



Skills Standards for Wind Turbine Technicians



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Contents

Acknowledgements	6
Special Thanks	9
Power Generation Skill Standards Project Outcomes	10
The Next Steps	10

11

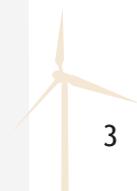
OVERVIEW

Perspectives	12
Labor Perspective	12
Industry Perspective	13

15

NATIONAL CONTEXT

A National Context for Skill Standards	16
What Are Skill Standards?	16
Why Are Skill Standards Important?	16
The Benefits and Uses of Skill Standards	17
Skill Standards to Curriculum: A Continuous Development Process	21
Pyramid of Competencies	24



25

SKILL STANDARDS

Project Goals, Guiding Principals, & Methodology	26
Project Goals	26
Guiding Principles	26
Identification of Skill Standards: Methodology	27
Employability Skills: SCANS Profile	31
Technical Skills, Knowledge, Abilities, and Tools	33

35

RESULTS

Typical Job Description	36
Primary Purpose	36
Responsibilities and Accountabilities	36
General Qualifications	37
Physical Requirements and Working Conditions	37
Critical Work Functions and Key Activities	38
Theories, Concepts, and Equipment	40
Scenario: Routine	44
Scenario: Crisis	48
Scenario: Long Term	52



SCANS Survey Results	56
Verification Survey Results	60
Skill Standards Tables	61

93

INTEGRATION

Assessment and Certification: A Vital Connection	94
Assessment Strategies	96
Assessment Design	98

99

APPENDICES

References	100
Notes	101



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Focus Group Participants

Focus group participants included front-line workers, first line supervisors, and subject matter experts in the wind energy sector within the Pacific Northwest region. They met over a two-day period at Energy Northwest's Nine Mile Canyon Wind Project and determined the critical work functions and key activities performed by wind turbine technicians. They then listed the performance indicators, technical knowledge, skills and abilities, and employability skills required to succeed in this field. Their insights were an invaluable contribution to this work. Participants included *(left to right, above)*:

Kris Finkbeiner, Energy Northwest Nine Canyon

Tim Clever, White Creek Wind

Matt Taylor, Energy Northwest Nine Canyon

Chad Rupert, Puget Sound Energy Wild Horse

Ryan Severe, Puget Sound Energy Hopkins Ridge

Todd Brogna, EnXco





Special Thanks

The Wind Turbine Technician Skill Standards project was launched at Puget Sound Energy's Wild Horse Wind Farm where industry training supervisors, plant managers and labor representatives determined the scope of the project. A two-day focus group meeting hosted by Energy Northwest at its Nine Mile Canyon Wind Farm engaged a team of skilled technicians who worked tirelessly to develop the content for the standards. The resource costs for this project were high, but the results provide a knowledge capture of the work of wind technicians that will serve industry, labor, and educational needs as we collaboratively create a benchmark standard for the power generation workforce. We sincerely thank our industry and labor partners for supporting this work:

Energy Northwest

Puget Sound Energy

White Creek Wind

EnXco

IBEW Local #77

Thanks also to these partners and to PacificCorp and Vestas for completing surveys verifying that the standards reflect the requirements of the wind industry throughout the Pacific Northwest region.



Power Generation Skill Standards Project Outcomes

This Wind Turbine Technician Skill Standards project is part of a broader initiative to establish power generation standards for the energy industry. The following are the overall outcomes targeted by the Power Generation Skill Standards, as determined by the partnership:

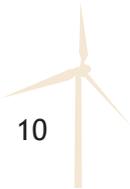
Skill standards needed for power generation careers consistent with the current and future needs of the public and business

Verification of worker input by written survey

A report for power generation employers, labor unions, and educators showing the standards and the data that supported those standards

The Next Steps

The completion of skill standards represents phase one of this endeavor. The next step is to provide oversight to the development and improvement of curriculum based on the skill standards. This is a cooperative and collaborative project with power generation industry, labor unions, high schools, and colleges throughout the state. Additionally, the skill standards will serve as a foundation for Registered Apprenticeship Training, Credit for Prior Learning, and industry human resource job requirements.





Overview



Perspectives

Labor Perspective



Don Guillot, Business Manager
IBEW Local 77 | Seattle, WA

The International Brotherhood of Electrical Workers 77 is proud to endorse the work that has been done to complete a set of skill standards that will lead to better prepared workers for the Wind Industry. The participation of employers and the workers in the development have given a real-time snapshot of the need for better training in this very important energy field.

Our plan for the standards is to develop curriculum and a Washington State Approved Apprenticeship program, using the wind standards as a template. We look forward to building strong partnerships with higher education and achieving an outcome that will benefit our workers and their employers.

In solidarity,

Don Guillot



Industry Perspective



Terry Meade, Plant Manager
Nine Canyon Wind Project
Energy Northwest | Richland, WA

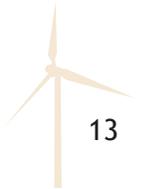
The U.S. wind energy industry growth rate over the last several years is staggering. Over 8,500 megawatts (MW) of new generating capacity was installed in CY 2008 alone, increasing the nation's total wind power generating capacity by 50 percent to over 25,300 MW. The new wind projects completed in 2008 account for about 42 percent of the entire new power-producing capacity added nationally last year.

There is currently nearly 1,500 MWs of wind generating capacity in Washington State and this value increases nearly everyday. Several new projects are in the development stage, and most of the existing projects are expanding.

Approximately 85,000 people are employed in the wind industry today, up from 50,000 one year ago. This growth represents viable employment opportunities for our young citizens. It is in the interests of the local communities and the wind industry to support the development of structured training programs. These programs will prepare our young people to enter this expanding job market and provide the source for this growing workforce.

The nature of the job is challenging and a good training program is needed. Many of the local community colleges are in the process of establishing curriculums to be able to provide the necessary training. These skill sets are an important first step to help the educational sector provide the specific training needed to meet the needs of the industry. Good fundamentals, knowledge, and skills are important to enable these individuals not only to move into this workforce, but to minimize the potential for injury on the job.

Energy Northwest has chosen to be actively involved in the development of the skill sets and is looking forward to contributing further as a partner with the educational sector to help these skill sets be used to develop quality training programs.

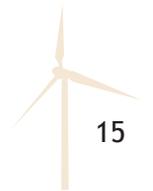




14

A large, stylized blue wind turbine graphic is positioned on the left side of the page, partially overlapping the title text. It features three blades and a vertical tower.

National Context



A National Context for Skill Standards

The National Skill Standards Board (NSSB) was established by Congress in 1994 to encourage the creation and adoption of a national system of voluntary skill standards that would enhance the ability of the U.S. to compete effectively in a global economy. By the time the NSSB sunset in 2003, several national voluntary skill standards projects were developed by various industries in full partnership with education, labor, and community-based organizations. The intent was to have voluntary skill standards that are flexible, portable, and continuously updated and improved.

Skill standards provide measurable benchmarks of skill and performance achievement. They answer two critical questions: What do workers need to know and be able to do to succeed in today's workplace? And, how do we know when workers are performing well? Without this fundamental information, employers do not know whom to hire or where to focus their limited training dollars; employees and new entrants to the workforce do not know what they need to do to improve their performance and educators do not know how to prepare students for the challenge of the workplace.

16

What Are Skill Standards?

Skill standards are performance specifications that identify the knowledge, skills and abilities an individual needs to succeed in the workplace. They are critical to improving workforce skills, raising living standards, and improving the competitiveness of the U.S. economy. To be effective, skill standards must reflect the consensus of industry professionals.

Why Are Skill Standards Important?

In today's workplaces, the only constant is change. Jobs that once were relatively simple now require high performance work processes and enhanced skills. Because skill standards reflect changing workplace realities, they are a tool that can be used by applicants and employees to access greater career opportunities.

National recognition of skill standards in career fields provides a common basis

for certifying achievement against those standards, thereby allowing for the portability of skills across geographic areas, companies, and careers.

Updating skills and knowledge is now a lifelong endeavor, causing many employers and employees to spend more effort, time, and money on education and training. Skill standards provide benchmarks for making education and training decisions, shaping curricula, and directing funds toward highest value education and training investments.

The Benefits and Uses of Skill Standards

Skill standards benefit all the stakeholders—business, labor, educators, government, and the community. The success of a skill standards development project and its usefulness to the community is dependent on the full participation and commitment of all stakeholders. These benefits can be used as a benchmark for evaluating the effectiveness of collaborative efforts.

How Skill Standards Benefit Employers

Employers can use skill standards to establish personnel qualification requirements. Interviews, performance reviews and productivity can be evaluated

and assessed to a higher degree of accuracy and efficacy. Employers are also able to identify core competencies and workers' abilities to demonstrate competencies. By matching competencies to critical work functions and key activities, employers can significantly improve efficiencies and productivity. Performance-based skill standards also provide a vehicle for varying degrees of job certainty and the structure for establishing competency-based pay scales. In addition, employers use skill standards to:

Align personnel qualification requirements with nationally adopted certificates of competence.

Modify employee training.

Simplify measurement of employee training effectiveness.

Assess employee skill levels based on industry standards.

Match employee skills to the work needed.

More easily document employee skills, training needs, and performance criteria.

Improve consumer satisfaction and confidence through better developed evaluation skills for customer contact personnel.

Improve employee satisfaction and morale by clarifying expectations.



Improve quality, productivity, time-to-market and competitiveness.

Achieve business goals.

Partner with education and labor in developing school-to-work initiatives.

How Skill Standards Benefit Educators

Educators can identify core competencies and assessments based on the skill standards and implement them in their curricula. Students can then be required to demonstrate competency throughout their coursework. Academia and industry can build a cohesive relationship through a like-minded expectation of student competencies and work readiness. This enhances an instructor's ability to teach information consistent with industry's entry level expectations and needs. In addition, educators use skill standards to:

Partner with business and labor to develop school to work initiatives.

Provide effective, targeted instruction.

Develop benchmarks for certificates of competence earned by students.

Communicate what companies expect of employees.

Develop new and evaluate existing curriculum and programs based on industry needs.

Develop assessments to evaluate skills, knowledge, and abilities in classrooms and internships.

Develop a common language on workforce preparation with business and labor.

Improve relationships with local businesses, labor unions, other educators, and agencies.

Provide students with relevant career education and counseling.

How Skill Standards Benefit Labor Unions

Labor unions can use skill standards to gain support for company-sponsored worker training programs and to identify career paths for workers within companies and industries. Unions can provide this information to union members and develop strategies to improve career mobility and stability. Skill standards help unions to:

Improve member value to the company.

Provide a greater worker voice in the company.

Link skill standards to increased training and upward career mobility for union members.



Assist employers to match employee skills to the work needed.

Develop skills based training and certification initiatives that complement union apprenticeship programs.

Communicate effectively with employers about worker training and retraining needs.

Cooperate with education and industry in developing school to work initiatives.

How Skill Standards Benefit Students and Workers

Skill standards assist students to make career choices by providing industry expectations for success in the workplace.

In addition, standards-based curriculum and assessments provide students with credentials that certify work-readiness. Work-ready students can anticipate being hired at higher rates of pay and can experience faster advancement in their chosen fields. Workers can accurately assess their skills against those required for career advancement and plan effectively for their career pathways. They can determine the skills and abilities needed for advancement or transfer within industries and determine the continuous learning and training they need to upgrade their skills. In addition, students and workers can use skill standards to:

Achieve clarity regarding what they are expected to learn and how to prepare for work.





Enter and reenter the workforce with better control of their choices of high paying jobs requiring high skills.

Accurately assess business expectations of the skills needed for positions and careers of their choice.

Improve mobility and portability of their credentials.

Obtain certification of competence of the skills they gain through experience, school, training, or self-study.

Enhance their performance and achievement by self-evaluation against known standards.

Be active contributors to the activities that make their organizations successful.

Assist in the development of a highly skilled and competitive workforce.

Evaluate the effectiveness of publicly funded education and training.

Increase opportunities for under-represented populations by making public the information that defines the skills required for success and by facilitating the national adoption of those definitions and their use.

Support the creation of high performance organizations where they improve living standards for all members of the population.

Facilitate collaboration between educators and industry.

Communicate the need and basis for education reform to business, education, labor, and the community-at-large on both local and national levels.

How Skill Standards Benefit Government

Government can provide information that will ensure a better skill match between workers and employers and initiate education reform to better educate future members of the workforce. Skill standards better enable agencies to provide options for career and job mobility and link learning to the needs of the workplace. In addition, government can use skill standards to:

Skill Standards to Curriculum: A Continuous Development Process

The skill standards generated in this project are designed to be used by participating education partners to develop or modify curriculum at the high school and community college level. By providing the necessary input from industry, this skill standards document is a first step in curriculum development to serve the power generation industry and to demonstrate what can be done across industries.

In order to keep current with a rapidly changing workplace, standards need to be reevaluated and updated on a regular basis, with full partner participation at each step. New technological developments impact the ways that workers organize and apply their skills, including time management and interpersonal relationships. Increased technological complexity may simplify some of the job tasks but make others more intricate. Today's successful power generation workers are challenged to acquire a broader range of decision making and customer service skills as well as keep current with emerging technologies. Ongoing changes like these must be reflected in curriculum in order to meet the needs of industry, where expectations for workers are evolving.

A model of continuous improvement for economic development: Using Skill Standards

Step 1: Skill Standards Identification

Compile and research existing standards in related jobs and careers.

Conduct focus groups to identify critical work functions and key activities. Define key activity performance indicators and identify technical knowledge, foundation skills, and personal qualities.

Conduct a survey of current workers to determine level of SCANS skills required for each job.

Develop work-related scenarios to place the skill standards in the context of the work environment.

Verify the data gathered from focus groups.

Disseminate skill standards information to involved parties from industry, education, and labor for their review and editing.





Step 2: Assessment

Develop assessments through the collaboration of industry and education to reflect competent performance as defined by the skill standards.

Collect evidence of a person's ability to perform at the levels determined by the skill standards.

Determine present skill level through direct and indirect evidence by assessing a student, trainee, apprentice, prospective worker, or worker seeking additional training.

Use products and items produced by the person being assessed as direct evidence.

Gather supporting information to use as indirect evidence.

Assess results using the criteria of validity, currency, authenticity, and sufficiency.

Demonstrate validity using tangible items or records of action.

Demonstrate authenticity by having the individual being assessed produce the item or specific piece of a team-effort.

Demonstrate sufficiency by providing enough evidence to match key tasks and performance criteria of the skill standards.

Step 3: Curriculum Development

Identify necessary competencies based on the skill standards information and assessments.



Develop program outcomes for specific academic and training programs, including Tech Prep, two-year, and apprenticeship programs.

Perform gap analysis to determine changes or additions to be made to curriculum.

Revise existing curriculum to better meet the current and future needs of the industry.

Develop new curriculum and establish new programs based on these competencies.

Step 4: Articulation

Develop models to support the articulation of program outcomes and competencies between academic and training systems.

Establish articulation agreements between existing programs to ensure portability of skills.

Connect competencies and Certificates of Competence with benchmark documentation to build national portability systems.

A Continuous Updating Process

A continuous exercise is necessary: all partners must revise and verify skill standards on a regular basis. For national economic development success, curriculum and current training methods must be updated to meet workplace standards.

Individual workers must have access to clearly stated competency goals and direct access to skill development assistance. With cooperative effort on local and national levels, we can begin to resolve the workforce shortages in the power generation industry that face us today.



Pyramid of Competencies

The Pyramid of competencies is a depiction of skill standards in three broad skill categories.

Tier I

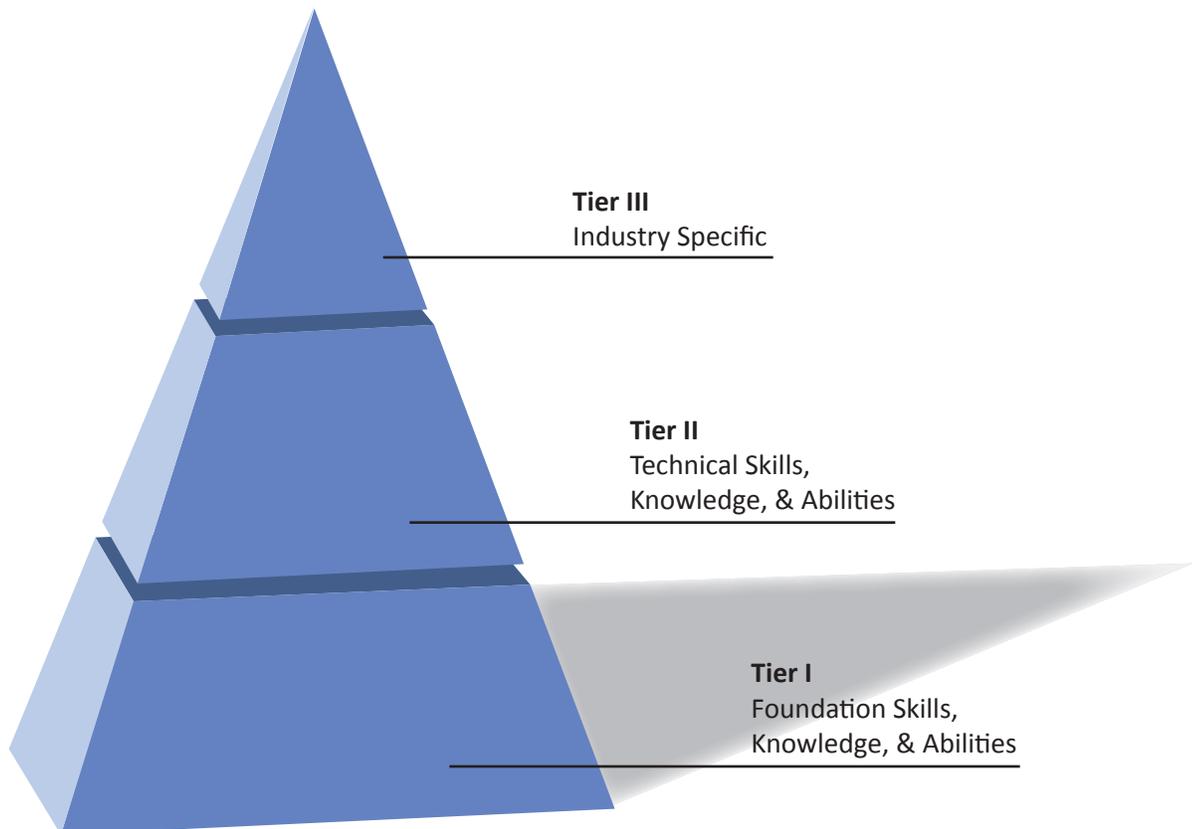
Tier I represents the broadest level of competencies, and is the set of employability (SCANS) skills, knowledge, abilities, and personal qualities required of all workers to be successful in today's workplace. These are the universal skills that are needed to apply technical knowledge and tools effectively.

Tier II

Tier II represents technical skills, knowledge, and abilities common to a cluster of jobs within a cluster across all an industries or industry sectors. For workers in power generation, for example, knowledge of applicable federal, state, and local laws would be applicable across all sectors.

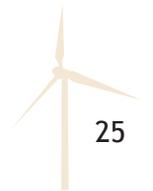
Tier III

Tier III represents industry-specific technical skills, knowledge, and abilities that are unique to individual jobs or clusters and are the most prone to rapid change. For example, many workers need to upgrade their skills based on sudden market shifts.





Skill Standards



Project Goals, Guiding Principles, & Methodology

Project Goals

Identify voluntary skill standards for the power generation industry. The standards will serve as benchmarks for entry into power generation careers at the technical level.

Disseminate the results and support the use of skill standards by educators, businesses, unions, students, workers, and government agencies.

The standards must be consistent with existing civil rights laws and practices.

Standards must be flexible, portable, and should be updated continuously.

Skill standards describe the major functions and key activities, as well as the performance indicators, technical knowledge and skills, employability skills, and personal attributes needed to succeed in the workplace.

Guiding Principles

Experienced workers are the experts in their career fields and are best able to identify the work performed and the skills, knowledge, and abilities required to be successful.

Business, labor, and education must work as partners to ensure the creation of a link between work expectations and curriculum.

Integrated skill standards define work duties and the skills required to perform them in the context of work settings.

The experience of the partners involved in this project holds that the success of any skill standards project is critically linked to the full participation and commitment of all partners.

Identification of Skill Standards: Methodology

Background

These industry-defined skill standards were developed using specific research-based processes. The project followed the process required by the Washington State Board for Community and Technical Colleges (SBCTC) as described in Skill Standards Guidebook I, Washington State Board for Community and Technical Colleges, 1996 and the process developed by the National Skill Standards Board (NSSB).

The Washington State Center of Excellence for Energy Technology was formed in 2004 in response to the desire of industry to address the ever-widening shortfall of skilled workers in the power generation industry. The Center represents the education and training needs of the Energy industry through its partnership with employers, labor, and educators. The Center coordinated stakeholder support and funding for energy skill standards projects.

Dr. Alan Hardcastle of the WSU Extension Energy Program and Terryll Bailey of The Allison Group conducted extensive secondary research to identify trends, current jobs, and existing skill standards in

the wind energy sector including data from the SBCTC Skill Standards Web site, the NSSB, and existing competencies identified during the research. Researchers met with industry representatives to determine the goals and research design of the skill standards project, to obtain their input on the research to date and to finalize the study design.

A facilitated meeting was conducted with Senior Experts from industry to review the preliminary research and advise the research process. These employers and labor leaders established the project direction and time line, and identified an initial list of critical work functions and key activities. This initial list was subsequently reviewed during a two-day focus group of subject matter experts, primarily current workers who perform those jobs.

Focus Groups

In the focus group, a structured process was used to guide the panel through the development of the critical work functions and key activities. The process included the following elements:

Panelists were facilitated by a professional skill standards focus group leader.

Panelists received an orientation to skill standards. Examples were provided.





Panelists from several different companies and sites arrived at consensus regarding the components of the skill standards.

Panelists clarified the organization and structure of the critical work functions and key activities, filled in gaps, and confirmed the accuracy of the critical work functions and key activities.

Panelists identified Performance Indicators for each key activity.

Panelists identified occupational technical knowledge and skills for each key activity.

Panelists brainstormed the topics that need to be covered in training and education programs to prepare people to enter the work.

Panelists completed surveys to level SCANS.

After a thorough orientation to skill standards, panelists were asked to brainstorm critical work functions for their cluster. After composing their own critical work functions, they were then provided with the draft critical work functions identified by the Senior Experts and through research. Panelists were asked to compare the critical work functions from the Senior Experts with those they brainstormed as a group and to consider the following criteria:

Is the function a broad responsibility?

Does it take a significant amount of time to achieve?

Are there groupings of key activities associated with it?

Participants were asked to review the key activities for each critical work function and to posit appropriate changes wherever necessary. The criteria used for this purpose were:

Does the activity describe what you have to do to achieve this function?

Is it a major area of task responsibility?

Is it concrete and specific?

Does it have relatively equal importance to the other Key Activities?

Does each Key Activity require distinct, definable skills?

Once the critical work functions and Key Activities were finalized, performance indicators were developed for each key activity. Panelists were asked how they know when a task is performed well and what elements need to be in place so they would be ensured that this key activity is performed competently. The following criteria were provided regarding performance indicators.

Performance Indicators should:

Describe competent performances.

Be directly observable, concrete, and measurable.

Capture the essential aspects of performance.

Be as precise and explicit as possible but still apply across the industry cluster.

Reflect what the individual can control.

Panelists brainstormed performance indicators and then arrived at consensus with respect to the final list. The group was assisted in putting the content into appropriate language format.

Panelists next moved to identify the occupational technical knowledge and skills for each key activity. They brainstormed occupational technical knowledge and skills, and then arrived at the final list through consensus. Panelists were asked what a person needs to know and be able to do to accomplish the key activities at the level defined by the performance indicators.

In each focus group an informal discussion was held to identify the subjects and topics most important for new entrants to the industry.



Surveys

A workplace competencies survey was conducted to level SCANS skills and personal qualities for the cluster. SCANS (Secretary's Commission on Achieving Necessary skills) are foundation abilities required of workers in all occupations at varying levels specific to their jobs, ranging from basic academic skills to problem solving, working in teams, and the use of technology. Surveys were distributed to panelists in the focus groups and to workers across the State of Washington. Complete survey data from 25 Wind Turbine Technicians was collected and analyzed. The SCANS survey results are presented in a separate section of this document.

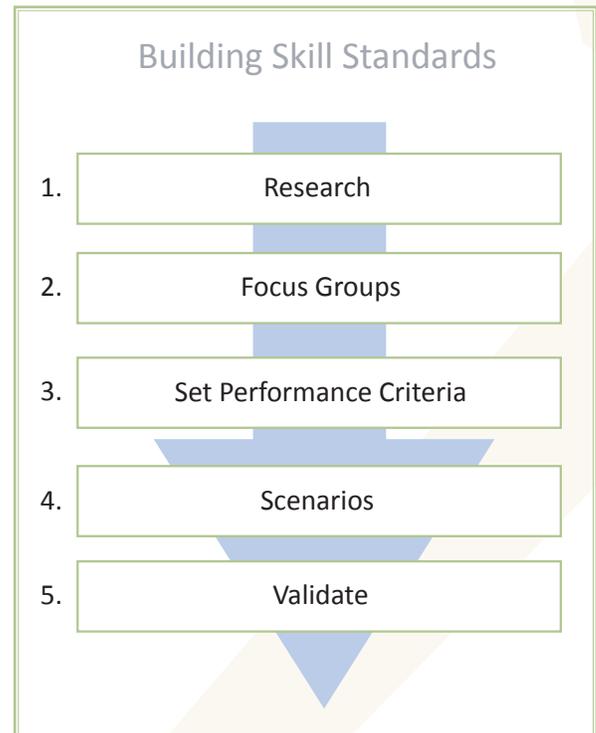
Survey respondents were asked to comment on the standards and to rank the relative importance of the functions and tasks identified by the focus groups. Complete survey data from 25 Wind Turbine Technicians was collected and analyzed. The Verification Survey Results are presented in a separate section of this document.

Senior Expert Review

Senior Experts from the energy generation sector reviewed the critical work functions, key activities and performance indicators produced by the focus group panels. The Senior Experts provided a few minor edits and answered some follow up questions from the research team. All of the Senior Experts confirmed the content of the skill standards.

Industry-wide Review

The preliminary skill standard was reviewed and verified in the early part of 2009 by a survey of the energy industry.



Employability Skills: SCANS Profile

During the data-gathering process of this project, employability skills for wind technicians were identified. Employability, or workplace skills, are basic academic and foundation skills needed to build more advanced competencies. The foundation skills are based on broad workplace categories, known as SCANS (Secretary's Commission on Achieving Necessary Skills, U.S. Department of Labor). This federal report, issued in 1991, identifies 37 foundation and workplace competencies required for work readiness.

SCANS are comprised of a three-part foundation of skills and personal qualities and five workplace competencies needed for successful job performance in today's workforce. Professionals currently working in the field were asked to identify the level of difficulty for each of the 37 SCANS skills most required for successful workplace performance in each cluster. The information in the charts on the following pages was compiled by taking a weighted average of the responses across the cluster. This summary information provides a general view of the key workplace skills deemed relevant and necessary for the front line worker in power generation as well as providing

the foundation for the employability skills within the skill standards.

Basic Skills Competencies

Reading

Writing

Arithmetic

Listening

Speaking

Thinking Skills Competencies

Creative Thinking

Decision Making

Problem Solving

Visualization

Knows/Learns

Reasoning

Personal Qualities

Responsibility

Self-Worth



Sociability

Self-Management

Integrity/Honesty

Workplace

Utilizing Resources

Interpersonal Skills

Utilizing Information

Using Systems

Using Technology

The ADVANCE™ Workplace Standards Skill Inventory from Advanced Educational Spectrums, Inc. was used to capture industry views on foundation skills for power generation workers. Industry professionals ranked the SCANS skill levels required. The chart on the following pages contains information created by taking the average of the profiles across the clusters. This summary information provides a general view of the key foundation skills deemed relevant and necessary for the entry-level power generation worker.

Definition of terms

Each chart in the following skill standards templates contains the following components:

Clusters

Clusters describe the major areas of work carried out across an industry cluster. They apply across specific industry segments (e.g. automobile manufacturing, furniture manufacturing, airplane manufacturing, etc.) and often cover families of related job titles. Plant electricians are an example of a cluster within power generation.

Critical Work Functions

Critical work functions represent the general areas of responsibility for the front-line worker in power generation. The functions tell us what must be done to achieve the key purpose of an occupation cluster.

Employability Skills

Employability skills are basic academic and personal skills that are needed to build more advance competencies. They

<i>Applies creative thinking</i>	Level I <input type="checkbox"/> <ul style="list-style-type: none"> Makes connections between old & new Recognizes general relationships 	Level II <input type="checkbox"/> <ul style="list-style-type: none"> Paraphrases/ Demonstrates creative thinking process skills while problem solving 	Level III <input checked="" type="checkbox"/> <ul style="list-style-type: none"> Develops creative solutions Applies creative solutions to new situations 	Level IV <input type="checkbox"/> <ul style="list-style-type: none"> Generates unique solutions Formulates new ideas/approaches Organizes new processes/procedures 	Level <ul style="list-style-type: none"> Jud resu Acti crea
<i>Applies decision making strategies</i>	Level I <input type="checkbox"/> <ul style="list-style-type: none"> Understands decision making process Recalls basic rules/principles Identifies goals 	Level II <input type="checkbox"/> <ul style="list-style-type: none"> Applies rules/principles to situation Gathers information 	Level III <input checked="" type="checkbox"/> <ul style="list-style-type: none"> Analyzes situations/information Considers risks/implications Compiles multiple viewpoints 	Level IV <input type="checkbox"/> <ul style="list-style-type: none"> Generates creative solutions Evaluates alternative solutions Formulates plan of action 	Lev <ul style="list-style-type: none"> J p E S pa
<i>Recognizes and solves problems</i>	Level I <input type="checkbox"/> <ul style="list-style-type: none"> Identifies the problem 	Level II <input type="checkbox"/> <ul style="list-style-type: none"> Understands the complaint/discrepancy Appropriately 	Level III <input checked="" type="checkbox"/> <ul style="list-style-type: none"> Examines information/data Considers risks/implications 	Level IV <input type="checkbox"/> <ul style="list-style-type: none"> Generates/evaluates solutions 	Level <ul style="list-style-type: none"> Eval plan



are competencies required by all workers in order to obtain meaningful work and participate in the modern workforce.

Key Activities

Key activities are the tasks related to the functional area of the career cluster and performed by workers in a given occupation. They are made up of work activities which are measurable and observable, and which result in a decision, product, or service.

Level of Importance

Professionals who are actively working in this occupation rated the level of importance for each critical work function and key activity, ranging from not important to critical. All critical work functions were rated and verified as being important, very important, or critical.

Performance Indicators

Performance indicators are specific behavioral evidence of a worker's achievement of skills, knowledge, and task completion. The question answered is: "How do we know when this key activity is performed well?" Performance indicators provide the standard of performance required to produce the necessary outcomes of key activities.

Technical Skills, Knowledge, Abilities, and Tools

Technical skills, knowledge, and abilities are those areas of expertise which workers must have in order to perform a given occupational task with excellence. A collection of skills, knowledge, abilities and tools make up competencies.

Skills refer to proficiency in an applied activity. This activity could be physical, mental, or interpersonal in nature.

Knowledge is a particular set of information.

Abilities are broad human characteristics that result from natural talent, training, or experience.

Tools are materials, equipment, and implements a worker must be able to use competently to meet the requirements of the job.







Results



Typical Job Description

Primary Purpose

Perform skilled journey-level work in the operations, maintenance, and repair of wind turbine generators.

Responsibilities and Accountabilities

May be responsible to perform a combination of the following duties based upon job assignment:

Perform mechanical, hydraulic, and electrical component service on wind turbines.

Troubleshoot and diagnose electrical, mechanical, and hydraulic malfunctions.

Work with complex wind-related instructions and procedures as well as diagrams.

Perform repairs and diagnosis of turbine operations problems in service area.

Perform necessary warranty and scheduled service work in accordance with the turbine supplier specifications.

Identify and report existing and anticipated problems with wind farm.

Performing other duties as related to the position.



General Qualifications

Skills and competencies:

Ability and willingness to work in all weather conditions.

Ability and willingness to read and interpret technical manuals, procedures, and regulations.

Ability to write reports and subtract, multiply, and divide in all units of measure.

Ability to effectively communicate with fellow employees and management.

Ability to perform service tasks outlined in the service manuals.

Ability and willingness to take initiative and work without direct supervision.

Ability to use personal computer with basic computer skills.

Ability to pass initial Fitness for Duty drug and alcohol screening.

Degrees, certificates, license, and experiences required:

A high school diploma or GED.

Valid drivers license and clean driving record history.

Physical Requirements and Working Conditions

Ability to perform manual work, i.e.: standing, stooping, and walking.

Ability to lift up to 45 lbs.

Ability to climb a ladder 260+ feet above the ground without assistance on a frequent basis.

Ability to work outdoors in extreme cold and heat for extended periods of time from towers and platforms.





Critical Work Functions and Key Activities

<i>Critical Work Functions</i>	<i>Key Activities</i>						
A Ensure a safe work environment and meet safety standards	A1 Participate in safety and pre-job meetings	A2 Perform emergency drills and participate in emergency response teams	A3 Identify and report unsafe conditions and take corrective actions	A4 Obtain and maintain required licenses and certifications	A5 Perform safety inspections	A6 Provide safety training	
B Troubleshoot and repair wind turbines (incident)	B1 Gather and prepare materials, tools and equipment; transport and set up equipment	B2 Perform troubleshooting	B3 Document repair and corrective action	B4 Perform repairs	B5 Perform mechanical and electrical component system tests	B6 Evaluate post repair testing	B7 Replace major components (i.e. gear box, main bearings, etc.)
C Maintain wind turbines (Reliability and Optimization)	C1 Gather and prepare materials, tools, and equipment; transport and set up equipment	C2 Perform preventative maintenance	C3 Perform mechanical and electrical component and system tests	C4 Perform repairs or replace components	C5 Document equipment installation, maintenance, and repair		
D Maintain tools, equipment, and inventory	D1 Maintain, inspect, and repair or replace hand tools and test equipment	D2 Maintain and operate utility/field truck tools and stock					

Critical Work Functions	Key Activities						
E Interact and communicate with coworkers, suppliers, customers, and contractors	E1 Participate in pre-job tailgate meetings	E2 Participate in meetings and problem solving groups with coworkers and management	E3 Interface with public and land owners	E4 Communicate with suppliers regarding parts, tools, and refurbishment	E5 Interact with, monitor, and direct contractors (i.e. cranes, roads, vendors, etc.)		
F Adhere to policies and standards	F1 Comply with environmental regulations (Spill Prevention Control and Countermeasures and Spill Response Plan (SPCC and SRP))	F2 Adhere to site-specific work practices and procedures; emergency response and preparedness	F3 Perform company and site-specific administrative activities (i.e. time sheets, vehicle accident forms, etc.)				
G Conduct training and participate in continuous learning	G1 Achieve and maintain proficiency in current and new technologies	G2 Train others in specific operation, maintenance, and repair procedures	G3 Maintain certifications				



Theories, Concepts, and Equipment

Knowledge of foundational science and engineering concepts and theories is essential in order to perform functions required of Wind Turbine Technicians. These are listed below, and are important supplements to the technical knowledge and skills listed with each key activity.

Science and Engineering Theories and Concepts

Basic physics

Behavior of matter

Gasses and liquids

Mechanical energy

Introductory mechanical engineering concepts

Levers, pulleys, machines

Hydraulics, pneumatics

Renewable energy processes and industries

Basic system design and components: hydraulics, pneumatics, terminology, symbols, functions, etc.

Advanced AC, Circuit Electronics, DC Power, Circuit Analysis

Environmental stewardship

Machines, friction, and bearings

Lubrication and cooling

Overview of power generation delivery grid system from generation to end user including VARS (Vertical and Azimuth Reference System)

WAC 296-45: High voltage electrical safety standards; OSHA 1910-333, NFPA 70-E

Computer process applications and networking

Aviation terminology and basic aerodynamics (physics)

Instrumentation and controls logic theory

Fiber optics

Basic rigging



Math for Wind Turbine Technician

Working knowledge of:
measurement, layout,
computation, formulae, functions

Basic logic

Algebra

Solid geometry

Computational technology

Principles of alignment

Torque

Properties and behavior of motion

Trigonometry (sin/cosine)

Wind Turbine Concepts

Statics dynamics

Thermo dynamics

Basic meteorology

Components and Equipment

Breakers (station service, air
blast, vacuum, oil, and field)

Metal clad switchgear

Electrical controls

Generators and PMGs (Permanent
Magnet Generator)

Shop machinery

Electrical hand tools

Cranes

Battery chargers & inverters;
station and auxiliary battery banks

Stator

Rotors

DC exciters / solid state excitation

Fractional horsepower motors

AC and DC motors

Annunciators / alarms

Auxiliary equipment

Distribution panels

Transformers (current, potential,
distribution)

Auxiliary generating equipment
and auxiliary generator controls

Isolated phase busses

Oil pump motors, starters, and
controls

Relays

Neutral ground devices

Switch boards, panels

Switching and grounding
equipment

Distribution circuits

UPS power supplies

Transfer switches

Voltage regulators

Motor starters and circuits





Relay circuits

Field rheostats

PLCs and PLC programs
(programmable logic controller)

Emission control systems, to
include scrubbers; electrostatic
precipitators

Diesel generators

Cathodic protection equipment

Lightning arrestors

Emergency lighting

Motor operated valves
(Linitorque/Crane Teledyne/
Auma)

LVDT (Linear Variable Differential
Transformer) and proximity
position sensing and indication

Instrumentation systems and
devices

Wind Farm Environment

Outdoor lighting circuits

Indoor lighting circuits

Ventilation systems

Conduits, wire, cable

Overhead and underground wiring,
including triplex

Remote control circuitry

RTU

Security systems

Emergency lighting

Life safety systems and equipment

High voltage cables and
terminations

Cable trays

Ground Fault Interrupters (GFI)

Grounding and bonding systems

Communication systems

Branch circuit panels and feeders
and over current devices

Power utilization circuits, devices
and equipment

Tools, Meters, and Monitoring Instruments

Volt Ohm meter

Ammeter

Megger

Phase rotation meter

Capacitor tester

Oscilloscope

Calibrator

Machine shop tools

High voltage tester

Hand tools

Electric hand tools

Micro-Ohm meter/ductor

Recording equipment/data acquisition equipment

Manometer

Hydraulic torquing tools (Hi Torque)

Knowledge of NEC, NESC, ANCI and IEEE or organizational construction electrical standards as required.



Scenario: Routine

The single most routine—and most important—job there is on a wind plant is scheduled service. After the turbine has been installed it is typically scheduled for service one to three times a year depending on the turbine manufacture. Performing thorough service on a consistent schedule prevents or significantly reduces future maintenance and repair work.

Service is typically scheduled out from the start up dates or by the number of run hours. The first scheduled service is the start up service, at 500 hours of operation.

Each manufacturer writes a specific service guideline, or protocol, which has to be followed. This is to ensure the best operation of the turbine and not to void any warranty obligations of the manufacture. There are also different service guidelines for the start up, semi annual (or six month), and annual services.

These scheduled services are a systematic check and repair of the turbine components and operations. This typically consists of:

Stretching base bolts (start up services).

Torquing bolts from the tower to the blades. This can be done with hydraulic powered torque pumps or hand held torque wrenches.

Visual inspections of components (from ladder through the hub).

Verifying proper operation of components (hydraulic and mechanical).

Greasing bearings and verifying fluid levels (Gear oils and hydraulic fluids).

Replacing oil and breather filters.

Verifying proper operation of brushes, slip-rings, and other electrical/electronic components.

Another factor to take into account is that after the start up service, project managers will try to work their service schedules around annual weather patterns. In the best case, these services would be performed in anticipation of the windy and peak demand seasons, in order to ensure high performance during inclement weather and peak demand periods. Other weather factors that are considered include lightning, snow, freezing rain, etc.





Some of the core skills that a service technician needs include:

Ability to read, understand, and follow maintenance/service protocols.

Knowledge of electrical and mechanical tooling, including how to operate.

Knowledge and understanding of electricity (AC, DC, high/medium/low voltages).

Knowledge and understanding of hydraulics (brakes and/or blade/tip pitching).

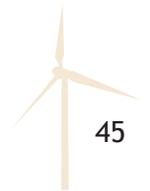
Knowledge and understanding of gearing.

Knowledge and understanding of fasteners and torquing.

Knowledge and understanding of lubrication (oil & greases).

Knowledge and understanding of Material Safety Data Sheets (MSDS).

Knowledge and understanding of weather patterns.



Critical Work Functions	Key Activities						
E Interact and communicate with coworkers, suppliers, customers, and contractors	E1 Participate in pre-job tailgate meetings	E2 Participate in meetings and problem solving groups with coworkers and management	E3 Interface with public and land owners	E4 Communicate with suppliers regarding parts, tools, and refurbishment	E5 Interact with, monitor, and direct contractors (i.e. cranes, roads, vendors, etc.)		
F Adhere to policies and standards	F1 Comply with environmental regulations (Spill Prevention Control and Countermeasures and Spill Response Plan (SPCC and SRP))	F2 Adhere to site-specific practices and procedures; emergency response and preparedness	F3 Perform company and site-specific administrative activities (i.e. time sheets, vehicle accident forms, etc.)				
G Conduct training and participate in continuous learning	G1 Achieve and maintain proficiency in current and new technologies	G2 Train others in specific operation, maintenance, and repair procedures	G3 Maintain certifications				



Scenario: Crisis

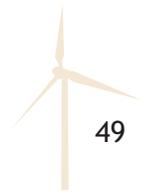
I arrive at the office and receive my work plan for the day from the lead technician. I am to troubleshoot turbine T-84, which is not communicating with the SCADA system. My partner and I get in the service truck and drive to the turbine. We enter the turbine door and I see that the turbine controller is not running. The display is blank, but two of the three LED's on the processor control pad are on: Auxiliary Power and Temp OK. This tells me that the controller has power and the temperature in each of the three controller cabinets is above freezing. I verify this by first checking the UPS (Uninterruptible Power Supply) and find that it is supplying the correct voltage to the controller.

I perform a manual reboot of the processor by cycling the breaker that supplies power to the controller from the UPS. When the processor is halfway through the startup process it stops at the "Checking Grid Flash" stage, shuts down, and begins the startup process again. I then look through the manual and find that the grid information is monitored by the CT 3251 control module in the top controller. I contact the inventory coordinator and request a new module to be brought to the turbine.

While waiting for the new module I connect my laptop to the turbine to check the status of the processor's memory. I am able to verify that the software and historical data in the turbine processor is still intact. The new CT 3251 arrives and my partner climbs the tower to replace the defective module. I open the UPS breaker once again to allow my partner to safely replace the defective CT module. While in the nacelle he also performs a visual inspection of the top controller. He reports that the top controller is visually okay and the CT module has been replaced. We are ready to re-energize the controller.

This time the controller starts up successfully and we are able to continue to troubleshoot the turbine to find out why it shut down in the first place.





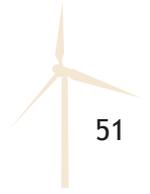


Primary Tasks and Functions Involved in this Scenario

Highlighted in blue

Critical Work Functions	Key Activities						
A Ensure a safe work environment and meet safety standards	A1 Participate in safety and pre-job meetings	A2 Perform emergency drills and participate in emergency response teams	A3 Identify and report unsafe conditions and take corrective actions	A4 Obtain and maintain required licenses and certifications	A5 Perform safety inspections	A6 Provide safety training	
B Troubleshoot and repair wind turbines (incident)	B1 Gather and prepare materials, tools and equipment; transport and set up equipment	B2 Perform troubleshooting	B3 Document repair and corrective action	B4 Perform repairs	B5 Perform mechanical and electrical component system tests	B6 Evaluate post repair testing	B7 Replace major components (i.e. gear box, main bearings, etc.)
C Maintain wind turbines (Reliability and Optimization)	C1 Gather and prepare materials, tools, and equipment; transport and set up equipment	C2 Perform preventative maintenance	C3 Perform mechanical and electrical component and system tests	C4 Perform repairs or replace components	C5 Document equipment installation, maintenance, and repair		
D Maintain tools, equipment, and inventory	D1 Maintain, inspect, and repair or replace hand tools and test equipment	D2 Maintain and operate utility/field truck tools and stock					

Critical Work Functions		Key Activities									
E	Interact and communicate with coworkers, suppliers, customers, and contractors	E1	Participate in pre-job tailgate meetings	E2	Participate in meetings and problem solving groups with coworkers and management	E3	Interface with public and land owners	E4	Communicate with suppliers regarding parts, tools, and refurbishment	E5	Interact with, monitor, and direct contractors (i.e. cranes, roads, vendors, etc.)
F	Adhere to policies and standards	F1	Comply with environmental regulations (Spill Prevention Control and Countermeasures and Spill Response Plan (SPCC and SRP))	F2	Adhere to site-specific work practices and procedures; emergency response and preparedness	F3	Perform company and site-specific administrative activities (i.e. time sheets, vehicle accident forms, etc.)				
G	Conduct training and participate in continuous learning	G1	Achieve and maintain proficiency in current and new technologies	G2	Train others in specific operation, maintenance, and repair procedures	G3	Maintain certifications				



Scenario: Long Term

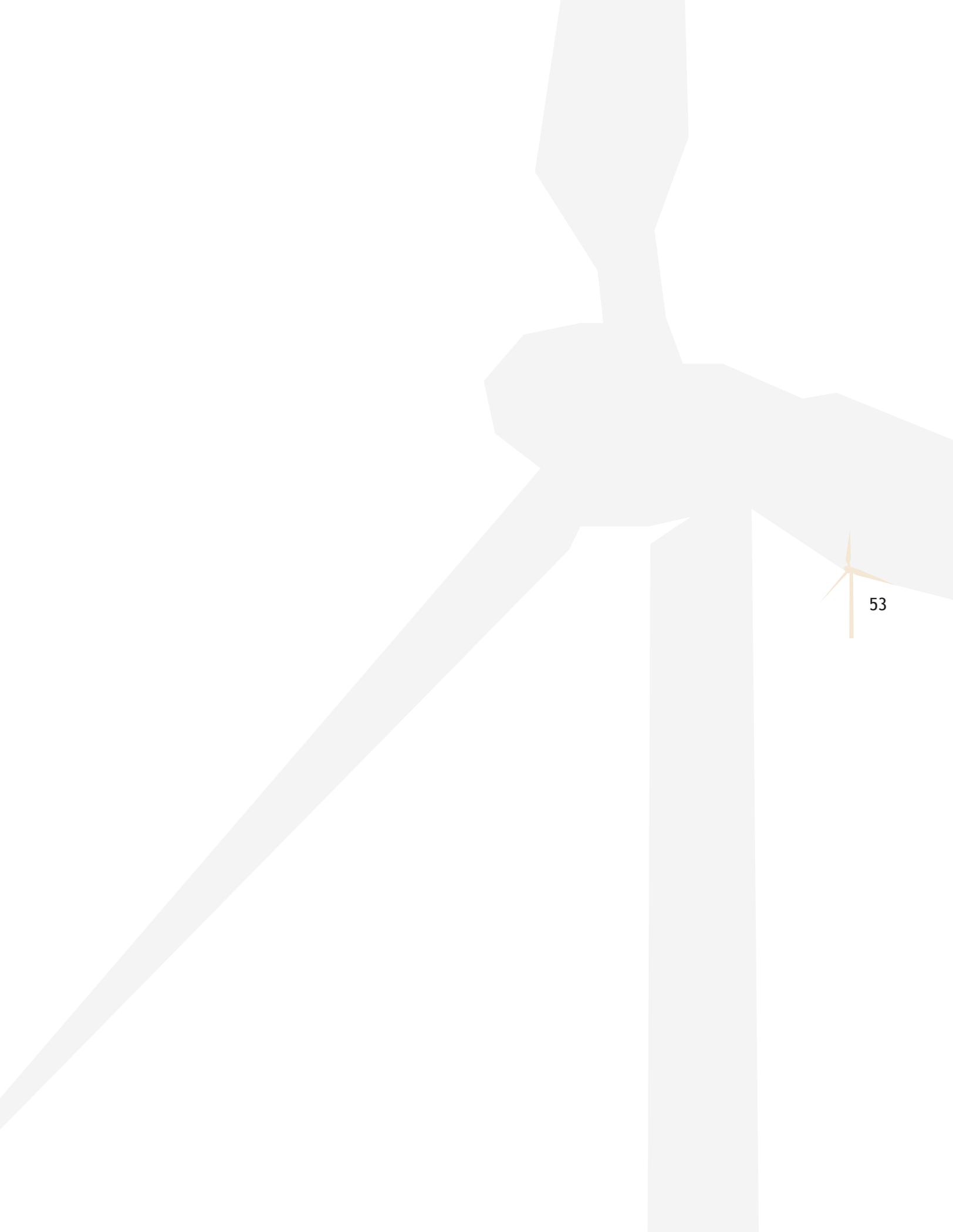
Every wind turbine on site has had a complete main bearing inspection, and it has been determined that 14 main bearings will be replaced over the year to replace the worst by way of a pre-determined rating system. The turbine manufacturer, turbine owners, buyers, and mechanics—along with the crane company—have been notified about the tight schedule for the replacement work. Scheduling is crucial due to wind forecasts and the expense of having three cranes dedicated to one wind site for such a long period of time. The job will require three technicians in the nacelle every day for tear down, replacement, and reassembly, while four others help on the actual “lift” days with rigging and tag lines.

The first crane will have to raise a man basket up to each uprising/horizontal blade to install the blade socks with attached tag lines, while the mechanics in the nacelle yaw the turbine to avoid tangling the 400 foot tag lines into the boom of the large crane preparing to lift the hub and blades. The other two cranes will work together to remove and lower the hub and blade assembly or rotor safely to the ground. The large crane will have to come back up and pick the entire transmission (main bearing, main shaft, and gear box assembled) as one ‘blind’ pick as the operator cannot see his hook or the equipment to be lifted. Communication and coordination will be key, as there will be no room for error.

Two mechanics at the shop facility will be assembling the new main bearing/main shaft assembly into another gear box so the complete transition from old bearing to new bearing can be lifted and set in place on the same day, minimizing the number of days over the year the cranes are used.

Routine service maintenance and trouble shooting duties cannot be compromised dramatically to maintain schedule. The complete job scope will take cooperation by all departments and contractors.





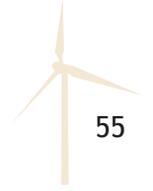


Primary Tasks and Functions Involved in this Scenario

Highlighted in blue

	Key Activities						
Critical Work Functions	A1	A2	A3	A4	A5	A6	
A Ensure a safe work environment and meet safety standards	A1 Participate in safety and pre-job meetings	A2 Perform emergency drills and participate in emergency response teams	A3 Identify and report unsafe conditions and take corrective actions	A4 Obtain and maintain required licenses and certifications	A5 Perform safety inspections	A6 Provide safety training	
B Troubleshoot and repair wind turbines (incident)	B1 Gather and prepare materials, tools and equipment; transport and set up equipment	B2 Perform troubleshooting	B3 Document repair and corrective action	B4 Perform repairs	B5 Perform mechanical and electrical component system tests	B6 Evaluate post repair testing	B7 Replace major components (i.e. gear box, main bearings, etc.)
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Critical Work Functions		Key Activities									
E	Interact and communicate with coworkers, suppliers, customers, and contractors	E1	Participate in pre-job tailgate meetings	E2	Participate in meetings and problem solving groups with coworkers and management	E3	Interface with public and land owners	E4	Communicate with suppliers regarding parts, tools, and refurbishment	E5	Interact with, monitor, and direct contractors (i.e. cranes, roads, vendors, etc.)
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G	Conduct training and participate in continuous learning	G1	Achieve and maintain proficiency in current and new technologies	G2	Train others in specific operation, maintenance, and repair procedures	G3	Maintain certifications				



SCANS Survey Results

Foundation Skills & Personal Qualities	0 1 2 3 4 5	Critical Competencies
Basic Skills		
Demonstrates Effective Reading Strategies		<i>Identifies relevant details, facts, and specification; follows set of instructions; and qualifies/analyzes information.</i>
Demonstrates Effective Writing Strategies		<i>Records information accurately, completes forms, and writes simple documents.</i>
Applies Arithmetic Processes		<i>Interprets and converts numerical data and predicts arithmetic results.</i>
Applies Mathematics Processes		<i>Summarizes, translates, and interprets mathematical data and manipulates formulas.</i>
Demonstrates Effective Listening Skills		<i>Confirms information and interprets, clarifies, and influences communication.</i>
Demonstrates Effective Speaking Skills		<i>Communicates appropriate verbal/non-verbal messages, actively participates in discussion, and presents complex ideas and information.</i>
Thinking Skills		
Applies Creative Thinking/Generates Ideas		<i>Demonstrates creative thinking process while problem solving; develops creative solutions and applies them to new situations.</i>
Applies Decision Making Strategies		<i>Analyzes situations and information, considers risks and implications, and compiles multiple viewpoints.</i>
Recognizes and Solves Problems		<i>Analyzes possible causes; generates and evaluates solutions.</i>
Demonstrates Visualization		<i>Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure; and interprets charts, graphs and symbols.</i>
Knows How to Learn		<i>Interprets and applies new knowledge and experience; analyzes application of learning tools.</i>



Foundation Skills & Personal Qualities	0 1 2 3 4 5	Critical Competencies
Applies Reasoning Skills		<i>Applies and analyzes rules and principles to processes and procedures; uses logic to draw conclusions.</i>

Personal Qualities

Demonstrates Responsibility		<i>Pays attention to details, demonstrates initiative, monitors performance standards, and follows up on assigned tasks.</i>
Demonstrates Belief in Self Worth		<i>Defends own viewpoints, accepts responsibility for own behavior, and understands own impact on others.</i>
Demonstrates Sociability in Groups		<i>Establishes rapport with coworkers and customers, modifies behavior to environment, shows understanding for others, and encourages cooperation and negotiation.</i>
Demonstrates Self-Management		<i>Maintains self control, accepts constructive criticism, sets well defined/realistic goals, and demonstrates commitment to self improvement.</i>
Demonstrates Integrity and Honesty		<i>Demonstrates honesty and trustworthiness, accepts responsibility for own behavior, and analyzes implications of decisions.</i>

Management of Time and Resources

Manages Time		<i>Efficiently manages time, prioritizes daily tasks, prepares schedule, and monitors and adjusts task sequence.</i>
Manages Money		N/A
Manages Materials and Facilities		<i>Orders and maintains inventory; monitors safe and efficient utilization of materials.</i>
Manages Human Resources		<i>Recognizes job tasks, distributes and analyzes work assignments and delegates responsibilities.</i>

Management/Use of Information

Acquires and Evaluates Information		<i>Selects relevant data, identifies the need for data, predicts outcomes, and integrates multiple items of data.</i>
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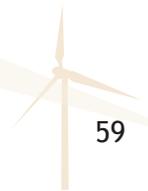




Foundation Skills & Personal Qualities	0 1 2 3 4 5	Critical Competencies
Organizes and Maintains Information		<i>Interprets information and applies processes to new information.</i>
Interprets and Communicates Information		<i>Recognizes accuracy of information, interprets information, and prepares basic summaries.</i>
Uses Computers to Process Information		<i>Understands computer operation, performs basic data entry, retrieves stored data, and interprets information.</i>
Interpersonal Skills		
Participates as a Team Member		<i>Assists and encourages team members, actively participates, works to improve team skills, and demonstrates commitment.</i>
Teaches Others		<i>Conducts task-specific training, coaches others to apply related concepts and provides constructive feedback and reinforcement.</i>
Serves Customers		<i>Demonstrates sensitivity to customer concerns and responds to and analyzes customer needs.</i>
Exhibits Leadership		<i>Adheres to standards, demonstrates commitment to excellence and leads by example.</i>
Negotiates Agreements		<i>Understands negotiations process, identifies conflicts, and demonstrates composure.</i>
Works with Diversity		<i>Recognizes differences, understands the legal aspects of discrimination, respects the rights of others, and recognizes the value of diversity.</i>
Understanding/Management of Systems		
Understands Systems		<i>Understands the system organization and hierarchy and follows processes and procedures.</i>
Monitors and Corrects System Performance		<i>Monitors system performance, troubleshoots system malfunctions, and analyzes system operation.</i>



Foundation Skills & Personal Qualities		Critical Competencies
Improves/Designs Systems	—	<i>Identifies and suggests needed system modifications and improvements.</i>
Use of Technology		
Selects Appropriate Technology	—	<i>Understands the requirements of the task and technological results and analyzes task/technology relationship.</i>
Applies Technology to Task	—	<i>Understands technology applications, flows proper procedures, and manipulates technology of desired results.</i>
Maintains and Troubleshoots Technology	—	<i>Troubleshoots and corrects malfunctions and failures, evaluates performance of technology and analyzes failures.</i>



Verification Survey Results

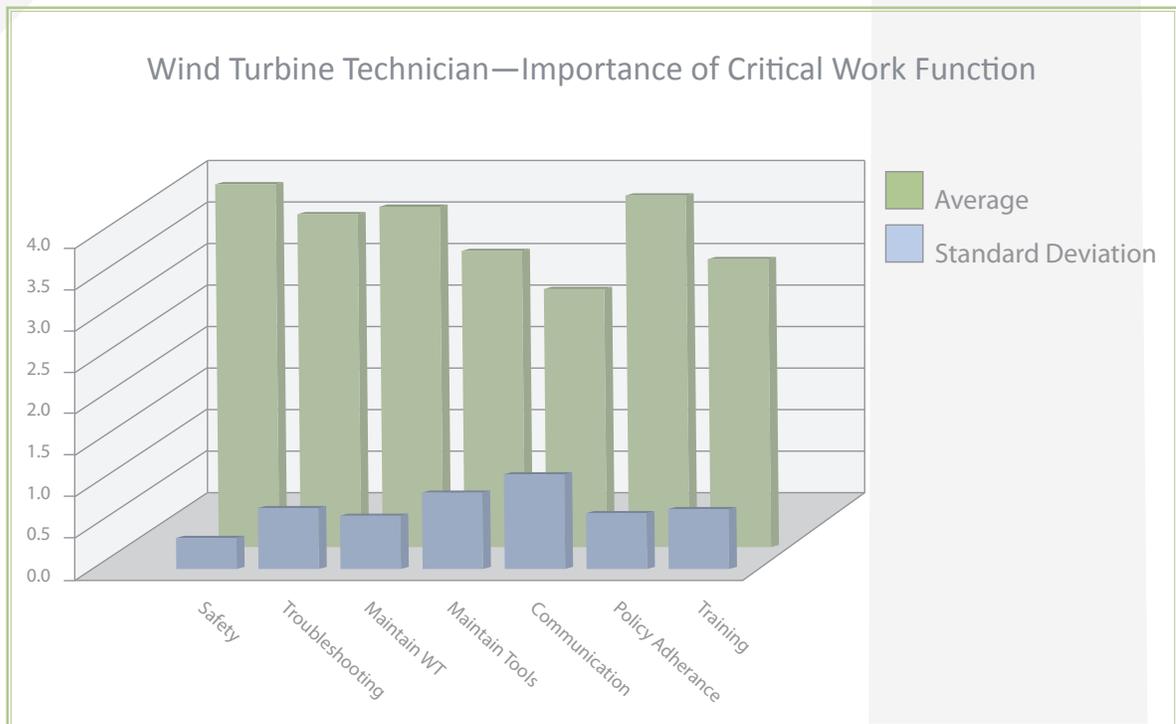
Verification surveys were administered to determine if the critical work functions and tasks identified by the Wind Turbine professionals would be verified by a broader sample of wind turbine technicians and subject-matter experts. The figure below shows the average importance and standard deviation of each function, rated on a scale from 0 to 4. These results generally verify that the critical work functions included in the skill standards document are relevant to the industry at large.

The results show that Safety (Critical Work Function A—Ensure a Safe Work Environment and Meet Safety Standards) and Policy Adherence (Critical

Work Function F—Adhere to Policies and Standards) rated highest as an important work function to the Wind Turbine Technician, followed closely by Troubleshooting (Critical Work Function B—Troubleshoot and Repair Wind Turbines) and Maintain WT (Critical Work Function C—Maintain Wind Turbines) with somewhat lower scores attributed to the remaining work functions. The largest variation in responses was for Communication (Critical Work Function E—Interact and Communicate with Co-Workers, Suppliers, Customers & Contractors), expressed as a standard deviation, however this value is just slightly larger than the average for all items.



60



Skill Standards Tables

Job: Wind Turbine Technician

Critical Work Function: A.) Ensure a Safe Work Environment and Meet Safety Standards

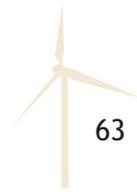
Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>A1 Participate in safety and pre-job meetings</p>	<ul style="list-style-type: none"> Open agenda items are contributed when appropriate. Unsafe work practices are noted and communicated in a clear and effective manner. Project-related electrical safety hazards and near misses are communicated to ensure awareness. Action items are properly assigned and completed. All required job task safety meetings are conducted in accordance with applicable laws, regulations, and organization policies and procedures. 	<ul style="list-style-type: none"> Knowledge of safety policies and procedures. Knowledge of safe work practices. Knowledge of the organization's safety structure, roles, and responsibilities. Knowledge of all project-related electrical safety hazards and near misses. Knowledge of laws, regulations, and organization policies and procedures regarding job task safety meeting requirements. Knowledge of safe working clearances for various system voltages. Knowledge of meeting protocols in accordance with organizational policies and procedures. 	<ul style="list-style-type: none"> Establishes rapport with coworkers and customers; modifies behavior to environment; shows understanding for others, and encourages cooperation and negotiation. Understands negotiations process, identifies conflicts, and demonstrates composure. Confirms information and interprets, clarifies and influences communication. Assists and encourages team members, actively participates, works to improve team skills, and demonstrates commitment. Recognizes differences, understands the legal aspects of discrimination, respects the rights of others, and recognizes the value of diversity.

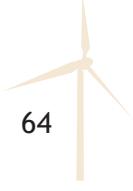




Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>A2 Perform emergency drills and participate in emergency response teams</p>	<ul style="list-style-type: none"> • Training and certification on relevant emergency, first aid, AED (Automatic External Defibrillator) and CPR (Cardio Pulmonary Resuscitation) equipment and procedures are complete and up to date. • Emergency response complies with company and regulatory policies and procedures. • Emergency rescues are practiced. 	<ul style="list-style-type: none"> • Knowledge of high angle rescue techniques. • Ability to obtain certifications. • Knowledge of emergency policies and procedures. • Knowledge of site-specific emergency and rescue responses. • Knowledge of emergency phone numbers and address/locations within facilities. • Knowledge of isolation procedures for the turbine and turbine component. • Knowledge of safety equipment at facilities. 	<ul style="list-style-type: none"> • Conducts task-specific training, coaches others to apply related concepts, and provides constructive feedback and reinforcement. • Efficiently manages time, prioritizes daily tasks, prepares schedule, and monitors and adjusts task sequence. • Adheres to standards, demonstrates commitment to excellence, and leads by example. • Communicates appropriate verbal/non-verbal messages, actively participates in discussion, and presents complex ideas and information.

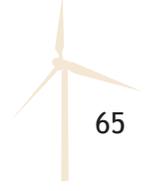
Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>A3 Identify and report unsafe conditions and take corrective actions</p>	<ul style="list-style-type: none"> • Conditions that present a threat to health, safety, and the environment are identified, reported, and documented promptly. • Corrective actions are identified and implemented and documentation is completed. • Appropriate parties are consulted about corrective actions. • Lockout tagout and switching and clearance procedures are followed in accordance with company guidelines. • Follow-up procedures are followed. 	<ul style="list-style-type: none"> • Ability to identify an unsafe condition. • Knowledge of the components, conditions, and procedures utilized in a safe working and operating environment. • Knowledge of the consequences of safety situations such as systems under pressure and stored energy systems vs. low risk maintenance items. • Knowledge of documentation procedures. • Knowledge of procedures for taking corrective actions. • Knowledge of lockout tagout and switching and clearance procedures. • Knowledge of the electrical systems and their implications for safety. 	<ul style="list-style-type: none"> • Demonstrates creative thinking process while problem solving; develops creative solutions and applies them to new situations. • Pays attention to details, demonstrates initiative, monitors performance standards, and follows up on assigned tasks. • Demonstrates honesty and trustworthiness, accepts responsibility for own behavior, and analyzes implications of decisions. • Analyzes possible causes; generates and evaluates solutions. • Defends own viewpoints, accepts responsibility for own behavior, and understands own impact on others. • Records information accurately, completes forms, and writes simple documents.





Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
A4 Obtain and maintain licenses and certifications	<ul style="list-style-type: none"> • Mandatory trainings are attended as required. • CEU (Continuing Education Units) are accumulated as required. • CDL (Commercial Driver's License) physicals and drug tests are passed as required and license is obtained. • Training for equipment licenses is completed and maintained as required. 	<ul style="list-style-type: none"> • Knowledge of safety manual. • Knowledge of first aid and ability to maintain first aid, CPR (Cardio Pulmonary Resuscitation), and AED (Automatic External Defibrillator) certification. • Ability to pass the CDL (Commercial Driver's License) physical and drug tests as required. • Knowledge of required certifications. 	<ul style="list-style-type: none"> • Maintains self control, accepts constructive criticism, sets well defined/ realistic goals, and demonstrates commitment to self improvement. • Identifies relevant details, facts, and specifications; follows sets of instructions; and qualifies/analyzes information. • Recognizes job tasks, distributes and analyzes work assignments and delegates responsibilities. • Understanding of the Organizational System. • Interprets information and applies processes to new information.

Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>A5 Conduct Safety Inspections</p>	<ul style="list-style-type: none"> • Inspections are thorough and complete. • Reference is made to technical manuals during the course of inspections. • Checklists and procedures are followed. • The environment is scanned for hazardous conditions. • Documentation is complete and accurate and submitted to appropriate personnel in a timely manner. • PPE (Personal Protective Equipment) is worn as required and PPE is tested on a daily basis to ensure there are no leaks; test dates and intervals are current. • Scheduled inspections of PPE are conducted in accordance with company guidelines. • Minimum electrical equipment clearances are inspected and equipment is relocated as required. • Hazard and near-miss card procedures are properly followed. • Security gates and access and clearances to switch yards, substations, and electrical equipment rooms are properly controlled. 	<ul style="list-style-type: none"> • Knowledge of location of equipment instruction manuals and how to use them. • Knowledge of uses of PPE (personal protective equipment) and ability to test and inspect. • Knowledge of requirements for minimum electrical equipment clearances. • Knowledge of hazard and near-miss procedures. • Knowledge of security gate operation and access requirements and procedures. • Knowledge of applicable codes and standards: NEC (National Electrical Code), NESC (National Electrical Safety Code), and NFPA 70-E (National Fire Protective Association), OSHA (Occupational Safety and Health Administration), WSHA (Washington Safety and Health Administration), WAC (Washington Administrative Code), and the ability to apply them to inspection issues. • Knowledge of the impact of weather (ice, wind, etc.) on wind turbines and appropriate safety responses. • Knowledge of normal operating parameters for wind turbines and equipment. 	<ul style="list-style-type: none"> • Analyzes situations and information, considers risks and implications, and compiles multiple viewpoints. • Maintains self control, accepts constructive criticism, sets well defined/ realistic goals, and demonstrates commitment to self improvement. • Conducts task-specific training, coaches others to apply related concepts, and provides constructive feedback/ reinforcement. • Assists and encourages team members, actively participates, works to improve team skills, and demonstrates commitment. • Analyzes possible causes; generates and evaluates solutions.



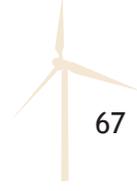


Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>A6 Provide safety training for other employees</p>	<ul style="list-style-type: none"> • Training covers all topics and procedures needed to facilitate employee safety. • Training makes clear the processes and need for employees to raise safety concerns, ask questions, and receive additional training. • Training is documented according to company requirements. • Training meets all relevant laws, policies, and regulations. • Where applicable, safety information is tailored to meet the requirements of a specific job. • The training makes clear the electrical system voltages involved, and the safety requirements for each. • Training includes high angle rescue and suspension trauma. • Training includes when and how to use PPE (Personal Protective Equipment). 	<ul style="list-style-type: none"> • Knowledge of high angle rescue techniques and evacuation procedures and equipment. • Knowledge of uses of PPE and ability to test and inspect it. • Knowledge of all topics and procedures required for employee safety (in particular how to wipe down a hot stick, inspect for damage, identify current test dates, and properly store a hot stick; identify current test dates for rubber goods; and proper installation of ground leads). • Knowledge of safety laws and regulations. • Knowledge of safe work practices. • Knowledge of terminology for wind turbine generation including tools, equipment, and systems. • Knowledge of specific job procedures and safety requirements. • Knowledge of electrical voltages and safety requirements for each. 	<ul style="list-style-type: none"> • Conducts task-specific training, coaches others to apply related concepts, and provides constructive feedback/reinforcement. • Communicates appropriate verbal/non-verbal messages, actively participates in discussion, and presents complex ideas and information. • Assists and encourages team members, actively participates, works to improve team skills, and demonstrates commitment. • Pays attention to details, demonstrates initiative, monitors performance standards, and follows up on assigned tasks. • Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure; and interprets charts, graphs and symbols. • Records information accurately, completes forms, and writes simple documents.

Job: Wind Turbine Technician

Critical Work Function: B.) Troubleshoot and Repair Wind Turbines

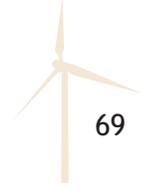
Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>B1 Gather and prepare materials, tools and equipment; transport and set up equipment</p>	<ul style="list-style-type: none"> • Special materials/tools and parts are located. • All required materials/tools for the job are assembled at the work site. • Where applicable, certification of tools is verified. • Materials/tools are checked to ensure they are in safe and proper working order. • Procedures regarding nonfunctioning tools are followed. • Applicable safety standards as they relate to the industry for job-site safety are followed. • Lifting equipment is properly set up in accordance with manufacturer's specifications and company procedures. 	<ul style="list-style-type: none"> • Knowledge of special materials/tools and parts. • Knowledge of how tools should work. • Knowledge of part ordering procedures. • Knowledge of procedures regarding nonfunctioning tools. • Knowledge of safe work practices. • Knowledge of occupational hazards and standard safety devices. • Knowledge of location of material and parts storage. • Knowledge of lifting equipment and ability to access manufacturer's specifications. 	<ul style="list-style-type: none"> • Orders and maintains inventory and monitors safe and efficient utilization of materials. • Efficiently manages time, prioritizes daily tasks, prepares schedule, and monitors and adjusts task sequence. • Analyzes situations and information, considers risks and implications, and compiles multiple viewpoints. • Understands the requirements of the task and technological results, and analyzes task/technology relationship. • Selects relevant data, identifies the need for data, predicts outcomes, and integrates multiple items of data.

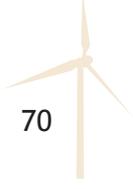




Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>B2 Perform trouble-shooting</p>	<ul style="list-style-type: none"> • The latest revision manuals and schematics are consulted as necessary. • Status of wind turbines prior to beginning troubleshooting is checked and documented and baseline readings are acquired. • Information about the nature and possible causes of failure is systematically gathered through visual inspection, past experience, technician feedback, SCADA (Supervisory Control and Data Acquisition), and observation of components during operations and disassembly of components, as appropriate. • Proper diagnostic tests are performed and repeated as necessary to determine the nature of the problem. • Diagnosis is timely and effective. • Manufacturer's performance specifications are used when evaluating wind turbine performance. • Procedures for isolating problems are initiated correctly and followed through completely. • Safety procedures are followed for troubleshooting in such areas as electrical and mechanical isolation and stored energy. 	<ul style="list-style-type: none"> • Knowledge of wind turbine components and how they interact. • Knowledge of how the site collection system operates and interacts with the substation. • Knowledge of and ability to perform diagnostic tests, use test equipment and interpret the output from the tests and diagnostic equipment. • Ability to use SCADA. • Ability to access and understand wind turbine logs and histories. • Ability to execute isolation procedures. • Ability to understand and apply schematics, and to identify the most current revision. • Ability to read and understand manufacturer's specifications and manuals. • Ability to test for and determine status of wind turbines. • Knowledge of normal operations of wind turbines and the ability to acquire and verify base line readings. • Knowledge of safety procedures, including electrical and mechanical isolation and stored energy safety procedures. 	<ul style="list-style-type: none"> • Summarizes, translates and interprets mathematical data and manipulates formulas. • Recognizes accuracy of information, interprets information and prepares basic summaries. • Troubleshoots and corrects malfunctions and failures, evaluates performance of technology, and analyzes failures. • Understands technology applications, flows proper procedures, and manipulates technology of desired results. • Interprets information and applies processes to new information. • Understands computer operation, performs basic data entry, retrieves stored data, and interprets information. • Monitors system performance, troubleshoots system malfunctions, and analyzes system operation.

Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
B3 Document repair and corrective action	<ul style="list-style-type: none"> • Documentation is performed according to company and department policies and procedures. • Documents and appropriate files are input into database, filed, or distributed to correct parties. • Documentation is understandable and succinct. • Corrective actions are reported to appropriate personnel effectively and in a timely manner. • Service reports are properly created to reflect the corrective action. 	<ul style="list-style-type: none"> • Knowledge of documentation policies and procedures. • Ability to input relevant and accurate data into manual and electronic system. • Ability to report findings and make recommendations based on documented history and findings. • Understanding of the operational system and how wind turbine maintenance issues can adversely impact operations. • Ability to use correct terminology. • Thorough and detailed knowledge of the component(s) being repaired. 	<ul style="list-style-type: none"> • Records information accurately, completes forms, and writes simple documents. • Understands computer operation, performs basic data entry, retrieves stored data, and interprets information. • Interprets information and applies processes to new information.





Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>B4 Perform repairs</p>	<ul style="list-style-type: none"> • Work is performed safely in accordance with company policies and procedures and with all applicable laws and regulations. • Lockout tagout and switching and clearance procedures are followed in accordance with company guidelines. • Repair procedures are followed. • Appropriate coworkers are informed regarding the repair process. • During repair process, wind turbines are thoroughly inspected to identify other repair needs. • Where appropriate, repair plan and job safety/hazard analysis are effectively communicated to appropriate personnel in a timely manner. • Replaced parts are properly disposed of or refurbished and returned to service. • Post repair testing is performed to ensure wind turbine is in proper working order. 	<ul style="list-style-type: none"> • Knowledge of safe work practices with respect to repairs. • Knowledge of lockout tagout and switching and clearance procedures. • Knowledge of company policies and procedures regarding repairs. • Knowledge of technical requirements for specifications of parts to be repaired and manufacturer's recommended procedures. • Knowledge of component function and purpose within the system and how they affect other systems. • Knowledge of wind turbine inspection procedures. • Ability to properly test and validate successful repair. • Knowledge of proper disposal and refurbishing procedures for parts and repairs. • Ability to perform measurement conversions. • Thorough and detailed knowledge of the component(s) being repaired. 	<ul style="list-style-type: none"> • Understands technology applications, flows proper procedures, and manipulates technology of desired results. • Troubleshoots and corrects malfunctions and failures, evaluates performance of technology, and analyzes failures. • Recognizes job tasks, distributes and analyzes work assignments, and delegates responsibilities. • Orders and maintains inventory and monitors safe and efficient utilization of materials. • Applies and analyzes rules and principles to processes and procedures; uses logic to draw conclusions. • Recognizes accuracy of information, interprets information, and prepares basic summaries. • Identifies and suggests needed system modifications and improvements.

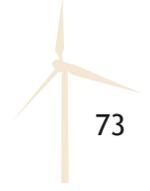
Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>B6 Evaluate post-repair testing</p>	<ul style="list-style-type: none"> • Test results are compared with baseline operating data of components and anomalies are corrected or referred to appropriate personnel or departments. • Test results and corrective actions are properly communicated, documented, and filed. • Active participation in root cause analysis is conducted as required. • Wind turbines are monitored for efficiency, safety, and operation within parameters. • Unsafe conditions are communicated to appropriate personnel effectively and in a timely manner. • Sights, sounds, feel, and smell of wind turbine components are noted as to confirm they are within normal operating parameters. • When applicable, test instrumentation is properly installed to monitor wind turbine components. 	<ul style="list-style-type: none"> • Knowledge of baseline operating data of the components. • Knowledge of test result documentation procedures. • Knowledge of electronics including analog, digital, and logic theory. • Knowledge of when to make corrections and when to refer problems to other individuals or departments. • Knowledge of how wind turbines operate and normal operating parameters. • Knowledge of turbine technical drawings and symbols. • Knowledge of safety standards and regulations and personal protective equipment and how to use it. • Ability to use SCADA (Supervisory Control and Data Acquisition) and understand wind turbine histories. • Knowledge of corrective actions and responses for specific problems. • Knowledge of wind turbine, technical, tool, safety, and personnel terminology. • Knowledge of how systems interrelate and the impact of this interrelationship on turbine operations. 	<ul style="list-style-type: none"> • Monitors system performance, troubleshoots system malfunctions, and analyzes system operation. • Applies and analyzes rules and principles to processes; procedures and uses logic to draw conclusions. • Analyzes situations and information, considers risks and implications, and compiles multiple viewpoints. • Records information accurately, completes forms, and writes simple documents. • Recognizes accuracy of information, interprets information, and prepares basic summaries.





Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
B6 Continued		<ul style="list-style-type: none"> • Ability to perceive changes based on sensory perception (sight, sound, feel, and smell) and to respond to them. • Knowledge of test instrumentation and how to install it to monitor wind turbine components. • Ability to check test equipment for calibration. 	
B7 Replace major components (i.e. gear box, main bearings, etc.	<ul style="list-style-type: none"> • Transport, removal and replacement of major components is performed safely and in accordance with all applicable laws and regulations. • Work instructions are followed accurately. • Lockout tagout is performed at the beginning of the project and removed upon completion. • Input is given to modify the plan of action as required during installation, customization, or upgrade. • Prior to starting replacement, communications are made to appropriate parties. 	<ul style="list-style-type: none"> • Knowledge of safety regulations, requirements, and policies regarding major components. • Ability to implement and follow work instruction and modify as needed. • Ability to understand and follow manufacturer's requirements and recommendations. • Knowledge of lockout tagout concepts and procedures. • Knowledge of wind turbine and system terminology. • Knowledge of how to interpret, apply and document test results to validate repair or installation. • Knowledge of test equipment calibration and use. 	<ul style="list-style-type: none"> • Understands computer operation, performs basic data entry, retrieves stored data, and interprets information. • Adheres to standards, demonstrates commitment to excellence, and leads by example. • Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure; and interprets charts, graphs and symbols. • Efficiently manages time, prioritizes daily tasks, prepares schedule, and monitors and adjusts task sequence.

Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<i>B7 Continued</i>	<ul style="list-style-type: none"> • Testing is performed in accordance with company protocols and manufacturer specifications. • Test results are properly documented and submitted. • Calibration date for test equipment is verified. • Lifting equipment is properly set up in accordance with manufacturer specifications and company procedures. • Return to service documentation is properly completed. • Pre-job briefings and job hazard analyzes are conducted. 	<ul style="list-style-type: none"> • Knowledge of lifting equipment and ability to locate and apply manufacturer specifications. • Knowledge of return to service procedures. • Thorough and detailed knowledge of the major component(s) being replaced. 	<ul style="list-style-type: none"> • Orders and maintains inventory; monitors safe and efficient utilization of materials. • Identifies and suggests needed system modifications and improvements.



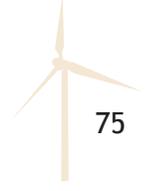


Job: Wind Turbine Technician

Critical Work Function: C.) Maintain Wind Turbines (Reliability and Optimization)

Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>C1 Gather and prepare materials, tools, and equipment; transport and set up equipment</p>	<ul style="list-style-type: none"> • All required materials/tools and parts for the job are located and assembled at the work site. • Where applicable, certification of tools is verified. • Materials/tools are checked to ensure they are in safe and proper working order. • Procedures regarding nonfunctioning tools are followed. • Applicable safety standards as they relate to the industry for job-site safety are followed. • Lifting equipment is set up properly in accordance with manufacturer specifications and company procedures. 	<ul style="list-style-type: none"> • Knowledge of special materials/tools and parts. • Knowledge of how tools should work. • Knowledge of part ordering procedures. • Knowledge of procedures regarding nonfunctioning tools. • Knowledge of safe work practices. • Knowledge of occupational hazards and standard safety devices. • Knowledge of location of material and parts storage. • Knowledge of lifting equipment and ability to understand manufacturer's specifications. 	<ul style="list-style-type: none"> • Orders and maintains inventory and monitors safe and efficient utilization of materials. • Efficiently manages time, prioritizes daily tasks, prepares schedule, and monitors and adjusts task sequence. • Analyzes situations and information, considers risks and implications, and compiles multiple viewpoints. • Understands the requirements of the task and technological results and analyzes task/technology relationship. • Selects relevant data, identifies the need for data, predicts outcomes, and integrates multiple items of data.

Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>C2 Perform preventative maintenance</p>	<ul style="list-style-type: none"> • Hazardous materials procedures are followed with respect to handling and disposal. • Safety and environmental procedures are followed and proper personal protective equipment is worn or used. • Preventive maintenance procedures are completely followed in accordance with manufacturer service manual. • Maintenance job is documented and verified according to company or department procedure. • Required maintenance is performed safely, correctly, on time. • Suggestions to revise maintenance plan are made to appropriate personnel effectively and in a timely manner. • Lockout tagout is correctly performed. • Preventive maintenance sampling is performed correctly and documentation is properly filled out and filed. 	<ul style="list-style-type: none"> • Complete understanding of the operational system. • Ability to read and interpret and follow manufacturer's service manual and PM procedures. • Knowledge of hazardous materials and safety and environmental procedures. • Knowledge of company policies and procedures. • Knowledge of computerized maintenance management system. • Knowledge of sampling procedures. • Knowledge of lockout tagout procedures. • Ability to perform measurement conversions. • Thorough and detailed knowledge of the component(s) being maintained. • Ability to write and update maintenance logs. 	<ul style="list-style-type: none"> • Troubleshoots and corrects malfunctions and failures; evaluates performance of technology; analyzes failures. • Maintains self control, accepts constructive criticism, sets well defined/ realistic goals, and demonstrates commitment to self improvement. • Orders and maintains inventory and monitors safe and efficient utilization of materials. • Identifies relevant details, facts, specifications, follows set of instructions, and qualifies/analyzes information. • Analyzes situations and information, considers risks and implications, and compiles multiple viewpoints. • Records information accurately, completes forms, and writes simple documents.





Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>C3 Perform mechanical and electrical component and system tests</p>	<ul style="list-style-type: none"> • Prior to starting tests, applicable communications are made to appropriate parties. • Testing is performed in accordance with company and industry protocols and procedures. • Test results are properly documented and submitted. • Calibration date for test equipment is verified. • All required test equipment is identified and located. • Test equipment is used correctly. 	<ul style="list-style-type: none"> • Knowledge of safety regulations, requirements, and policies regarding components. • Ability to understand and follow manufacturer requirements and recommendations. • Knowledge of lockout tagout procedures. • Knowledge of manufacturer, wind turbine and system terminology. • Knowledge of testing procedures and parameters. • Ability to perform testing in accordance with company policy and procedures. • Knowledge and application of relevant safety policies and procedures. • Knowledge of how to interpret, apply, and document test results to validate repair or installation. • Knowledge of test equipment, calibration, function, and use. • Thorough and detailed knowledge of the component(s) being tested. 	<ul style="list-style-type: none"> • Understands technology applications, flows proper procedures, and manipulates technology of desired results. • Interprets and converts numerical data and predicts arithmetic results. • Understands the requirements of the task and technological results and analyzes task/technology relationship. • Understands the system organization and hierarchy and follows processes and procedures. • Efficiently manages time, prioritizes daily tasks, prepares schedule, and monitors and adjusts task sequence. • Recognizes job tasks, distributes and analyzes work assignments, and delegates responsibilities.

Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>C4 Perform repairs or replace components</p>	<ul style="list-style-type: none"> • Work is performed safely in accordance with company policies and procedures and in accordance with all applicable laws and regulations. • Lockout tagout and switching and clearance procedures are followed in accordance with company guidelines. • Repair procedures are followed. • Appropriate coworkers are informed regarding the repair process. • During maintenance process, components are thoroughly inspected to identify other repair needs. • Where appropriate, repair plan and job safety/hazard analysis are effectively communicated to appropriate personnel in a timely manner. • Replaced parts are properly disposed of or refurbished and returned to service. • Post-repair testing is performed to ensure components are in proper working order. • Housekeeping procedures are followed. • Where applicable contract workers are properly supervised to ensure work complies with all company procedures. • Special tools are gathered and checked. 	<ul style="list-style-type: none"> • Knowledge of technical requirements and manufacturer recommended work instructions. • Knowledge of inspection procedures. • Thorough and detailed knowledge of turbine and component function and purpose within the system, and their impact on other systems. • Ability to participate in root cause analysis. • Ability to properly test and validate successful repair. • Knowledge of proper disposal and refurbishing procedures for parts and repairs. • Knowledge of housekeeping practices. • Ability to use special tools. • Thorough and detailed knowledge of the component(s) being repaired or replaced. 	<ul style="list-style-type: none"> • Understands technology applications, flows proper procedures, and manipulates technology of desired results. • Troubleshoots and corrects malfunctions and failures; evaluates performance of technology; analyzes failures. • Recognizes job tasks, distributes and analyzes work assignments, and delegates responsibilities. • Orders and maintains inventory and monitors safe and efficient utilization of materials. • Applies and analyzes rules and principles to processes and procedures and uses logic to draw conclusions. • Recognizes accuracy of information, interprets information, and prepares basic summaries. • Identifies and suggests needed system modifications and improvements.



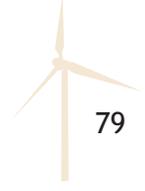


Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>C5 Document equipment installation, maintenance and repair</p>	<ul style="list-style-type: none"> • Documentation is performed according to company and department policies and procedures. • Preventive maintenance schedule is properly adjusted to reflect repairs made. • Documentation is understandable, relevant, and succinct. • Documents and appropriate files are input into database, filed, or distributed to correct parties. 	<ul style="list-style-type: none"> • Knowledge of documentation policies and procedures. • Ability to record relevant and accurate data into manual and electronic systems. • Ability to report findings and make recommendations based on documented history and findings. • Understanding of the operational system and how wind turbine maintenance issues can adversely impact operations. • Ability to use correct terminology. 	<ul style="list-style-type: none"> • Interprets information and applies processes to new information. • Records information accurately, completes forms, and writes simple documents. • Pays attention to details, demonstrates initiative, monitors performance standards, and follows up on assigned tasks.

Job: Wind Turbine Technician

Critical Work Function: D.) Maintain Tools, Equipment, and Inventory

Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>D1 Maintain, inspect, repair, or replace hand tools and test equipment</p>	<ul style="list-style-type: none"> • Hand tools and test equipment are assessed to determine if they are beyond repair and if not, proper repair procedures are followed. • Information regarding broken hand tools and equipment is communicated to appropriate personnel effectively and in a timely manner. • Calibration tags are checked to verify if calibration is needed; proper procedures are followed to attain calibration. • Supplies are stocked and maintained. • The correct checklists are used properly. • Safety procedures are followed. • Equipment malfunctions and readiness are communicated to appropriate personnel effectively and in a timely manner. 	<ul style="list-style-type: none"> • Knowledge of tool and equipment terminology and the locations of tools, parts, and equipment. • Knowledge of calibration tags. • Ability to properly inspect tools and submit nonfunctional tools for repair. • Ability to repair hand tools and test equipment. • Knowledge of established policies and procedures regarding tools. • Knowledge of tools and equipment function and use. • Knowledge of tests to ensure hand tools and test equipment are in good and safe working order. • Knowledge of standard operating and safety procedures. 	<ul style="list-style-type: none"> • Orders and maintains inventory and monitors safe and efficient utilization of materials. • Defends own viewpoints, accepts responsibility for own behavior, and understands own impact on others. • Troubleshoots and corrects malfunctions and failures; evaluates performance of technology; analyzes failures. • Interprets and applies new knowledge and experience and analyzes application of learning tools. • Interprets information and applies processes to new information.





Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>D2 Maintain and operate utility/field truck tools and stock</p>	<ul style="list-style-type: none"> • Vehicle is in good working order and scheduled maintenance is consistently performed. • Vehicle safety equipment is available and up-to-date. • Site rules for vehicle use are followed. • Adequate tools, equipment, and materials are present for everyday use or scheduled work. • Truck bins are properly stocked and maintained in an orderly manner. • Information regarding missing, broken, or depleted safety equipment and standard tools is communicated to appropriate personnel effectively and in a timely manner. 	<ul style="list-style-type: none"> • Knowledge of characteristics of a vehicle in good working order or in need of repair. • Knowledge of scheduled maintenance for vehicles and how to obtain it. • Knowledge of vehicle safety equipment. • Ability to determine if safety equipment is up-to-date. • Knowledge of tools, equipment, and materials required for everyday use or a scheduled job. • Ability to inspect safety equipment and standard tools and communicate inspection information to supervisor. • Knowledge of tool kit inventory requirements. 	<ul style="list-style-type: none"> • Troubleshoots and corrects malfunctions and failures; evaluates performance of technology; analyzes failures. • Demonstrates honesty and trustworthiness, accepts responsibility for own behavior, and analyzes implications of decisions. • Analyzes situations and information, considers risks and implications, and compiles multiple viewpoints. • Orders and maintains inventory and monitors safe and efficient utilization of materials. • Adheres to standards, demonstrates commitment to excellence, and leads by example. • Efficiently manages time, prioritizes daily tasks, prepares schedule, and monitors and adjusts task sequence. • Understands technology applications, flows proper procedures, and manipulates technology of desired results.

Job: Wind Turbine Technician

Critical Work Function: E) Interact and Communicate with Coworkers, Suppliers, Customers, and Contractors

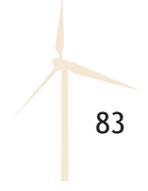
Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>E1 Participate in pre-job/tailgate meetings</p>	<ul style="list-style-type: none"> The entire crew is in attendance. Meeting covers the scope of the job and individual work assignments. Issues are thoroughly discussed and solutions are defined. Proper terminology is used. Meeting starts and ends on time. Acknowledgements and recognition are provided to individuals as appropriate. 	<ul style="list-style-type: none"> Knowledge of industry terminology. Knowledge of the wind turbine system and equipment. Knowledge of meeting protocols in accordance with organizational policies and procedures. 	<ul style="list-style-type: none"> Establishes rapport with coworkers and customers; modifies behavior to environment; shows understanding for others; and encourages cooperation and negotiation. Confirms information and interprets, clarifies, and influences communication. Assists and encourages team members, actively participates, works to improve team skills, and demonstrates commitment. Adheres to standards, demonstrates commitment to excellence, and leads by example. Analyzes possible causes, generates and evaluates solutions, and generates and evaluates solutions. Applies and analyzes rules and principles to processes and procedures and uses logic to draw conclusions. Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure; and interprets charts, graphs and symbols.





Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>E2 Participate in meetings and problem solving groups with coworkers and management</p>	<ul style="list-style-type: none"> • Meetings are attended with active participation and with adequate preparation to be well informed about the meeting topic. • Issues are accurately and thoroughly discussed and solutions are defined. • Where applicable, meeting minutes and notes are taken and submitted to appropriate departments and parties. • All required job task safety meetings are conducted in accordance with applicable laws, regulations, and organization policies and procedures. 	<ul style="list-style-type: none"> • Knowledge of industry, company, wind turbine, equipment, safety, regulatory, maintenance, repair, and personnel terminology. • Knowledge of the wind turbine system. • Knowledge of wind turbines and wind turbine components. • Knowledge of laws, regulations, and organization policies and procedures regarding job task safety meeting requirements. 	<ul style="list-style-type: none"> • Interprets information and applies processes to new information. • Recognizes accuracy of information, interprets information, and prepares basic summaries. • Recognizes differences, understands the legal aspects of discrimination, respects the rights of others, and recognizes the value of diversity. • Communicates appropriate verbal/non-verbal messages, actively participates in discussion, and presents complex ideas and information. • Maintains self control, accepts constructive criticism, sets well defined/realistic goals, and demonstrates commitment to self improvement.

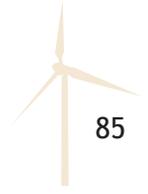
Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>E3 Interface with public and land owners</p>	<ul style="list-style-type: none"> • Health, safety, and environmental information is on file and accessible. • Upon request, meetings are held and tours are provided with all relevant groups and individuals to educate them about health, safety, and/or environmental assurance programs and topics. • Information is provided regarding working and living around wind turbines. • Discussions with the public are initiated when appropriate regarding safety and environmental issues. • Property owner and land use concerns are responded to in a timely manner. • Presentations are provided upon request. • Communications with land owners and public comply with standards of conduct and sensitive communications policies. 	<ul style="list-style-type: none"> • Knowledge of health, safety, and environmental information locations and sources. • Knowledge of land use, health, safety, and/or environmental assurance topics and issues. • Knowledge of standards of conduct and sensitive communications policies. • Knowledge of wind turbines and how they interface with land owners and the public. 	<ul style="list-style-type: none"> • Defends own viewpoints, accepts responsibility for own behavior, and understands own impact on others. • Communicates appropriate verbal/non-verbal messages; actively participates in discussion, and presents complex ideas and information. • Confirms information and interprets, clarifies and influences communication. • Demonstrates sensitivity to customer concerns and responds to and analyzes customer needs. • Establishes rapport with coworkers and customers; modifies behavior to environment; shows understanding for others; and encourages cooperation and negotiation.





Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>E4 Communicate with suppliers regarding parts, tools, and refurbishment</p>	<ul style="list-style-type: none"> • Research is conducted to properly prepare for the communication. • Communication is respectful, clear, and without discrimination. • Actions and results of discussions with suppliers are communicated to management and all required approvals are obtained. 	<ul style="list-style-type: none"> • Ability to research parts and tools. • Knowledge of the function of parts. • Knowledge of specifications of part in question. 	<ul style="list-style-type: none"> • Communicates appropriate verbal/non-verbal messages, actively participates in discussion, and presents complex ideas and information. • Understands negotiations process, identifies conflicts, and demonstrates composure. • Selects relevant data, identifies the need for data, predicts outcomes, and integrates multiple items of data. • Confirms information and interprets, clarifies, and influences communication.

Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>E5 Interact with, monitor, and direct contractors (i.e. cranes, roads, vendors, etc.)</p>	<ul style="list-style-type: none"> Contracted services are monitored for effectiveness. Communications regarding deficiencies are conducted in a clear and timely manner. Housekeeping is monitored to ensure a clean and productive workplace. Relationships are made and kept in a respectful and ethical manner. Company ethical guidelines are followed. 	<ul style="list-style-type: none"> Knowledge of requirements for contracted services. Ability to identify contracting deficiencies. Knowledge of company standards of conduct and required and allowable communications with external customers and contractors. Knowledge of company ethical guidelines with respect to contractors. Knowledge of the component with which the contractor is working. 	<ul style="list-style-type: none"> Communicates appropriate verbal/non-verbal messages, actively participates in discussion, and presents complex ideas and information. Confirms information and interprets, clarifies, and influences communication. Recognizes job tasks, distributes and analyzes work assignments, and delegates responsibilities. Selects relevant data, identifies the need for data, predicts outcomes, and integrates multiple items of data. Analyzes situations and information, considers risks and implications, and compiles multiple viewpoints. Efficiently manages time, prioritizes daily tasks, prepares schedule, and monitors and adjusts task sequence.



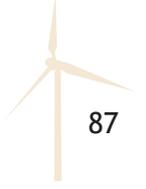


Job: Wind Turbine Technician

Critical Work Function: F) Adhere to Policies and Standards

Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
F1 Comply with environmental regulations (SPCC & SRP) (Spill Prevention Control and Countermeasures & Spill Response Plan)	<ul style="list-style-type: none"> • Safety and OSHA (Occupational Safety and Health Administration) regulations are supported and followed. • Proper PPE (Personal Protective Equipment) is available and used by all personnel as required. • Noncompliance conditions are reported to proper personnel and authorities in accordance with all applicable laws, regulations, and company policies. • Noncompliance conditions are corrected and logged in accordance with project permit and regulatory requirements. • SPCC (Spill Prevention Control and Countermeasures) plans are up to date. • Spill remediation supplies and kits are inspected and maintained. 	<ul style="list-style-type: none"> • Knowledge of procedures for taking corrective actions. • Knowledge of emergency policies and procedures and ability to use emergency equipment. • Knowledge of PPE requirements. • Knowledge of regulations protecting the environment. • Knowledge of project and regulatory compliance requirements. • Knowledge of SPCC plans and requirements. • Knowledge of contents of spill remediation supplies and kits. 	<ul style="list-style-type: none"> • Identifies relevant details, facts, specifications, follows set of instructions, and qualifies/analyzes information. • Recognizes accuracy of information, interprets information, and prepares basic summaries. • Pays attention to details, demonstrates initiative, monitors performance standards, and follows up on assigned tasks. • Assists and encourages team members, actively participates, works to improve team skills, and demonstrates commitment. • Demonstrates honesty and trustworthiness, accepts responsibility for own behavior, and analyzes implications of decisions.

Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>F2 Adhere to site-specific work practices and procedures, and emergency response and preparedness</p>	<ul style="list-style-type: none"> • Site-specific work practices and procedures are completely followed. • Coworkers are informed of site-specific work practices and procedures and emergency response and preparedness. 	<ul style="list-style-type: none"> • Knowledge of site-specific work practices and procedures. • Knowledge of emergency response and preparedness. 	<ul style="list-style-type: none"> • Demonstrates honesty and trustworthiness, accepts responsibility for own behavior, and analyzes implications of decisions. • Pays attention to details, demonstrates initiative, monitors performance standards, and follows up on assigned tasks. • Selects relevant data, identifies the need for data, predicts outcomes and integrates multiple items of data. • Adheres to standards, demonstrates commitment to excellence, and leads by example. • Assists and encourages team members, actively participates, works to improve team skills, and demonstrates commitment. • Recognizes accuracy of information, interprets information, and prepares basic summaries.



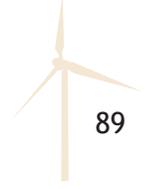


Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
F3 Perform company and site-specific administrative activities (time sheets, vehicle accident forms, etc.)	<ul style="list-style-type: none"> • Records and reports are accurate and are filed in proper locations. • Records and reports are submitted in a timely manner to appropriate personnel and departments. • Records and reports are kept up to date. • Records and reports are maintained in accordance with company policies. • Security protocols are accurately followed. 	<ul style="list-style-type: none"> • Knowledge of reporting requirements. • Knowledge of policies and procedures regarding records and reports. • Knowledge of security protocols. 	<ul style="list-style-type: none"> • Demonstrates honesty and trustworthiness, accepts responsibility for own behavior, and analyzes implications of decisions. • Records information accurately, completes forms, and writes simple documents. • Understands computer operation, performs basic data entry, retrieves stored data, and interprets information. • Efficiently manages time, prioritizes daily tasks, prepares schedule, and monitors and adjusts task sequence. • Recognizes job tasks, distributes and analyzes work assignments, and delegates responsibilities.

Job: Wind Turbine Technician

Critical Work Function: G) Conduct Training and Participate in Continuous Learning

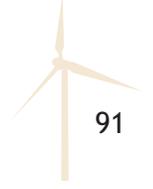
Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>G1 Achieve and maintain proficiency in current and new technologies</p>	<ul style="list-style-type: none"> • Technical trainings and working demonstrations are attended with full participation. • Initiative is demonstrated to participate in continuous learning opportunities. • Initiative is demonstrated to recommend and request training opportunities from management and gain knowledge on an individual basis. 	<ul style="list-style-type: none"> • Ability to access information on continuous learning opportunities. • Knowledge of location of wind turbine instruction manuals and how to use them. 	<ul style="list-style-type: none"> • Understands computer operation, performs basic data entry, retrieves stored data, and interprets information. • Maintains self control, accepts constructive criticism, sets well defined/ realistic goals, and demonstrates commitment to self improvement. • Interprets and applies new knowledge and experience and analyzes application of learning tools. • Identifies relevant details, facts, specifications, follows set of instructions, and qualifies/analyzes information. • Understands technology applications, flows proper procedures, and manipulates technology of desired results.





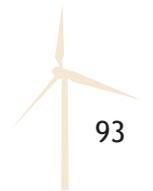
Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>G2 Train others in specific operation, maintenance, and repair procedures</p>	<ul style="list-style-type: none"> • Trainees are given a complete orientation to wind turbines. • All relevant information regarding wind turbine safety is communicated clearly and effectively. • Ongoing mentoring and technical assistance are provided to trainees. 	<ul style="list-style-type: none"> • Knowledge of the location of wind turbines in the project, how the wind turbines operate, and normal operating parameters. • Knowledge of schematics and diagrams (mechanical, electrical, and hydraulic) and standard IEEE (International Electrical and Electronics Engineers) and IEC (International Electrical Code) symbols. • Knowledge of wind turbines and wind turbine components. • Knowledge of safety standards and regulations OSHA (Occupational Safety and Health Administration), 1910.269, and WAC (Washington Administrative Code) 296.45, and personal protective equipment and how to use it. • Ability to use tools such as hand tools, power tools, and meters. Ability to read wind turbine histories and trend data and document them. • Knowledge of standard operating procedures, documentation requirements, and required logs. • Knowledge of company, wind turbine, equipment, technical, tool, safety, and personnel terminology. • Knowledge of how systems interrelate and the impact of this interrelationship on project operations. 	<ul style="list-style-type: none"> • Conducts task-specific training, coaches others to apply related concepts, and provides constructive feedback/reinforcement. • Communicates appropriate verbal/non-verbal messages, actively participates in discussion, and presents complex ideas and information. • Confirms information and interprets, clarifies, and influences communication. • Pays attention to details, demonstrates initiative, monitors performance standards, and follows up on assigned tasks. • Recognizes differences, understands the legal aspects of discrimination, respects the rights of others, and recognizes the value of diversity. • Adheres to standards, demonstrates commitment to excellence, and leads by example.

Key Activity	Performance Indicators <i>How do we know when the task is performed well?</i>	Technical Knowledge <i>Skills, Abilities, Tools</i>	Employability Skills <i>SCANS Skills and Foundational Abilities</i>
<p>G3 Maintain certifications</p>	<ul style="list-style-type: none"> • Mandatory trainings are attended as required. • CEU (Continuing Education Units) are accumulated as required. • CDL (Commercial Driver's License) physicals and drug tests are taken as required (site-specific). 	<ul style="list-style-type: none"> • Knowledge of first aid and ability to maintain first aid, CPR (Cardio Pulmonary Resuscitation) and AED (Automatic External Defibrillator) certification. • Ability to pass the CDL physical and drug tests as required. 	<ul style="list-style-type: none"> • Interprets and applies new knowledge and experience and analyzes application of learning tools. • Pays attention to details, demonstrates initiative, monitors performance standards, and follows up on assigned tasks. • Understands technology applications, flows proper procedures, and manipulates technology of desired results. • Assists and encourages team members, actively participates, works to improve team skills, and demonstrates commitment. • Identifies relevant details, facts, specifications, follows set of instructions, and qualifies/analyzes information.





Integration



Assessment and Certification: A Vital Connection

Skill standards, while useful on their own, are just one part of a much larger equation. Skill standards establish the standard of competent performance, but they do not tell a person whether he or she has succeeded in meeting that standard.

For this reason, developing skill standards does not end with their publication. Next steps should include developing voluntary assessments and certifications which will make it possible for students, workers, and any interested persons to determine their strengths and weaknesses based on the standards, and to earn certification showing that they can perform work competently as established by the skill standards.

In today's fast-moving technological economy, the necessity for assessments and certification is crucial. The demand for both technical and employability skills are escalating as work becomes more complex. The workforce is more mobile, with workers moving freely between jobs and industries. This job mobility requires that workers must be able to communicate their qualifications to potential employers. They must keep up with technological change through continuous learning and

worker retraining, and must be able to prove they have kept pace. All of these factors mean more training and education for individuals, and the ability to show evidence that this training translates to performance on the job.

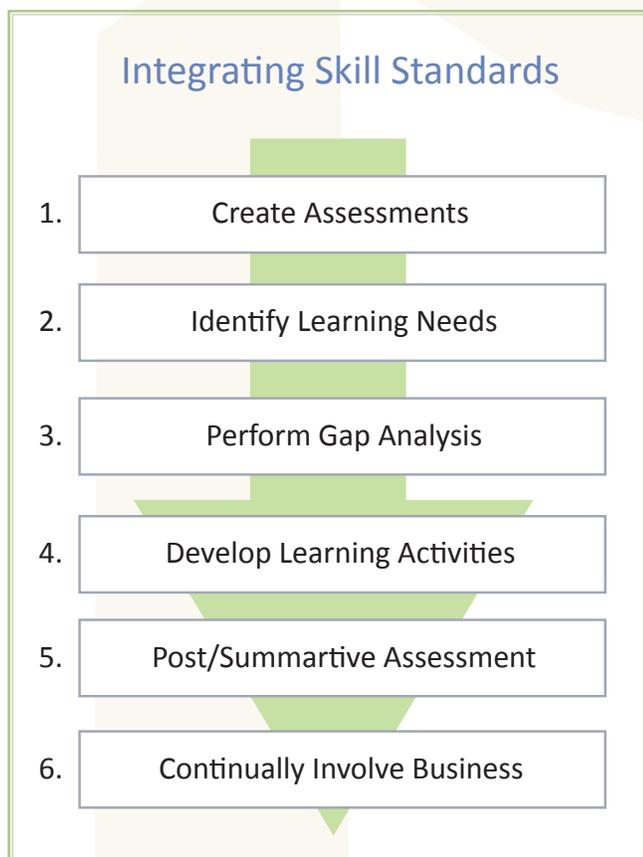
Voluntary assessments and certifications based on skill standards will help us

Please Note: *To ensure the use of standards and their related assessments and certifications do not contradict U.S. employment law, employers will need to conduct an internal validation of the standards before using the skill standards to make hiring and promotion decisions. The purpose of this validation is to ensure that the knowledge, skills and performance described by the standards are needed for competent performance in an employer's organization. The need to validate the standards internally is a key requirement of U.S. employment law, which seeks to protect individuals from discrimination in hiring and promotion.*

address all of these needs because of the guiding principles upon which skill standards are based, and because of the stakeholders—employers, labor, educators, workers, students, and government—whose needs skill standards are designed to meet.

A step toward a statewide system of assessments and certifications is the development of assessments which measure an individual’s ability to perform work competently as defined by the skill standards. Once these assessments are developed, curriculum can be reviewed to determine that all necessary topics and practicums sufficiently cover the items

in the assessment. As gaps are identified, learning activities and content adjustments can be made and post/summative assessments can be administered. Finally, it is critical that industry be involved every step of the way, and that standards are continuously reviewed and updated. The diagram below provides a summary of this process.



Assessment Strategies

Upon completion of the development of skill standards, performance assessment can be created to assess the criteria identified. Sample assessments and standards may be distributed to instructors and curriculum developers who will be educated on the skill standards elements.

Assessments based on the skill standards may include pre-and post-evaluations of the student to measure skill progression and to track the success rate of obtaining certification, where applicable.

Within a skill standards or competency-based system, assessment is the generation and collection of evidence of performance which can be matched to specified explicit standards that reflect expectations of performance in the workplace. There are two main forms of evidence:

Evidence of actual performance

Evidence of underpinning knowledge, skills, and abilities

The types of evidence may vary and will include:

Direct evidence (products and items produced by the performer)

Indirect evidence (supporting evidence and information about the performer)

Evidence can be collected in a wide variety of educational or business settings. To a large extent, the range of opportunities available for demonstration will determine the most appropriate setting. Often it is difficult to actually perform the task in the authentic work setting. In this case, evidence generated during an educational course or an in-house training session can be collected by individuals and added to their overall portfolios.

By requesting that the student or trainee produce tangible results in the form of take-away products (videos, tapes, paper, and electronic products), the participant will have created real evidence which can be shown to human resource personnel, hiring managers, supervisors or assessors. When assessing these products, the trained assessor will seek:

Validity

Currency

Authenticity

Sufficiency





Therefore, when designing a skill standards-based assessment for an educational course or training session, the assessment process and results will meet four criteria:

Validity: The assessment instrument/process clearly relates to the relevant standards.

Currency: The assessment instrument/process calls for a demonstration of the current standards in the industry.

Authenticity: The individual being assessed produces the assessment results; it is their own work. Team activities will be useful to demonstrate the skills and abilities to work effectively with others, not necessarily the total end results. The individual can, if possible, identify his or her part of the team project to demonstrate evidence of his or her own results.

Sufficiency: Enough evidence is collected to match the key task and the performance criteria included in the skill standards.

When designing/revising the curriculum for power generation, students will be assisted in generating high-quality evidence of performance or of underpinning skills, knowledge, and abilities which will help them to be successfully assessed as fully competent.

¹ Adapted from *Skill Standards Volume 2: Assessment, 1999, Washington State Board for Community and Technical Colleges, and Designing Competency-Based Training, Shirley Fletcher, 1991, Pfiffer & Company, p. 86-88.*

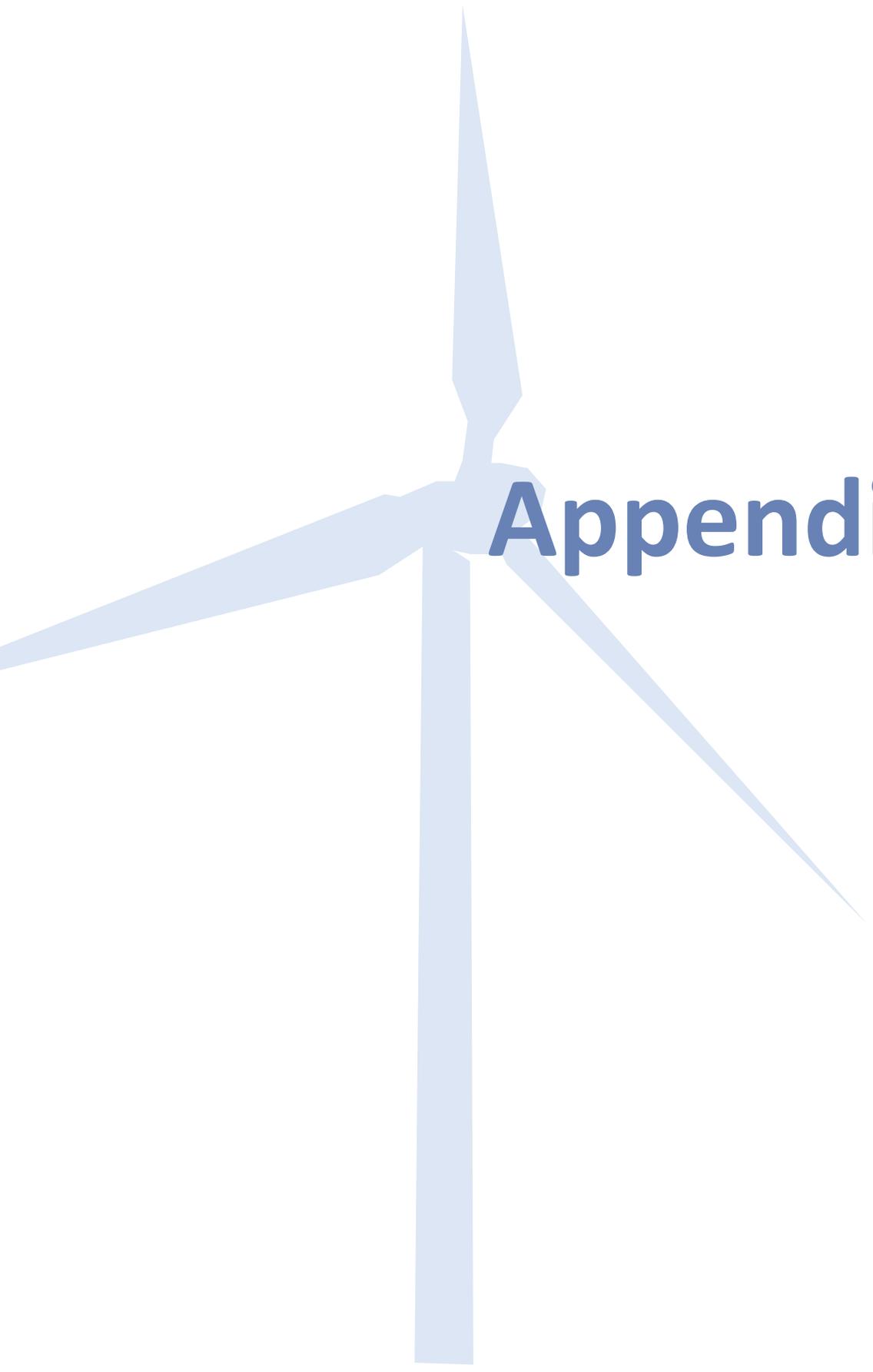


Assessment Design

Type of Authentic Assessment	Description of Authentic Assessment Strategies
Project	Hands-on demonstration of knowledge, skills, and attitudes that reveals a student's ability to plan, organize, and create a product or an event.
	Documentation of process of development from initial steps to final presentation.
Portfolio	Collection of pieces of evidence of a student's knowledge, skills, and attitudes.
	Showcase of best work and/or work-in-progress.
	Record of student's progress over time.
	Content selection by student in collaboration with the teacher.
On-Demand Demonstrations	Centerpiece for parent conferences.
	Hands-on performance by a student, which illustrates levels of knowledge, skills, and attitudes.
	Typically involve a "real life" problem or situation to solve.
Case Studies	Focus on the application of knowledge and skills learned in one situation as it connects to a new and different one.
	Analysis of events and individuals in light of established criteria.
Paper/Pencil Tests	Synthesis of evidence to support generalizations based on individual cases.
	Multiple-choice, essay, and/or true-false questions that rely on extended responses to further clarify a student's understanding of the knowledge being assessed.
Structured Observation	Graphic representations that reveal a student's understanding of connections among ideas.
	Observation of events, groups, and individuals that focuses on the salient traits of the skill or attitude being observed.
Scenarios	A problematic or challenging situation presented in the context of a career-technical perspective.
	Study required to analyze or evaluate a situation.
	Apply relevant knowledge or skills.
	Prepare and justify a reasonable solution.
Critical Incident	An interview where the assessee is asked to describe past experiences which demonstrate skill standards.



From: Center for Occupational Research and Development, November 1996, and the forthcoming *Skill Standards Volume 2: Assessment*, 1999, Washington State Board for Community and Technical Colleges.



Appendices



References

Additional energy-sector skill standards can be found at: www.wa-skills.com/energy.html

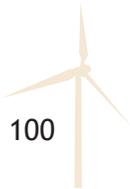
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Notes

