

# ENERGY CONSERVATION SKILLS INVENTORY FOR BUILDING OPERATORS

Northwest Energy Efficiency Council conducted a job task analysis and identified four critical work functions building operators perform that can impact energy efficiency and performance of commercial buildings. This body of skills, abilities, and knowledge was reviewed by 203 building operators and the national advisory committee members, setting a standard that underscores the key role the building operator professional plays in a profitable corporate energy management strategy and helping organizations meet and exceed energy management goals. Building operators may use this information as a self-assessment tool to take an inventory of the skills needed to operate buildings efficiently; track and identify gaps in their skills; and promote and utilize their skills affectively.

## Get Started

As an operator, having a clear picture of the skills you have now can enable better decision making about what steps to take to meet career goals. You can begin by completing the self-assessment.

**Self-assessment:** *(approximately 30 minutes – 1 hour to complete)*

*Column 1:* Rate your ability to perform a task on a scale of 1 to 3.

- 1 - Need help from others
- 2 - Moderate ability
- 3 - Highly skilled

*Column 2:* Jot down how you applied the task on the job. Make the connection between what was done and why it matters to the organization. Highlight significant achievements and how the organization is better off because of the contribution. This can be a specific problem you solved, no-cost adjustment, the solution you used, specific cost-savings, and years of experience you have performing the task in question. It would be good to note challenges you faced whether technical or interpersonal and how you managed or overcame the obstacle.

*Column 3:* Note the type of equipment or system and some specifics such as tonnage, wattage, horse power, or other relevant specifications.

## Next Steps:

At the end of the assessment, you'll find a section that walks you through a good process you can use to synthesize your skills and interests and focus on what you want to do and how to get there.

## ENERGY CONSERVATION SKILLS INVENTORY FOR BUILDING OPERATORS

		1	2	3
<b>Key Activity: Technical Knowledge, Skills, Abilities and Tools</b>		<b>Rate your ability</b> 1 - Need help from others 2 - Moderate ability 3 - Highly skilled	<b>Brief summary of how you applied the key activity on the job</b>	<b>Identify the equipment or system involved</b>
<b>A</b>	<b>Maintain Energy Using Building Systems, Equipment, and Envelope to Minimize Energy Use</b>			
<b>A1</b>	<b>Perform preventive and predictive maintenance</b>			
A1.1	Demonstrate understanding of whole building systems and how components interact with each other, with the building, its occupants, and the environment.			
A1.2	Read and interpret maintenance schedules, manufacturer and as-built building system specifications and follow recommendations for preventative maintenance requirements.			
A1.3	Use appropriate handtools and equipment to maintain building systems and equipment including envelope, HVAC systems, and electrical systems with no adverse impact on other building systems and equipment.			
A1.4	Use predictive maintenance techniques to perform unscheduled maintenance.			
A1.5	Maintain lighting systems and identify lighting retrofit options.			
<b>A2</b>	<b>Troubleshoot system and equipment problems and perform diagnostic testing</b>			
A2.1	Conduct a walk-through inspection of lighting systems, mechanical equipment, electrical rooms, rooftop equipment, plumbing fixtures, and overall building operation. Identify abnormal building performance and detect equipment degradation.			
A2.2	Install data loggers including occupancy sensors, light loggers, and environmental quality monitors.			
	Analyze equipment performance using trend and test data, distinguish trends in performance, diagnose performance deviations, and determine corrective action.			

<b>Key Activity: Technical Knowledge, Skills, Abilities and Tools</b>		<b>Rate your ability</b> 1 - Need help from others 2 - Moderate ability 3 - Highly skilled	<b>Brief summary of how you applied the key activity on the job</b>	<b>Identify the equipment or system involved</b>
A2.3	Use in-house documentation and manuals to troubleshoot including manufacturer's specifications, instrument calibration sheets, service and maintenance schedules, sequence of operation, and equipment measurements and trends logs.			
A2.4	Use root cause analysis to troubleshoot building systems.			
A2.5	Calibrate DDC control components including transmitters, transducers, and flow instruments.			
A2.6	Identify mechanical problems associated with damper and valve actuators.			
<b>A3 Document equipment maintenance</b>				
A3.1	Document diagnostic test results and maintenance activities and update records (i.e. wiring diagrams, prints, schedules, checklists) after changes are made to the building systems (i.e. operational sequences, schedules, and set points).			
A3.2	Organize and maintain library of documentation and O&M manuals including as built drawings, device specifications and sequence of operation, vendor service manuals, instrumentation calibration sheets, in-house service and maintenance schedules.			
<b>B Operate Energy Using Systems for High Performance</b>				
<b>B1 Operate equipment settings and system control points</b>				
B1.1	Read the building operating plan for each system and identify the desired conditions, seasonal variations in operations, and monitored space conditions used to control the base systems.			
B1.2	Read and write sequence of operation documentation for HVAC equipment.			
B1.3	Read pneumatic and/or electrical controls diagrams to identify control points for HVAC systems, air handling units, chilled water, and hot water systems for constant volume and VAV applications.			

<b>Key Activity: Technical Knowledge, Skills, Abilities and Tools</b>		<b>Rate your ability</b> 1 - Need help from others 2 - Moderate ability 3 - Highly skilled	<b>Brief summary of how you applied the key activity on the job</b>	<b>Identify the equipment or system involved</b>
B1.4	Adjust operating settings of Pneumatic Control Systems according to best practices for efficient operation.			
B1.5	Adjust operating settings of electrical/Direct Digital Control (DDC) Systems according to best practices for efficient operation.			
B1.8	Operate HVAC system and adjust components for energy savings including reducing ventilation air, hot/cold water reset, economizer control, start time optimization, and peak demand load shedding.			
<b>B2</b>	<b>Measure and monitor energy performance</b>			
B2.1	Help develop and implement energy management goals and monitor outcomes for improved performance.			
B2.4	Collect energy use data using utility bills, rate structures, energy use indices, meters, digital controls, and other operating data.			
B2.6	Benchmark building performance and compare the performance to other buildings and national benchmarks.			
B2.5	Use spreadsheets, graphs, and charts to analyze energy usage and operation of building systems and distinguish trends and deviations in performance.			
B1.7	Conduct a lighting survey of the facility and implement energy efficiency lighting strategies.			
B2.3	Perform, measure, and verify low-cost/no-cost adjustments (equipment scheduling, sensor error, simultaneous heating and cooling, outside air usage).			

Key Activity: Technical Knowledge, Skills, Abilities and Tools	Rate your ability 1 - Need help from others 2 - Moderate ability 3 - Highly skilled	Brief summary of how you applied the key activity on the job	Identify the equipment or system involved
<b>B3 Sustain Energy Performance</b>			
B3.1	Recognize frameworks and current methods for assessing building key performance indicators (KPI) including LEED-EBOM™.		
B3.2	Identify common building KPI measurements for energy, operational practices, environmental quality, materials and resources, and awareness/cultural issues.		
B3.3	Access and systematically review established KPI measurements from a DDC, computerized maintenance management system (CCMS), logs, meter data, etc.		
B3.4	Ensure service contracts promote value through environmentally sound products, reduced costs and improved efficiencies. This can include selecting energy-efficient equipment, cleaning and building products that do not produce noxious or irritating odors, for example.		
B3.5	Interpret local and state energy efficiency requirements and identify utility incentives and tax credits available to implement energy saving measures.		
B3.6	Apply water conservations strategies to save water and associated energy consumption.		
<b>C Perform Technical and Administrative Duties</b>			
<b>C1 Communication</b>			
C1.1	Communicate clearly and proactively (timely) with building and project stakeholders including building management, O&M staff, occupants, architects, engineers, project managers, contractors, construction managers, and vendors.		
C1.2	Listen actively, clarify and confirm understanding.		
C1.3	Choose the most appropriate communication method (email, fax, letter, briefing, visual aid) for the job or purpose e.g. ask a simple question, provide complex instructions, keep a team informed, speak with an occupant, or make a proposal.		

<b>Key Activity: Technical Knowledge, Skills, Abilities and Tools</b>		<b>Rate your ability</b> 1 - Need help from others 2 - Moderate ability 3 - Highly skilled	<b>Brief summary of how you applied the key activity on the job</b>	<b>Identify the equipment or system involved</b>
C1.4	Address issues openly. Keep a log of important communications.			
C1.5	Read and check written communication for errors and spelling before sending them.			
C1.6	Use supporting documentation (reports, charts, graphs, and other visual aids) to keep others informed of building performance.			
<b>C2 Assist in occupant education and training</b>				
C2.1	Research industry awards and certifications and help occupants certify their space including LEED for Commercial Interiors (LEED CI) certification, ENERGY STAR Partner of the Year, NAREIT Leader in the Light, and BOMA awards.			
C2.2	Help occupants reduce utility use and office waste through awareness education, knowledge development, and by fostering occupant behavior change.			
C2.3	Help develop and implement an occupant communication plan.			
C2.4	Identify energy saving opportunities and/or inefficient occupant energy practices, suggest solutions, and monitor conservation activities.			
<b>C3 Obtain and maintain certification and proficiency in current and new technologies</b>				
C3.1	Use computer based building automation systems to collect and analyze building performance data.			
C3.2	Use productivity software such as word processing, email, databases, spreadsheets.			

Key Activity: Technical Knowledge, Skills, Abilities and Tools	Rate your ability 1 - Need help from others 2 - Moderate ability 3 - Highly skilled	Brief summary of how you applied the key activity on the job	Identify the equipment or system involved
C3.3 Use web-based resources, calculators, reporting, and benchmarking tools.			
<b>D Maintain Indoor Environmental Quality (IEQ) to Standards</b>			
<b>D1 Measure and monitor IEQ parameters</b>			
D1.1 Measure pressure, flow, velocity, temperature, CO2, humidity, carbon monoxide, radon, lead, asbestos, and spore count of indoor air.			
D1.2 Monitor fresh-air intake/air filtration, identify air barrier systems, and identify contaminant sources, pathways, and driving forces.			
D1.3 Measure lighting, electromagnetic frequency levels, and potable water quality.			
D1.4 Monitor common HVAC problems that lead to poor indoor air quality including compressor condensation, intake, oil, and moisture filters, and air dryer condenser.			
D1.5 Verify industry IEQ (ASHRAE 52.2) standards and IEQ ratings for HVAC equipment .			
D1.6 Read and interpret Materials Safety Data Sheets (MSDS) and comply with national environmental safety standards such as EPA and OSHA.			
D1.7 Survey occupants to determine thermal, acoustic, and lighting comfort and take corrective action.			
D1.8 Determine occupancy usage patterns, identify discrepancies between current occupancy and original space design, and identify and prioritize improvements.			

<b>Key Activity: Technical Knowledge, Skills, Abilities and Tools</b>		<b>Rate your ability</b> 1 - Need help from others 2 - Moderate ability 3 - Highly skilled	<b>Brief summary of how you applied the key activity on the job</b>	<b>Identify the equipment or system involved</b>
<b>D2</b>	<b>Troubleshoot IEQ issues</b>			
D2.1	Promptly respond to occupant IEQ concerns and document issues and complaints. Maintain a pollutant and source inventory and inspection schedules and checklists.			
D2.2	Promptly perform retrofits and remediation tasks to reduce or eliminate water leaks, HVAC problems, spills, capture and exhaust of point sources, control re-entrainment, and other events.			
D2.3	Control infiltration and exfiltration of air and abate airborne contaminants produced by outgassing of building materials, volatile organic compounds (VOC), molds, improper exhaust ventilation of ozone, and light industrial chemicals.			
D2.4	Apply daylight concepts and techniques to optimize natural and artificial light levels for a given task.			
<b>D3</b>	<b>D3 Assist in developing and implementing an IEQ plan</b>			
D3.1	Use low emitting materials and products, clean cooling towers & drip pans, remove old carpet.			
	Follow workplace safety practices. Call in experts when a situation is beyond your expertise.			
D3.7	Use proper cleaning equipment.			

# CAREER ACTION PLAN

**Action Plan:** (approx. 15 minutes)

After completing the self-assessment you should have a good picture of your strengths and areas you may want to develop. Take a few moments to make a plan of action. What are your strengths? How would you like to promote and utilize your skills more effectively? You may be interested in applying for a promotion, taking on more responsibility, or interested in a leadership role within your organization. Describe your goal in 1- 2 sentences. Then write down when you'd like to accomplish it – 1 year, 2 years?

Goal	Priority 1 , 2, or 3 years
1	
2	
3	

Determine what you need to do to take your career to next level and accomplish your goals. What skills do you need to develop? Are you interested in learning how to maintain a specific HVAC system or Direct Digital Controls? You may be interested in focusing on more effective communication. List the key activity, skill, ability, or tool you need to develop. Do you need special training? If so, find out what schools offer the training you need. Then write down the courses or reading material that will help you build your knowledge in these areas.

Skill	Training Program, Reading Material

# FEEDBACK FORM

Please help us improve the ENERGY CONSERVATION SKILLS INVENTORY by providing your feedback. If you feel something can be improved, or lacks clarity, or you think we should include additional resources or information, fill out this form and fax or email it to the **Training Manager at 206-292-4125 or olga.gazman@putnamprice.com**. Be sure to include your name, address, and phone number so we can respond to you with our thanks and further information.



Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Phone: \_\_\_\_\_ Email \_\_\_\_\_

## About the SKILLS INVENTORY

Rate the extent to which you agree or disagree with the following statements:

	Strongly Agree			Strongly Disagree	
1. The directions for completing the SKILLS INVENTORY were clear and easy to follow.	5	4	3	2	1
2. It took me 60 minutes or less to complete the inventory.	5	4	3	2	1
3. I was able to form a clear picture of the skills I have now.	5	4	3	2	1
4. I was able to identify the skills I need to develop.	5	4	3	2	1

## About the CAREER ACTION PLAN

Rate the extent to which you agree or disagree with the following statements:

	Strongly Agree			Strongly Disagree	
1. The directions for completing the CAREER ACTION PLAN were clear and easy to follow.	5	4	3	2	1
2. It took me 15 minutes or less to complete the plan.	5	4	3	2	1
3. I was able to set at least two career goals for myself based on the skills assessment.	5	4	3	2	1
4. I was able to research and identify training programs to help me build my skills.	5	4	3	2	1
5. I was able to identify reading material that will help me build my knowledge.	5	4	3	2	1

## Your Comments and Suggestions

Did you find ways the inventory tool can be improved and/or help you promote your skills effectively?

---

---

---

---