order to accomplish the collaboration outcomes described above, the grant showed administrative and managerial efficacy. The two primary administration and management successes reported by Implementation Team key informants were communication and leadership. These are described in further detail below.

Communication efforts and access

Key informants identify the communication efforts and access as a primary success of the grant implementation. These include:

- Periodic meetings and conference calls
- Direct access for industry to communicate with academic partners
- Technology and tools including the email and Webex shared desktop

These specific communications-related successes were integral to the ability of the project to operate and collaborate effectively.

> Communication and the meetings – without how that was all managed, I don't think the grant could have been successful. That was very well done. The use of technology, the organization, and the use of the Webex tool, being on the phone while seeing materials on my computer from somebody else's desktop – so that capacity to meet like that with 10 or 15 people. The face-to-face meetings in the front end worked well to establish relationships, as well as the business industry partnership meetings and the meetings of those involved in the implementation of the grant.

Leadership and coordination

Project coordination and leadership was also described as a primary administrative success. This includes the tactical coordination by the project manager at the MnSCU institution level as well as the strategic leadership and grant oversight at the Office of the Chancellor level. An administrator from one of the schools explains the value of having a coordinator:

> I think we hired an individual who had time to commit to coordinating between the colleges. Without that, we would have been in a real mess. [It is] not just release time from other duties, but being able to really focus on this. We got a lot done because of it.

Another respondent noted that the grant managers at the Office of the Chancellor helped the grant succeed because of their "organization skills, leadership skills, knowing the grant and its particulars, and being detail oriented."

Issues related to time, geography, and logistics

The difficulty to coordinate schedules, give enough time to the grant work, and overcome the geographic dispersion of participants were, by far, the most common challenges reported by key informant respondents. These issues were described in the context of all of the specific grant-related activities as well as the more general activities related to the Implementation Team and strategic partnership.

Respondents also noted that providing enough time (and having patience) for the work was an important lesson learned through the grant activities. This echoes the grant's own reporting. In the first quarterly report, the primary lesson learned cited was that grant startup activities take longer than expected.

Leveraging resources

All (100%) of key informants working in the Implementation Team or implementation activities agree (54% strongly agree) that the grant has acquired or leveraged additional resources that would not have been without the grant. Leveraged resources reported by the grant primarily include the time and expenses that participating organizations and individuals provided to complete ongoing work related to the Implementation Team, curriculum development, and career awareness activities. Other resources leveraged include equipment purchased, scholarships and tuition reimbursement financing, and finances dedicated to the Core Skills Study.

The sources from which resources were leveraged include the MnSCU administrative offices, MnSCU campuses, other government programs (primarily a U.S. Department of Labor WIRED sub grant), and industry representatives or businesses.

Directed time and expenses to partnership work

Overall, the most common resources leveraged through the partnership were the time and expenses contributed by partners to complete work and activities related to the partnership. As part of quarterly reporting to the Department of Labor, the grant reported $756,898 in human resources (salary + fringe) directed to do the work of the grant. Another $5,850 in mileage and other expenses were leveraged for grant-related activities.

These leveraged funds represent a large proportion of the work and effort the partners took to pursue and accomplish the grant goals. To better understand the dynamics of

these leveraged expenses, the activities for which they were used and their sources are described below.

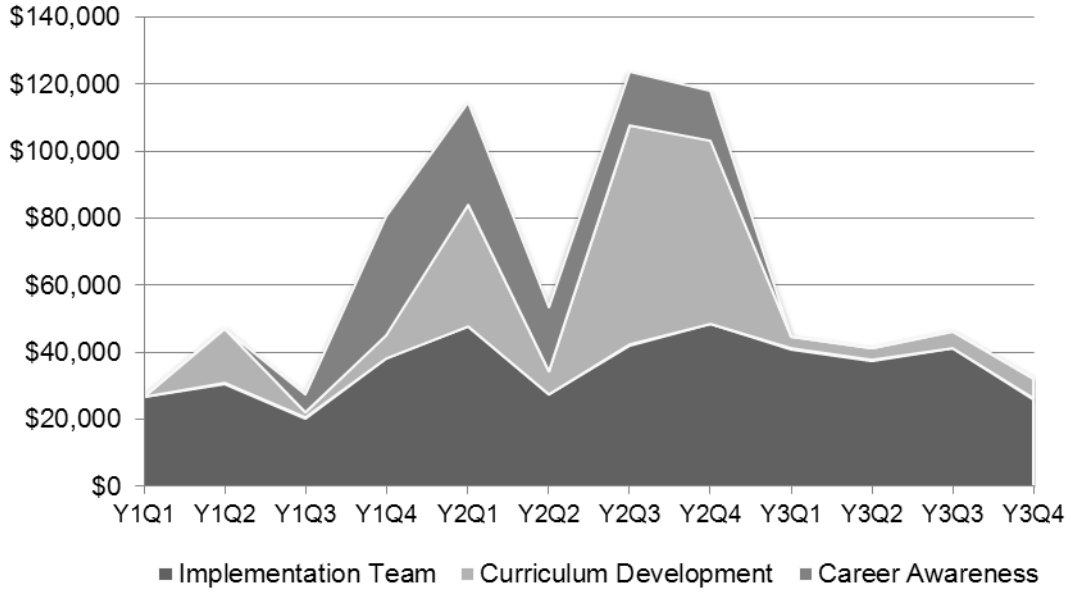
Activities engaged with leveraged time and expenses

Of the $756,898 total, the grant leveraged $428,101 in time and expenses for Implementation Team activities. There was relatively even distribution of these resources over the 12 fiscal quarters reported by the grant (July, 2008 – June, 2011).

Curriculum development activities leveraged a total of $207,248 in time and expenses over the reported grant period. These resources were less evenly distributed with substantial investments in the second quarter of year one ($16,467) and the first, third, and fourth quarters of year two ($36,483, $65,447, and $54,791 respectively).

Most of the time and expenses leveraged for career awareness activities were used from the fourth quarter of year one through the fourth quarter of year two (averaging $23,220 per quarter). These resources were primarily for the development and implementation of the Energy Careers website, Job Vacancy Survey, and other outreach. In total, $121,549 were leveraged in time and expenses to complete the career awareness activities. See Figure 5.

5. Time and expenses used on grant activities, by fiscal quarter of grant period



Source: *Grant quarterly reporting to Department of Labor. Data compiled by Wilder Research.*

Note: *At the time of this report, grant reporting was only available for the first 11 fiscal quarters of the grant.*

Sources of leveraged time and expenses

The $504,711 in time and expenses leveraged through MnSCU schools ($339,733) and the Office of the Chancellor ($164,978) provided the base of resources to complete the grant work. The WIRED sub-grants and Minnesota Department of Employment & Economic Development (DEED) were also sources of leveraged time and expenses.

Purchased equipment

Along with the personnel resources to complete the grant work, $352,989 in equipment resources were also leveraged to strengthen academic programs. This includes:

- **$199,905** leveraged by Saint Cloud Technical College to purchase equipment for their energy program lab.
- **$145,600** leveraged from the State of Minnesota by Minnesota West Community & Technical College and used to build a climbing tower for training students in the Wind certificate program.
- **$7,484** leveraged from Carl D. Perkins funds by Century College for solar equipment.

Provided scholarships and tuition reimbursement

During years two and three of the grant, there was also significant resources leveraged for scholarships and tuition reimbursement.

- **$47,470** in tuition reimbursement for students through Southwest Minnesota First's WIRED sub-grant
- **$2,970** in scholarships from the Office of the Chancellor

Grant reporting shows that funds were provided for 145 other scholarships, totaling $157,452, to students through the grant. This includes:

- Fall 2009: 23 students received **$22,600**
- Spring 2010: 28 students received **$24,270**
- Fall 2010: 53 students received **$62,550**
- Spring 2011: 41 students received **48,032**

As part of grant activities, in addition to providing scholarships and tuition re-imbursement to open-enrollment students, Minnesota West Community and Technical College worked with Heron Lake BioEnergy to provide certificate training to employees. To complete these activities, the grant leveraged a total of $246,349 in the following areas:

- **$146,549** from Heron Lake BioEnergy provided employee wages, facility space, and administrative time enabling employees to take ethanol certificate courses
- **$81,800** to pay for the delivery of certificate courses though Minnesota West's WIRED sub-grant
- **$18,000** from venders providing training to employees of Heron Lake BioEnergy in Ethanol Certificate course

Financed the completion of the Energy Industry Core Skills Study

The grant also leveraged $90,000 for Alexandria Technical College to complete the Energy Industry Core Skills Study. This includes leveraging $70,000 from the MnSCU Office of the Chancellor and $20,000 from the Minnesota Energy Consortium. Completion of the Core Skills Study during the first quarter of grant year one was integral to understanding the industry needs for technicians in the following industries:

- Traditional fuels (coal and natural gas) fired power generation
- Wind power electrical generation
- Solar power
- Ethanol and biodiesel production
- Natural gas distribution

The study helped to identify the common entry-level knowledge and skills requirements for successful employment in the energy industry, and how to structure curricula to provide those skills to students. A key informant respondent describes how this strengthens the Minnesota energy industry:

> [The grant has strengthened the Minnesota energy industry by] really taking a close look at core skills across multiple industries, so that we can have a more diverse employee when they get to the company. [Graduates] will be able to be cross-trained even when they are at their work site. We identified the skills that are required in multiple energy areas and put them together as our core.

Knowledge utilized and shared

Along with leveraging resources, the Department of Labor tasked the grant with leveraging and sharing knowledge. Overall, the key informant respondents agreed that the grant had used and shared knowledge. Sharing curricula or other grant resources with other grant partners received the highest rating from respondents working on implementation of grant activities. See Figure 6.

6. Key informant respondent perspectives regarding used and shared knowledge

The Department of Labor grant has…	N	Agree or strongly agree	Strongly agree	Don't know
Shared curricula or other resources created through the grant with the grant partners	14	93%	71%	0
Identified or used best practices in the field	13	92%	46%	1
Developed curricula or other resources that have been used outside of the partnership	12	83%	33%	2

Notes: *Question asked to respondents involved with grant activities related to management and implementation of grant activities.*

"Don't know" responses are not included in the total N.

A particularly apparent example of the grant's work being leveraged by others is that the Manufacturing Association of Central Minnesota, after seeing the Energy Careers website, provided funding to iSEEK to develop a comparable website for manufacturing.[1] The new site also used the architecture iSEEK created for the Energy Careers website and, in doing so, likely saved cost on development.

Key informant respondents' perspectives regarding the grant's development of "catalytic knowledge" were less sure than for other outcomes (i.e., respondents were more likely to say "don't know"). However, respondents who were able to answer the applicable questions mostly agreed that the grant had been a catalyst for innovation and created models that are being applied in other industries. See Figure 7.

[1] http://www.iseek.org/industry/manufacturing/index.html

7. Key informant respondent perspectives regarding catalytic knowledge

The Department of Labor grant has…	N	Agree or strongly agree	Strongly agree	Don't know
Been a catalyst for developing innovative platforms for new products and services	8	7	1	3
Created models that are being applied to other industries	7	6	2	4

Notes: *Percentages are only shown where there are ten or more respondents.*
Questions were asked of respondents involved in activities related to career awareness.
"Don't know" responses are not included in the total N.

System influence

Key informant respondents reported changes within the MnSCU system because of grant activities as well as some issues related to the overall system that provided barriers to completing the grant work. These are described below.

Changes in how MnSCU supports energy-related programs

Most of the key informant respondents (86%) reported that the grant has helped to change how the MnSCU system supports or encourages productivity in Minnesota's energy industry. The remaining respondents reported they were unaware whether the grant had encouraged these changes. No respondents reported the grant had not helped to change how MnSCU supports energy-related programs.

Descriptions of what those changes look like include:

- Xcel Energy reported their employees can now go to their local technical college to complete the Edison Electrical Institute (EEI) pre-employment tests.
- A connection has been established to industry in the development and creation of courses and programs providing course content to meet industry needs.
- The collaboration across MnSCU institutions provides the platform to offer online and shared energy curricula.

All (100%) of the respondents who said the grant helped change how MnSCU supports energy-related programs also reported that these changes will continue after the grant period ends.

Systemic or structural issues

Along with changes the grant was able to accomplish within the MnSCU system, respondents also noted some challenges related to the partnership's interaction with the overall system. These systemic challenges encountered during the grant were mainly dealing with academic approval and alignment processes directly related to the multi-campus offering of programs developed through the grant. As one key informant respondent notes:

> [MnSCU] colleges are independent, so the challenges of enrollment across colleges has been a big barrier; they are getting through it, but it is taking a lot more staff time and student advising than was anticipated, which has been a burden to the colleges.

Other respondents reported that these issues required additional communication to faculty and campuses, as well as advising to students, to provide clarity and direction to the details and processes of multi-campus offerings.

> [The barrier to progress in the grant] is more the infrastructure in our system. Helping both students and colleges to understand that when they are taking the courses from another campus, that campus will be paid. So the processes and confusion over [multi-campus offerings] within the system [impedes progress].

Key informant respondents credit the grant for providing necessary resources to allow the communication and development work to overcome many of these structure and systemic issues.

Program and pipeline development

...to increase academic quality and output

The three specific activities related to the development of programs and the pipeline of students included curriculum development activities, capacity building, and student recruitment. These activities and their outcomes are described below.

Curriculum development

Fourteen of the key informant respondents worked on activities related to curriculum development. This includes:

- Nine who worked on development of curriculum for the Energy Technical Specialist A.A.S.,
- Eight who worked on development or enhancement of certificates, and
- Four who worked on development or implementation of the hands-on energy lessons targeted at high school students.

These respondents described the development of new courses and curriculum as an accomplishment in itself as well as describing the improvement in the quality of curriculum (either improved academics or better alignment of courses) as an accomplishment.

Expanding degree programs

After completing the Energy Industry Core Skill Study (described on page 22), the Energy Technical Specialist A.A.S., certificates, and high school energy modules were developed or enhanced.

Energy Technical Specialist Associate of Applied Science (A.A.S.) degree

The primary programmatic expansion developed through the grant was the Energy Technical Specialist A.A.S. degree. This shared degree has been approved and launched at all 10 participating schools. After completing the Core Skills study discussed earlier, the grant did the following.

- The Implementation Team developed a consortium agreement to outline governance, policies, and procedures under which the program is offered

- A Faculty Curriculum Council was established to develop and finalize a common list of courses and course outcomes

- The Implementation Team convened a meeting with the Industry Advisory Board to approve the list of courses and course outcomes

To complete an Energy Technical Specialist A.A.S., students are required to take 15 general education credits, 35 credits from the "Core Curriculum" (common to seven targeted energy segments), and 10 electives either focused on specific energy segments or distributed across different energy segments. As a faculty member describes, the new degree program "fills a void of something MnSCU did not have. And it encompasses a lot of energy sectors under one degree." An industry representative notes the particular value to their company.

> It provided our utility company the confidence in the education level and expectations of students being qualified to work at a utility like ours, to work at any electric utility.

Certificates

The grant has also worked to develop six renewable energy-related certificates. Minnesota West Community & Technical College served as the project lead in developing the Wind Turbine Maintenance, Ethanol Production, and Biodiesel Production certificates. Century College took the lead on development of three solar certificates; Solar Assessor, Advanced Photovoltaic Energy Systems Certificate, and Advanced Thermal Energy Systems Certificate.

Wind Turbine Maintenance. This certificate includes 16 credits of online coursework at Minnesota West Community & Technical College along with an in-person climbing and safety course at Minnesota West. A climbing tower, built with donations and grant-leveraged resources, was completed on the Canby campus of Minnesota West in February 2010. The tower allows online Wind Certificate students to travel to the Canby campus to complete their one-week OSHA-certified climbing lab without having to shut down a working wind turbine. Incumbent workers have also been able to utilize the tower for training.

Ethanol Production & Biodiesel Production. Offered online by Minnesota West Community & Technical College, these two certificates are very similar. As part of their development, both increased the number of credits required for completion from 11 to 16. The biodiesel and ethanol certificates utilize a similar framework for classes, with the only difference being two courses.

Solar Installation. These were brand new certificates, and going through the MnSCU approval process was required to complete them. The degree program was initially proposed as a Solar Panel Installation certificate but was changed due to issues involved regulations requiring certified electricians to be involved in solar installation projects. However, the 16-credit Solar Assessor certificate was denied approval by Department of Labor Federal Project Office (FPO) and the certificate development returned to (more extensive) Solar Installation certificates. The certificates were increased to 30 credits when faculty recognized the content could not be covered in 16 credits. The Advanced Solar Thermal Energy Certificate is designed to provide existing contractors with the skills necessary to install and maintain solar thermal systems. The Advanced Photovoltaic Energy Systems Certificate is designed to provide entrance into the field of photovoltaic energy systems and to provide the skills necessary to work in photovoltaic installation and maintenance. Hands-on labs and internships are a key component of these degrees.

High school energy modules

Two faculty members from Itasca Community College worked to develop and pilot two interactive high school energy modules. Targeting high school science and technology teachers and students, teachers use curriculum guides and materials kits to demonstrate wind and biofuels concepts through hands-on activities. After the curriculum was finalized in November 2009, high school teachers were trained to deliver the modules and high schools started using the modules.

Grant reporting indicates that over 78 instructors at 45 schools were trained to deliver the modules, and over 4,000 students have received the curriculum to date. This meets the grant goal of serving at least 30 high schools. A complete listing of schools trained is in the appendix.

Evaluation forms completed by teachers during three separate trainings on the energy modules show very high satisfaction with the training. See Figure 8.

Additionally, when the teachers were asked to describe the most useful and least useful parts of the program for them and their classrooms, they were much more likely to describe ways in which the program was useful. Two of these session evaluations also asked if the teachers would use the modules in their classrooms and there was an overwhelming consensus (25 out of 26 responses) that they would.

8. High school Renewable Energy Modules, teacher training feedback

	N	Agree or strongly agree	Strongly agree
The instructors were knowledgeable about the subject.	46	100%	72%
The balance between discussion, demonstration, and participation was good.	46	100%	72%
The concerns and questions of the group were addressed in a timely manner.	44	100%	68%
The objectives of the training were made clear.	46	100%	63%
The instructors presented materials in an organized manner.	46	100%	59%
Use of technology was appropriate and helpful.	46	100%	59%
The objectives of each module were clear and met.	46	97%	54%

Source: *High school modules teacher training evaluation forms. Data compiled by Wilder Research.*

Enhancing quality of degree programs

All (100%) of the key informant respondents who were directly involved in the grant's curriculum development activities reported that those activities increased the quality of energy-related curricula at MnSCU institutions. Furthermore, 85 percent of students who participated in the survey agreed that their coursework taught them the skills they need to succeed in an energy career and 82 percent agreed that their knowledge about careers in energy industries increased. See Figure 9.

9. Student perspectives on energy-related programs

	N	Agree or strongly agree	Strongly agree
My coursework taught me the skills I need to succeed in an energy career.	27	85%	27%
I increased my knowledge about careers in energy industries.	28	82%	46%
I would recommend this coursework to others who are interested in an energy-related career.	28	68%	36%
The instruction and teaching were high quality.	28	68%	25%
Overall, I am satisfied with the coursework.	27	63%	19%
I would take this coursework again.	26	58%	31%

Source: *Survey of students in grant-impacted programs. Wilder Research, June, 2011.*

Meeting industry needs

Key informant respondents reported positive feedback from industry representatives regarding the skills that the grant-developed curricula provide. As noted by an industry representative, the grant helped to create curriculum that "is now truly in alignment with industry demand, truly creating curriculum that meets industry needs."

One important example of the way in which curriculum development is meeting the needs of industry is through the Edison Electric Institute (EEI) testing. As noted previously, Saint Cloud Technical and Community College now offers the exam. Grant reporting shows that as of December 2010, 11 of the 14 Energy Technical Specialist (ETS) students taking the EEI passed. This compares, as reported by the grant, to an average 60 percent pass rate for non-ETS students.

While this represents a small number of students, the combination of having the test available through the school and the initial high pass rate posted by students provides a positive outlook for continued success of the program and its graduates. As this industry key informant notes, the graduates coming out of grant-impacted programs are also coming into the industry at an opportune time.

> The utility industry as a whole is facing a lot of retirements and a shortage of skilled replacements. I think this project will grow a lot of good candidates, not only for green energy but for the industry as a whole.

Furthermore, when key informants who identified "meeting industry needs" as a primary goal of the grant were asked if the grant was achieving the goals they described, all but one of the respondents mentioned they were "mostly" (the highest rating offered) achieving their goals (the other respondent said "somewhat").

Grant support helped achieve curriculum outcomes

Not only do the key informant respondents report that the partnership has achieved important goals related to curriculum development, but they also, for the most part, feel that those goals would not have been achieved without the grant. Respondents particularly pointed to the resources and coordination provided by the grant as the key aspects of change. As one college dean describes, "we just do not work together like that in the [MnSCU system]. And we did not have processes like that set up [before the grant] so [we could work together]." Another educational representative elaborates on the system issues that may have impeded the curriculum development work if not for the grant:

> The ability for this to have been successful required a number of institutions to work together in a cooperative manner. I do not think there would have been the opportunity for the colleges to have come together without [the grant] support. There would have been attempts to produce this, but with much more negative competitive results [due to] the barrier of the state's guideline against unnecessary duplication of efforts. The grant allowed for duplication through a cooperative effort, which is very unique for our system for so many partners.

Capacity building and recruitment

Thirteen key informants reported working on capacity building or recruitment activities including:

- 10 who worked on professional development of high school or college faculty and
- 10 who worked on recruiting students through scholarships, advising, or outreach.

All of these respondents agreed (54% strongly agreed) that the grant increased faculty knowledge of the energy industry.

Improving access to programs

As shown in Figure 10, there was a very high level of agreement among key informant respondents that the grant increased access to A.A.S. degrees and helped incumbent energy employees to access programs to earn credentials.

10. Respondent perspectives student access to programs

The Department of Labor grant…	N	Agree or strongly agree	Strongly agree	Don't know
Increased access to A.A.S. degrees in energy-related fields	13	100%	54%	0
Increased access for incumbent energy employees to earn credentials	12	100%	42%	1

Note: *Questions asked to respondents working on activities related to faculty development student recruitment.*

Increased access was mostly described as the development of online registration and delivery of courses that provide multiple program tracks, through multiple colleges, to students regardless of their location. A key informant describes this increased access as "the online degrees allowing students to take the courses on one campus without having to apply to that campus." Stackable credentials, transferable credits, and articulation agreements were also cited as examples of improved access.

Ninety percent of respondents in the student survey reported they had taken an online course as part of their program, including almost one-half (44%) who reported taking an online course from a different college than the one granting their degree. Overall, students have somewhat positive perceptions of their experiences with their online coursework. See Figure 11.

It should be noted that, because of the low response rate of the student survey, these responses may not be representative of most students' online course activities and perceptions.

11. Student perceptions of online courses

	N	Agree or strongly agree	Strongly agree	Don't know
The online course were easy to access and maneuver.	25	84%	24%	1
Overall, the quality of the online courses was satisfactory.	23	70%	13%	3
Learning was easy through the online courses.	25	68%	16%	1

Note: *"Don't know" responses are not included in the overall N.*

The grant also sponsored a faculty and staff professional development conference in May 2010 with the goal of increasing student enrollments in the Energy Technical Specialist A.A.S. shared degree program. A primary objective of the conference was to improve student access through increased understanding of how to enroll students in a shared-degree program delivered by multiple colleges. Forty-four faculty, staff, and deans participated in the conference. Additional faculty and staff professional development took place in October 2010 with the goal of highlighting the certificates.

Increasing enrollments

All (100%) of the key informants involved in student recruitment activities reported the agreed (62% strongly agreed) that the grant increased the numbers of students pursuing energy careers and earning credentials.

As part of the grant reporting activities to the Department of Labor, the project manager worked to track students and graduates. Students had to meet all three of the following criteria to be included in the enumeration and tracking.

- Pursuing a grant-related degree or certificate or have the intent to pursue a grant-related degree or certificate
- Take a grant-impacted course or received grant-related service after January 1, 2009

- Consent to the release their private individually identifiable information

Overall, the grant counted 298 students, of which 76 had received degrees by the Spring 2011 semester.

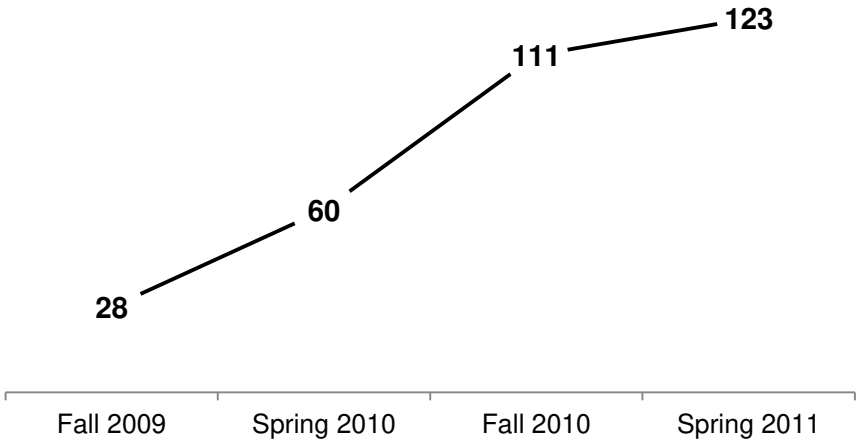
12. Number of students enrolled in grant-impacted courses, Spring 2009 through Spring 2011

	Enrolled	Graduated	TOTAL
Energy Technical Specialist A.A.S	103	11	114
Ethanol Certificate	8	15	23
Solar Certificate	7	2	9
Wind Certificate	104	48	153
TOTAL (ALL COLLEGES)	**222**	**76**	**298**

Source: *Grant reporting compiled by Wilder Research.*

Grant tracking shows steady growth in enrollments since the 2009 fall semester. See Figure 13.

13. Number of students, courses taken, and credits earned in grant-impacted courses



Source: *Grant reporting data compiled by Wilder Research.*

Additionally, the grant identified 55 students that may have been enrolled, but they were unable to obtain consent to collect and use the students' data. Eight of these graduated from grant programs. Grant administrators report that issues encountered with obtaining student consent provided a good lesson learned from. Even though the grant established a cohort code to help identify students enrolled in the Energy Technical Specialist or certificate programs, there was still a challenge to implement the informed consent process consistently

across the schools without additional assistance from staff not participating in the Implementation Team. This led to some delays and reduced numbers of consents. It was also noted that gaining consent of students enrolled online was more of challenge than the in-person classes.

Of these, the MnSCU ISRS database was able to track 210 students who have completed one or more of the grant-impacted courses (those which the grant had developed or enhanced). Students enrolled in grant-impacted courses ranged from age 18 to 60 and were mostly male (93%) and white (88%). Almost one-third (30%) of students enrolled in these courses were First Generation College Students.[2]

To better understand the motivations of students entering these energy-related programs, student survey respondents were asked to give their reasons for entering their program. Students most commonly mentioned opportunities related to jobs or careers (current and future potential). Students also described personal reasons for entering their program, including content that aligns with their own interests, talents and skills or social or environmental concerns related to energy production.

See Figure 14.

14. How important were the following in your decision to enroll in training for an energy-related career?

	N=	Very important	Important	Somewhat important	Not Important
The job market and availability of jobs in energy industries	29	62%	24%	7%	7%
The work or occupation interests you.	29	55%	41%	3%	0%
You wanted to contribute to the energy needs in your nation and community	28	50%	29%	11%	11%
The pay or benefits available in this field.	29	41%	38%	18%	3%
Your skills or talents are closely aligned with job requirements.	29	45%	52%	3%	0%

Source: *Survey of students in grant-impacted programs. Wilder Research, June 2011.*

Overall, grant reporting shows significant outreach and career awareness activities, which are described in the next section.

[2] First Generation College Student, Minnesota: A student who has neither parent who received any postsecondary education (Chapter 133, Article 1, Section 3, Subdivision 3).

Career awareness and marketing

...to increase access to career and labor market information

Eleven of the key informants (52%) reported working on career awareness activities. This includes being directly involved in at least one of the following activities:

- Development or maintenance of the Energy Careers website
- Development or implementation of the Renewable Energy Job Vacancy Survey
- Providing training and advising to students in grant-funded courses or programs

Providing a web-portal for job seekers

All (100%) of the key informant respondents engaged in career awareness activities agree (73% strongly agree) that the grant increased access to career information. The Energy Careers website supported by the grant and developed by iSEEK fills a gap in providing job seekers connections to find positions and opportunities in the industry. As a key informant respondent describes:

> [Energy Careers] is the only comprehensive energy-specific website connect to a general career exploration website. People explore the website in both directions. Some starting more general and winding up on the energy website and some starting with energy and winding up more general.

Further showing the importance of the website, analytics gathered through iSEEK show that the Energy Careers website has averaged 9,760 page views from 1,840 unique visitors per month over the 17 months leading to June 2011. This speaks to the integrated outreach done by the grant partners after the website went live.

> After the launch of the [Energy Careers Web]site, we did have a lot of outreach responsibilities to get the word out about the site to students and job seekers, and we were successful at that, as well. We created marketing materials – brochure, fact sheet – and we brought those to marketing opportunities, such as job fairs and the like, including the State Fair.

Key informants also describe why the outcomes related to the Energy Careers website would not have been possible without the partnership. As a key informant respondent reports, "We would not have been able to spend the time or the resources working on the

[Energy Careers] website if it were not for the funding [from the grant]." Along with providing the necessary resources to prompt the development of the site, the grant also was integral in bringing the appropriate knowledge resources together to create success. As one iSEEK representative reported:

> From our perspective, the thing we needed help with, and got help with, was advisory assistance. We were not the experts on energy, so getting the help of expertise in the energy sector, which was done successfully, so a barrier was overcome. [This barrier was overcome by] getting the advisory group of educators and industry representatives together to really help us understand and pull [the website] together.

Mirroring this response, one of the MnSCU key informants reported that "iSEEK is a huge source of data, and as a result, we have a very robust website." These quotes together provide a perspective of the importance the grant's strategic partnership played in the development of key grant activities and outcomes.

Adding to the knowledge base

All (100%) of key informant respondents engaged in career awareness activities agreed (45% strongly agreed) that the grant has increased access to labor market information. The grant's primary mechanism for accomplishing this was through the administration of the Renewable Energy Job Vacancy Survey. Initially completed in October 2009, the Renewable Energy Job Vacancy Report expanded in the fall of 2010 to include all green jobs in Minnesota, and was renamed the Green Jobs Vacancy Survey. The Green Jobs Vacancy Survey was first published in July 2010. The ultimate purpose is to "measure the strength of the current market (job vacancies) for green jobs" Minnesota.[3] The survey is part of Minnesota's larger Job Vacancy Survey, which is mailed to over 12,000 employers every spring and fall quarter. Findings from the Green Jobs Survey include:

- Statewide estimates of green job openings by industry and occupation
- Regional estimates of green job openings
- Data on the nature and types of green job openings in Minnesota
- Information about green occupations that are experiencing labor shortage, skill gaps, or hiring difficulties

[3] http://www.positivelyminnesota.com/Data_Publications/Data/LMI/PDFs/Green_Jobs_2011/Research_Overview.pdf.

Public discourse, opinion, and the economy are barriers to progress

Key informant respondents note that the grant faces many external barriers to their career awareness and marketing efforts. These barriers primarily break down to how the public perceives the energy industry and how the economy affects the industry. These barriers are described in the key informant responses below.

> We have done well with student recruitment. The main barrier has been that there have not been the thousands of jobs we thought would be available. Ethanol, biodiesel, and solar have gone flat. Also, a lot of people at retirement age are not retiring, because their nest eggs disappeared with the economy.
>
> And there have been real shifts in industry in terms of things like biofuel. The ethanol industry was booming. There was enthusiasm for green. But that has all changed, and now the jobs that are out there are in coal-fired plants – and there aren't that many of those jobs. I think that will change over time. The other thing that changed was that investment money just hasn't been available for some large projects in industry that were planned.

Other outreach

Grant reporting shows significant outreach to students, high school teachers and counselors, and industry or other community members. This outreach includes making presentations, attending meetings or job fairs, distributing brochures or literature, and leveraging media exposure. Some examples of the outreach work completed by the grant are described below.

- A presentation on "Career Opportunities in Renewable Energy" to 75 individuals, mostly high school students and their parents. (September 2008)
- Three presentations on energy careers and the details of the grant, made to 1,330 high school students. Separate presentation about renewable energy careers to 28 high school counselors. Four presentations made to 171 adult community members and leaders concentrating on emerging career opportunities in energy. (October – December 2008)
- Presentations to the Wind Energy Forum (160 people) and a town hall meeting (145 people). Presented information about the grant and related training to a meeting of Minnesota's 16 workforce center directors. (January – March 2009)
- Gave a presentation to a group of 96 students at a "Career One" summer program operated by Saint Cloud's workforce center. (April – June 2009)
- Energy Technical Specialist A.A.S. degree featured as a "highlighted program" on the MnSCU new student website. Partnership colleges were allocated $1,000-2,000 each to boost Fall 2010 enrollments in the A.A.S. degree program. (January – March 2010)

Issues to consider

The grant achieved successful implementation and outcomes that position the MnSCU system (and its partners in the energy industry) to play a substantial role in Minnesota's current and future energy economy. To help position the grant's work for continued and increased success, focusing on the process, enrolling students, and adaptability will be critical. The grant also has a unique opportunity to affect the MnSCU system.

Process

The activities of the partnership represent a diverse and well-aligned set of work that provides the information needed (career and labor market information) to increase interest (recruitment and outreach) in an industry that will be better served by students graduating from high quality programs (curriculum development).

While the overall goals of the project are held in common, different roles and backgrounds of different partners provide different motivations for participation. Having this diversity of interest and motivation has allowed the partnership to engage education and industry to work on common goals from different perspectives. Maintaining this diversity of education and industry partnership is critical to responding to the needs of industry and shaping the future of energy-related training and education in Minnesota.

Enrollments

The programs were slightly under their established enrollment goals at the end of the grant period. However, with the number of current enrollments, and the growth seen over the past three years, enrollment and graduation rates are not of great concern. Furthermore, the significant number of K-12 teachers and schools trained to deliver the high school energy modules, for which the grant exceeded its established goals, potentially strengthens the pipeline of students and may increase future enrollments.

The student tracking system developed by the grant will valuable in measuring future performance and accountability. Continued tracking of students and graduates, as well as setting target enrollment goals, will help establish sustainable strategies for training the energy workforce.

System

The grant outcomes pose some key considerations for the MnSCU system. The system's policy regarding duplication of programs was a barrier to the grant's work to increase cross-campus collaboration and curriculum offerings. This policy should be reviewed to ensure that it is achieving its intended outcome of reducing unnecessary redundancy, while not impeding potential academic innovation in the system through increased cooperation. Grant partners should also look to other similar industry-education partnerships in the system (e.g., Centers of Excellence) to share effective methods of collaboration and further the work started through the grant. One potential example is sharing knowledge from the grant's conference on promoting online program registration with similar online delivery efforts in the system (e.g. 360°'s eTECH grant).

Adaptability

The key to ongoing success and value of partnership activities is the ability to sustain the work. This is particularly important in an industry as dynamic as the energy industry looks to be in the near future. Even the most successful intervention, if it becomes static, will not produce the long-term outcomes that the education system and industry want and need. It is important that, as this grant sunsets, the dynamic collaborations and connections that have been built through the grant find a way to continue to evolve, adapt, and further the positive foundation of work already accomplished.

Appendix

MnSCU schools involved in the grant

Schools	Cities
Alexandria Technical & Community College	Alexandria
Century College	White Bear Lake
Hibbing Community College	Hibbing
Itasca Community College	Grand Rapids
Mesabi Range Community & Technical College	Virginia
Minnesota West Community & Technical College	Canby, Granite Falls, Jackson, Pipestone, and Worthington
Rainy River Community College	International Falls
South Central Community College	Faribault and North Mankato
Saint Cloud Technical & Community College	Saint Cloud
Dakota County Technical College	Rosemount

Notes: *Dakota County Technical College joined as a grant partner the fall of 2010, after the grant had started.*

Grant-impacted courses

Grant-impacted courses developed for the Energy Technical Specialist, A.A.S.

■ Industrial Safety	NHED (online)
■ Introduction to Traditional and Renewable Energy	MN West (online)
■ AC/DC Fundamentals I	MN West (online)
■ AC/DC Fundamentals II	MN West (online)
■ Digital Electronics	South Central (online)
■ Mechanical Fundamentals	South Central (online)
■ Mechanical Fundamentals for Process Control	MN West (online)
■ PLC Fundamentals	Alexandria Tech (online)
■ Pneumatics	Alexandria Tech (online)
■ Hydraulics	Mn West (online)
■ Introduction to Process Control and Instrumentation	St. Cloud Tech (online)
■ Print Reading and Design	Century College (online)

Grant impacted courses developed for the Biofuels Certificates (Biodiesel and Ethanol)

■ Mechanical Fundamentals (for Process Control)	MN West (online)
■ P & ID, PFD	MN West (online)
■ Intro to OSHA	MN West (online)
■ Process Dynamics	MN West (online)
■ Ethanol Process Fundamentals	MN West (online)
■ Instrumentation & Control	MN West (online)
■ Ethanol Separation Technology	MN West (online)
■ Industrial Water Treatment	MN West (online)
■ Biodiesel Feedstocks, Technologies, & Reg. Issues	MN West (online)
■ Biodiesel Fundamentals	MN West (online)

Grant impacted courses developed for the Windsmith Certificate (Note: This degree was reorganized after January 1, 2010)

(Through Fall 2009)

- AC Circuits — MN West (online)
- DC Circuits — MN West (online)
- Fluid Power Hydraulic Theory — MN West (online)
- Wind Energy Fundamentals — MN West (online)
- Wind Energy OSHA — MN West (online)
- Digital Electronics — MN West (online)

(Starting January 1, 2010)

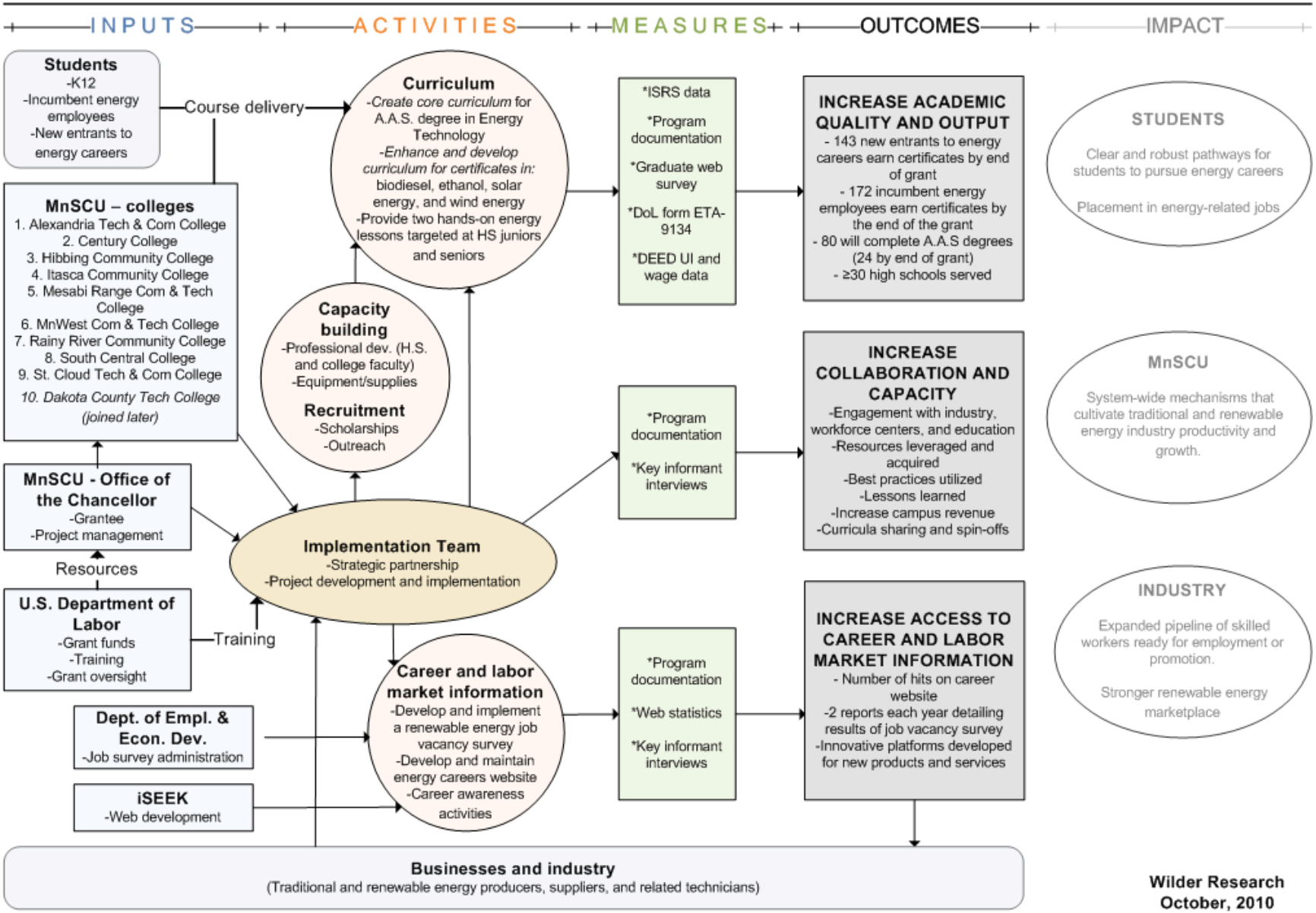
- AC Circuits — MN West (online)
- DC Circuits — MN West (online)
- Basic Hydraulics — MN West (online)
- Wind Energy Fundamentals — MN West (online)
- Intro to OSHA — MN West (online)
- Wind Energy OSHA Standards & Climbing Lab — MN West (on ground)
- Environmental Health and Safety — MN West (online)

Grant impacted courses developed for the Advanced Solar Thermal Energy Systems certificate

- Introduction to Solar Site Assessment — Century (online)
- Construction for Solar Energy — Century (on ground)
- Advanced Solar Thermal Energy Concepts — Century (on ground)
- Solar Thermal Lab — Century (on ground)
- Advanced Photovoltaic Systems — Century (on ground)
- Photovoltaic Systems Lab — Century (on ground)
- Photovoltaic Systems Integration Internship — Century (on ground)
- Solar Thermal Installation Internship — Century (on ground)
- Project Management for Renewable Energy — Century (on ground)
- Residential Energy Auditing and Conservation — Century (on ground)

Logic model – Minnesota Training Partnership for a Sustainable Energy Economy

A collaboration between MnSCU and Minnesota energy industries to promote energy careers, training, and jobs.



Key informant interview protocol

Hello, my name is ____ and I am calling from Wilder Research in Saint Paul. We are working with the MNSCU Office of the Chancellor on an evaluation of the Minnesota Training Partnership for a Sustainable Energy Economy. Otherwise known as the Department of Labor Energy grant. Your name was provided as someone who has worked on grant activities and would have a unique and valuable perspective about the work and impact of the grant. We would like to complete an interview with you, by telephone, about your thoughts and experiences with the DOL energy grant. We estimate this interview will take about 30 minutes but the length depends on what you have to say. We can complete the interview now or schedule a time that is convenient for you to complete the interview.

[IF EXPLANATION OF GRANT IS NEEDED]
In July 2008, Minnesota State Colleges and Universities received a $1 million, 3-year grant from the U.S. Department of Labor to increase its capacity to train workers for the energy industry and to raise career awareness in the industry. This was most often referred to as the DOL Energy Grant project. This project was led by the Minnesota State Colleges and Universities Office of the Chancellor and six college partners (Alexandria Technical College, Minnesota West Community and Technical College, Century College, St. Cloud Technical and Community College, South Central College, and the Northeast Higher Education District).

Background

First I have a few questions about your background and connection to the DOL energy grant.

1. To make sure we have your organizational affiliation correct for our records, what is the/your…

   A. Name of organization: _____

   B. Title: _____

   D. How long have you been in that position? _____ years OR _____ months

   C. How would you describe your responsibilities at your organization? (FOR OWN **OVERALL** JOB):

   _____

   _____

2. In what month and year did you first become involved with the DOL grant? _____year _____month

3a. How did you get involved in the DOL grant?

   _____

   _____

   _____

   _____

3b. When you **first got involved** with the DOL grant, what were your initial expectations for the project?

_____

_____

_____

_____

4. How would you describe your involvement in the grant? (PROBE: What is your overall role or relationship with the project?)

_____

_____

_____

_____

5a. On average, about how many hours per week have you spent on grant-related activities **during the last three months**? _____

5b. Thinking about the entire time you've been involved with the DOL grant, would you say that your time commitment in **the last three months** has been…

Higher than normal, ... 1

About average, or (SKIP TO 6) 2

Lower than normal? 3

Refused (SKIP TO 6)..... 7

Don't know (SKIP TO 6) 8

5c. Please describe how your time commitment has changed during your time working on grant activities.

_____

_____

_____

_____

6. How would you describe the **overall** goals of the DOL grant project? (What is the grant supposed to accomplish?)

_____

_____

_____

_____

7. As of now, would you say that the grant has accomplished these goals? Would you say… (IF NEEDED: The goals you just described)

Mostly, (SKIP TO 9) 1
Somewhat, or (SKIP TO 9) 2
The goals have not been accomplished? 3
Refused (SKIP TO 9)..... 7
Don't know (SKIP TO 9) 8

8a. [IF NO] Can you say a little about why you feel the grant has not accomplished these goals?

_____
_____
_____
_____
_____
_____

8b. Do you think the grant is on the right track to accomplishing these goals? Why?/Why not?)

_____
_____
_____
_____
_____

9. From your vantage point, what would you say are the main overall accomplishments of the grant so far?

_____
_____
_____
_____
_____
_____

10a. From your perspective, has the grant helped to change anything about how the **overall MNSCU system** supports or encourages productivity or growth in Minnesota's energy industry?

Yes 1
No (SKIP TO 11) 2
Refused (SKIP TO 11)..... 7
Don't know (SKIP TO 11) 8

10b. [IF YES] What has changed? (PROBE for new products and also processes / relationships / knowledge.) Will these changes continue after the grant has ended?

_____

_____

_____

_____

10c. Do you think these changes will continue after the grant period has ended?

Yes 1

No 2

Refused 7

Don't know 8

Specific activities related to the project

11. I am going to read a list of specific activities related to some of the partnership's key areas of implementation. For each activity I list, please tell me whether you have been directly involved in the activity, you know about the activity, but are not directly involved, or you were not aware the partnership was involved in the activity.

	Would you say you are…				
How about….	**Directly involved in this activity,**	**Know of it, but not directly involved, or**	**Not aware of this activity?**	**REF**	**DK**
A. Trainings provided by the Department of Labor	1	2	3	7	8
B. Day-to-day project or grant management	1	2	3	7	8
C. Participation in the Implementation Team meetings and assignments	1	2	3	7	8
D. Coordinating class offerings and enrollments, including coordination across multiple institutions participating in the project	1	2	3	7	8
E. Other project management or training activities? **SPECIFY:**	1	2	3	7	8
	IF YES TO ANY A-E=> COMPLETE SECTION A **(PROJECT MANAGEMENT IMPLEMENTATION AND TRAINING)**				
F. Development or implementation of the renewable energy job vacancy survey	1	2	3	7	8
G. Development or maintenance of the energy careers website	1	2	3	7	8
H. Providing training and advising to students in grant-funded courses and programs	1	2	3	7	8
I. Other career awareness activities? **SPECIFY:**	1	2	3	7	8
	IF YES TO ANY F-I => COMPLETE SECTION B **(CAREER AWARENESS)**				

J. Professional development of high school or college faculty	1	2	3	7	8
K. Recruiting students for energy careers through scholarships, advising or outreach	1	2	3	7	8
L. Other capacity building or recruitment activities? **SPECIFY:**	1	2	3	7	8
	IF YES TO ANY J-L => COMPLETE SECTION C **(CAPACITY BUILDING AN RECRUITING**				
M. Development of curriculum for the Energy Technical Specialist A.A.S. degree program	1	2	3	7	8
N. The enhancement or development of certificates in biodiesel, ethanol, solar, and wind energy	1	2	3	7	8
O. Development or implementation of the hands-on energy lessons targeted at high school juniors and seniors	1	2	3	7	8
P. Other curriculum activities? **SPECIFY:**	1	2	3	7	8
	IF YES TO ANY M-P => COMPLETE SECTION D **(CURRICULUM DEVELOP**				

12. Since you started working with the partnership, how has the time you spent on the partnership been divided among the following major activities? [NOTE: ONLY ASK ABOUT THOSE THAT THEY HAVE HAD DIRECT INVOLVEMENT IN AT LEAST ONE SPECIFIC ACTIVITY – IF ONLY INVOLVED IN ONE AREA = 100%]

A-E. Project management, implementation, and training ..... _____%

F-I. Career awareness activities _____%

J-L. Faculty development and student recruitment ..... _____%

M-P. Curriculum development _____%

Z. Other activities (IF OFFERED or A-P don't = 100%) ..... _____%

13. [IF 11Z > 0%] What other activities are you involved with that we have not discussed? [NOTE: IF ANY FIT INTO THE A-P CATEGORIES TRY TO RECODE %s)

_____

_____

SECTION A: PROJECT MANAGEMENT, IMPLEMENTATION AND TRAINING

[COMPLETE THIS SECTION (A1-A3 IF DIRECTLY INVOLVED WITH ANY 11 A-E.]

I would like to ask you a few questions about your involvement with the project's management, implementation, and training.

A1. When you think specifically about the **management and implementation of the grant**, what has worked well or been successful in terms of **how the project operates**?

_____

_____

_____

_____

A2. When you think specifically about the **management and implementation of the grant**, what have been the biggest challenges? (IF NEEDED: What, if anything, has inhibited progress or the basic operation of the project?)

_____

_____

_____

_____

A3. Now I would like to ask for your feedback about a few of the organizational outcomes identified for this grant. Please tell me if you agree or disagree with the following statements about the grant.

	Do you…					
The DOL grant has…	**Strongly agree**	**Agree**	**Disagree**	**Strongly disagree**	**REF**	**DK**
A. Increased engagement with industry (including ene producers, businesses, and industry representatives an associations)	1	2	3	4	7	8
B. Increased engagement with workforce centers	1	2	3	4	7	8
C. Increased engagement with K-12 education	1	2	3	4	7	8
D. Acquired or leveraged new or additional resources would not have been secured otherwise.	1	2	3	4	7	8
E. Identified and utilized best practices in the field.	1	2	3	4	7	8
F. Increased campus revenues.	1	2	3	4	7	8
G. Has shared curricula or other resources created thro the grant among the members of the partnership	1	2	3	4	7	8
H. Developed curricula or other resources through the that have been used by agencies or organizations outsi the partnership.	1	2	3	4	7	8
I. Helped colleges create and deliver joint or shared programs	1	2	3	4	7	8

SECTION B: CAREER AWARENESS

[COMPLETE THIS SECTION (B1a-B4) IF **DIRECTLY INVOLVED** WITH ANY Q11 F-I.]

B1a. Briefly, what do you see as the main outcomes of the DOL grant's **career awareness activities**? (Why?)

_____

_____

_____

_____

B1b. Do you think these outcomes could or would be likely to be achieved without the DOL grant? (PROBES: IF NO: What specific advantage does something like the grant provide to accomplishing these outcomes? IF YES: How would it have been accomplished without the grant?)

_____

_____

_____

_____

B2a. What, if anything, have been the biggest barriers to successful implementation of the **career awareness activities**? (PROBE: What suggestions do you have for reducing these barriers? What is essential to overcoming these barriers?)

_____

_____

_____

_____

B2b. What suggestions do you have for reducing these barriers?

_____

_____

_____

_____

B3. In what ways, if any, have the **career awareness** activities of the DOL grant helped to expand the pipeline of skilled workers ready for employment or promotion? (PROBE for ways activities help workers enter into the workforce or advance within the industry)

_____

_____

_____

_____

B4. Now I would like to ask for your feedback about a few of the specific **career awareness** outcomes identified for this grant. Please tell me if you agree or disagree with the following statements about the grant.

	Do you…					
Career awareness activities have…	**Strongly agree**	**Agree**	**Disagree**	**Strongly disagree**	**REF**	**DK**
A. Increased access to career information	1	2	3	4	7	8
B. Increased access to labor market information	1	2	3	4	7	8
C. Been a catalyst for developing innovative platforms for new products and services	1	2	3	4	7	8
D. Created models that are now being applied to other industry sectors.	1	2	3	4	7	8

SECTION C: FACULTY DEVELOPMENT AND STUDENT RECRUITMENT

[COMPLETE THIS SECTION (C1a-C3) IF **DIRECTLY INVOLVED** WITH ANY Q11 J-L.]

C1a. Briefly, what do you see as the main outcome of the partnership's **faculty development and student recruitment** activities?

_____

_____

_____

_____(IF DK GO TO C2)

C1b. Do you think these outcomes could or would be likely to be achieved without the DOL grant? (PROBES: IF YES: What specific advantage does something like the grant provide to accomplishing these outcomes? IF NO: How would it have been accomplished without the grant?)

_____

_____

_____

_____

C2. What have been the biggest barriers to successful implementation of **faculty development and student recruitment**? (PROBE: What suggestions do you have for reducing these barriers?)

_____

_____

_____

_____

C3. Now I would like to ask for your feedback about a few of the specific **faculty development and student recruitment** outcomes identified for this grant. Please tell me if you agree or disagree with the following statements about the grant.

Faculty development and student recruitment activities have…	Do you… Strongly agree,	Agree,	Disagree, or	Strongly disagree?	REF	DK
A. Increased the numbers of students pursuing energy careers and earning credentials	1	2	3	4	7	8
B. Increased access for incumbent energy employees to earn credentials	1	2	3	4	7	8
C. Increased access to AAS degrees in energy-related fields	1	2	3	4	7	8
D. Increased faculty knowledge of the energy industry	1	2	3	4	7	8

CURRICULUM DEVELOPMENT

[COMPLETE THIS SECTION (D1a-D3e) IF **DIRECTLY INVOLVED** WITH ANY Q11 M-P]

D1a. What do you see as the main outcome of the DOL grant's **curriculum development** activities?

_____

_____

_____

_____(IF DK GO TO D2)

D1b. Do you think these outcomes could or would be likely to be achieved without the DOL grant? (PROBES: IF NO: What specific advantage does something like the grant provide to accomplishing these outcomes? IF YES: How would it have been accomplished without the grant?)

_____

_____

_____

_____

D2. What, if anything, have been the biggest barriers to successful implementation of the **curriculum development** activities? (PROBE: What suggestions do you have for reducing these barriers?)

_____

_____

_____

_____

D3a. Would you say that the DOL grant's **curriculum development** activities have increased the quality of energy-related curricula at MnSCU institutions? Would you say…

Yes, or 1

No? (SKIP TO D3c) 2

Refuse (SKIP TO 14)..... 7

Don't know (SKIP TO 14) 8

D3b. In what ways has the grant's **curriculum development** activities strengthened the quality of the energy-related curricula at MnSCU institutions? (PROBE for improved academic quality of curricula and improved delivery of curricula)

_____

_____

_____

_____(GO TO 14)

D3c. Do you think the grant's **curriculum development activities** have the potential to increase the quality of the energy-related curriculum?

Yes 1

No (SKIP TO D3e) 2

Refuse (SKIP TO 14)..... 7

Don't know (SKIP TO 14) 8

D3d. What are your expectations for this to happen? (PROBE: When would this change occur? What will change? How will the grant activities help to affect the change?)

_____

_____

_____

_____(GO TO 14)

D3e. Why do you say this? (PROBES: What would have to happen that is not currently happening?)

_____

_____

_____

Successes and promising practices

Now I would like to shift back to thinking about the DOL grant project as a whole.

14. Can you please briefly describe the ways in which the DOL grant project has changed **how** individuals or organizations work with each other? (PROBE: Can you identify any **new ways** of doing things or working collaboratively that have resulted from the grant's implementation?)

    _____

    _____

    _____

    _____

15. Please briefly describe what ways, if any, the overall activities of the DOL grant have helped to create a stronger energy industry in Minnesota? (IF NOTHING PROBE: In what ways, if any, do you think the activities of the grant **will potentially** create a stronger energy industry in Minnesota?)

    _____

    _____

    _____

    _____

16. From your vantage point, what one or two lessons have you learned that we can pass along about how to set up and implement a training partnership grant like this? (What do you wish you would have known at the beginning of the project that you know now?)

    _____

    _____

    _____

    _____

17. To better understand the work that has been done through the DoL grant, we would like to know some of the connections or relationships that have been made or utilized through the grant. To help define these relationships, I would like to read of list of people who are associated with DoL grant activities. For each person, I will ask if you have worked with them **closely** through the grant, if you have only done **some** work with them through the grant, or if have **not worked with them at all** through the grant. For those with whom you have worked with through the grant, I would also like to know if you had worked with them before the DoL grant.

	As part of your work with the grant, have you worked with this person…			[IF CLOSE or SOME] **Had you worked with this person before the grant?**			
How about…	**Closely,**	**Some, or**	**Not at all?**	**Yes**	**No**	**REF**	**DK**
Respondents names (removed for confidentiality)	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8
	1	2	3	1	2	7	8

18. Thanks, that's all the questions we have. Do you feel there is anything else that we should know about the Minnesota Training Partnership for a Sustainable energy Economy or your role and relationship to it?

____

____

Student web survey instrument

You have been enrolled in a new and innovative program to train for jobs in energy-related fields. To help better serve students in these and other programs, it is important to understand the perspectives of students' taking these courses. Please take a few minutes to complete this survey about your experience in your energy-related program. Your responses are voluntary and completely confidential, and your participation will help improve these programs. Thank you for your time.

Would you like to proceed? (Yes | No)

1. Please check your certificate or degree program

   ☐ Energy Technical Specialist AAS

   ☐ Biofuels Technology AAS

   ☐ Wind Energy Technology AAS

   ☐ Wind Mechanic Diploma

   ☐ Biofuels Technology: Certificate in Ethanol

   ☐ Biofuels Technology: Certificate in Biodiesel

   ☐ Windsmith Certificate

   ☐ Certificate in Solar Energy

   ☐ None of the above >>> END SURVEY

2. What made you want to pursue this degree or certificate? (OPEN END)

3. How important were the following in your decision to enroll in training for an energy-related career?

	Very important	Important	Somewhat important	Not at all important	REF	DK
The job market or availability of jobs in energy industries.	1	2	3	4	7	8
The pay or benefits available in this field.	1	2	3	4	7	8
The work or occupation interests you.	1	2	3	4	7	8
You wanted to contribute to the energy needs in your nation and community.	1	2	3	4	7	8
Your skills or talents are closely aligned with job requirements.	1	2	3	4	7	8

4. How did you *first* learn about this program?

   ☐ Employer

   ☐ Workforce Center

   ☐ High school teacher or guidance counselor

   ☐ Family member, co-worker or friend

   ☐ College recruiter/admissions representative

   ☐ College advisor/faculty member

   ☐ College or other website (specify:_____)

   ☐ Other (specify:_____)

5. We would like to understand more about your experience with your energy-related coursework. Please rate the following items.

	Strongly Agree	Agree	Disagree	Strongly Disagree	REF	DK
My coursework taught me skills I need to succeed in an energy career	1	2	3	4	7	8
The instruction and teaching were high quality.	1	2	3	4	7	8
I increased my knowledge about careers in energy industries.	1	2	3	4	7	8
I would recommend this coursework to others who are interested in an energy-related career.	1	2	3	4	7	8
I would take this coursework again.	1	2	3	4	7	8
Overall, I am satisfied with the coursework.	1	2	3	4	7	8

6. Did you take any online courses as part of your degree or certificate program?

	Strongly Agree	Agree	Disagree	Strongly Disagree	REF	DK
The online courses were easy to access and maneuver.	1	2	3	4	7	8
Learning was easy through the online courses.	1	2	3	4	7	8
Overall the quality of the online courses was satisfactory.	1	2	3	4	7	8

7. Did you take an online course from a college that was not the same college granting your degree or certificate? (Yes | No)

8. Please rate the following questions based on your experience with the online courses you took at **other institutions**.

	Strongly Agree	Agree	Disagree	Strongly Disagree	REF	DK
It was easy to figure out options for online course[s].	1	2	3	4	7	8
It was easy to pay my bill for the online course[s].	1	2	3	4	7	8
It was easy to check my email for the online course[s].	1	2	3	4	7	8
It was easy to register for the online course[s].	1	2	3	4	7	8

9. What have been 1 or 2 best things about your experience with the energy-related program? (open end)

10. What are the 1 or 2 things you would change about the energy-related program? (open end)

11. Which of the following best describes your employment situation or goal after you complete your energy-related degree or certificate?

☐ I have changed or plan to change positions within the energy-related field (with a current or new employer). (GO TO 12)

☐ I have continued or plan to continue my current job in an energy-related field. (GO TO 13)

☐ I have pursued or plan to pursue a job in an energy-related field for the first time. (GO TO 14)

☐ I have continued or plan to continue my existing job in a non-energy-related field. (GO TO 15)

☐ Other (Describe_____) (GO TO 16)

☐ Don't know (GO TO 16)

12. Are you receiving a promotion or advancement in your job directly because you are completing this program? (Yes | No | DK)

13. Please read the following statements and rate them. [promotion/changing/continuing position]

The energy-related program I am enrolled in…	Strongly Agree	Agree	Disagree	Strongly Disagree	REF	DK
Will help me qualify for a new position in the energy industry	1	2	3	4	7	8
Has specific value in my current job	1	2	3	4	7	8
Was recommended by my employer	1	2	3	4	7	8
Is being paid for (at least partially) by my employer	1	2	3	4	7	8

GO TO 12

14. Please read the following statements and rate them. [pursuing energy job]

The energy-related program I am enrolled in…	Strongly Agree	Agree	Disagree	Strongly Disagree	REF	DK
Gives me an advantage over other job-seekers in the energy-related field.	1	2	3	4	7	8
Provides a good vision of what a career in the energy-related field would be like.	1	2	3	4	7	8
Makes me more excited to pursue an energy-related career.	1	2	3	4	7	8
Has provided valuable networking opportunities with others in the energy-related field.	1	2	3	4	7	8

GO TO 12

15. Please read the following statements and rate them. [continuing non-energy job]

	Strongly Agree	Agree	Disagree	Strongly Disagree	REF	DK
I may pursue an energy-related career at a later time	1	2	3	4	7	8
This coursework applies directly to my current job even though it is not in an energy industry	1	2	3	4	7	8
I have an interest in energy-related technologies.	1	2	3	4	7	8

GO TO 12

16. Have you ever visited the iSEEK website to explore energy-related career opportunities? (www.iseek.org) (Yes | No | Don't know)

17. Please provide any other comments you have about your experiences with MnSCU energy-related coursework or how you expect to use the skills and knowledge you may have gained from it. (Open end)

Thank you!

Other data

A1. Complete DoL partner network

		MnSCU											Industry								
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
MnSCU	**1**		1	1	2	1	1	2	2	1	2	2	1	1	1	2	2			1	
	2	1		1	1	1	1	2	2	1	1	1	1								
	3	1	1		2	1		1			2		1								
	4	1	1	2		1	1	1	1	1	2	1	1		1						
	5	1	1	1	1		1	1	1		1	1									
	6	1				1		1	1		1	1									
	7	1	2	1	2	1	1		2	1	2	1	1		1			1	2	1	
	8	1	2		1		1	2			1	1			1			1	1		
	9	1						1			1										
	10	1	1	2	2	1	1	1	1	1		2	1	1	1					1	1
	11	2	1				1	1			2		1								
Industry	**12**	1			1		1	1			2			2	1					1	2
	13	1			1		1				1		1								
	14	1			2			2			2		1	1			1				
	15	1											1				1				
	16	1			1								1								
	17		1		1			1	1					1							
	18		1					2	1					1							
	19										1		1								1
	20										2	1	2							1	

Source: *Key informant interviews.*

Note: *Cells showing "1" represent connections that existed during the grant. Cells showing "2" represent connections that existed before and during the grant.*

A2. Enrollments and completions by school and degree

	Enrolled	Graduated	TOTAL
Alexandria Technical & Community College	**16**	**0**	**16**
Energy Technical Specialist A.A.S	16	0	16
Century College	**18**	**2**	**20**
Energy Technical Specialist A.A.S	11	0	11
Solar Certificate	7	2	9
Dakota County Technical College	**18**	**0**	**18**
Energy Technical Specialist A.A.S	18	0	18
Minnesota West Community & Technical College	**125**	**65**	**190**
Energy Technical Specialist A.A.S	13	2	15
Ethanol/Biodiesel Certificate	8	15	23
Wind Certificate	104	48	153
Saint Cloud Technical & Community College	**44**	**9**	**53**
Energy Technical Specialist A.A.S	44	9	53
South Central College	**1**	**0**	**1**
Energy Technical Specialist A.A.S	1	0	1
TOTAL (ALL COLLEGES)	**222**	**76**	**298**
Energy Technical Specialist A.A.S	103	11	114
Ethanol Certificate	8	15	23
Solar Certificate	7	2	9
Wind Certificate	104	48	153

Source: *Grant reporting compiled by Wilder Research.*

A3. High schools trained on energy careers modules

	High School	City MN	# Teachers	Students per Teacher
16	Spring Lake Park	Spring Lake Park	1	25-30
22	Detroit Lakes	Detroit Lakes	1	100+
47	Sauk Rapids/Rice	Sauk Rapids	4	25-30
129	Montevideo	Montevideo	2	100/120
206	Jefferson	Alexandria	2	150
207	Brandon	Brandon	1	24
208	Evansville	Evansville	1	72
261	Ashby	Ashby	2	30
264	Herman-Norcross	Herman	1	20
347	Willmar	Willmar	3	150
403	Lincoln	Ivanhoe	1	15
414	Minneota Public	Minneota	1	30
547	Parkers Prairie	Parkers Prairie	3	83
622	N. St. Paul Maplewood	North St. Paul	2	60
726	Becker	Becker	2	25-30
738	Holdingford	Holdingford	1	25-30
740	Melrose	Melrose	2	25-30
742	Apollo	St. Cloud	6	25-30
743	Sauk Centre	Sauk Centre	1	30
745	Albany	Albany	4	25-30
750	ROCORI	Cold Spring	2	25-30
769	Morris Area	Morris	1	26
777	Benson	Benson	2	100
803	Wheaton	Wheaton	2	30
832	Mahtomedi Public	Mahtomedi	1	30+
833	So Washington County	Cottage Grove	1	120+
846	Breckenridge	Breckenridge	1	30
876	Annandale	Annandale	2	25-30
2149	Minnewaska	Glenwood	3	120
2167	Lakeview Public	Cottonwood	1	14
2190	Yellow Medicine East	Granite Falls	2	45/120
2890	Renville Co. West	Renville	1	58
4000	City Academy Inc.	St. Paul	2	100

Source: *Grant reporting compiled by Wilder Research.*