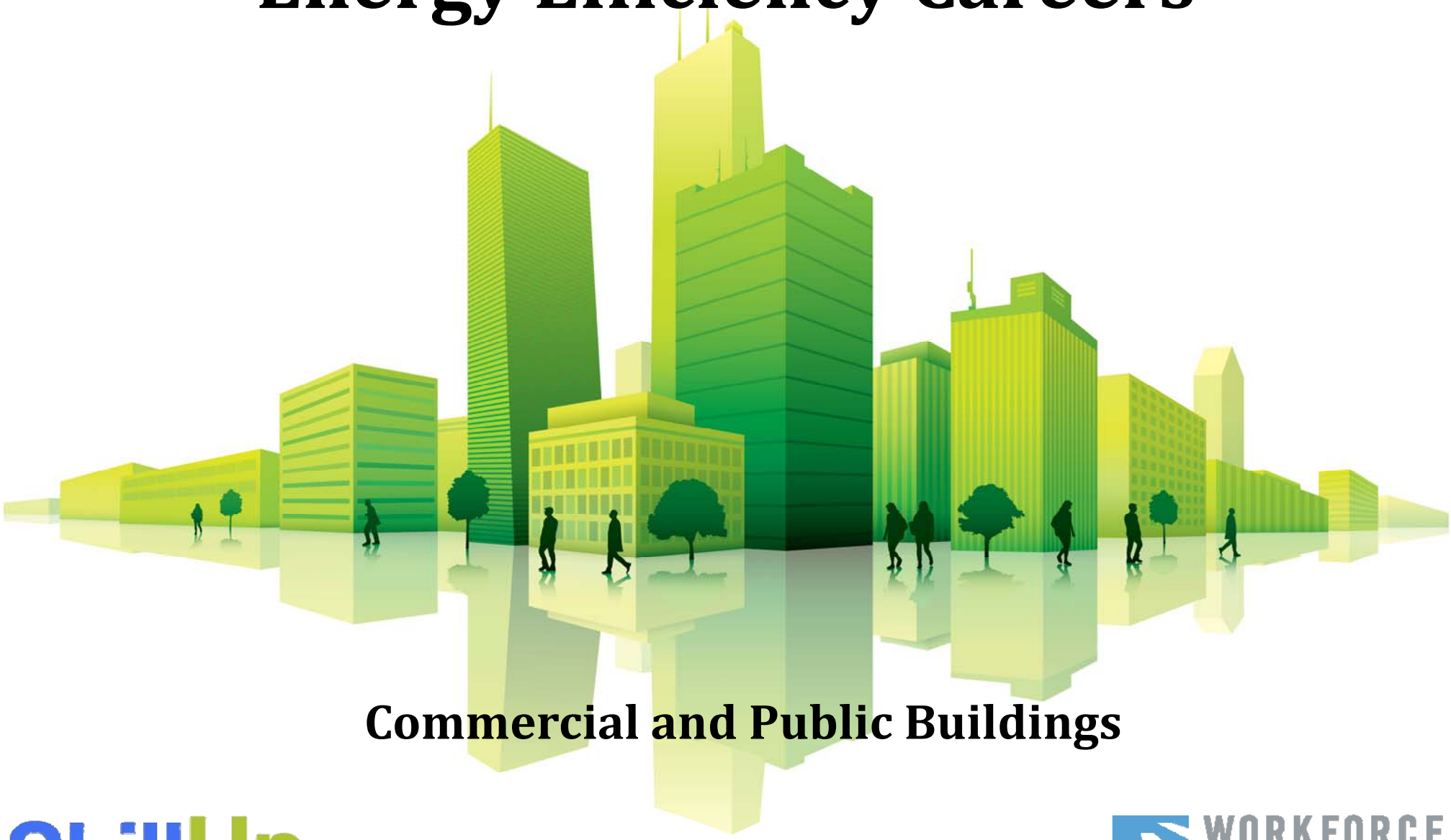
Energy Efficiency Careers



Commercial and Public Buildings

SkillUp WASHINGTON

WORKFORCE DEVELOPMENT COUNCIL OF SEATTLE – KING COUNTY

Our Workforce, Our Future

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Table of Contents

Introduction and Methodology

A prominent goal of the Northwest Energy Efficiency Opportunities Project (NEWOP), funded by SkillUp Washington with a grant from Living Cities Foundation, was the identification of career opportunities related to energy efficiency in the residential and commercial building markets. During the commercial phase of the NEWOP project, the Workforce Development Council of Seattle-King County (WDC) sponsored this study to spotlight careers in the commercial energy efficiency field and inventory training programs available through local colleges, industry certification programs, and registered apprenticeships.

The report features a number of jobs projected to grow over the next few years in energy efficiency in Washington State. In addition, skills that are transferable into this industry from other jobs and industries are highlighted.

The career information presented is useful to a number of audiences, including educators, career counselors, job seekers and career changers, as they find paths to enter and advance in the commercial energy efficiency field. The training program information is also an important tool for educators and funders as they identify training gaps and curriculum development needs.

The report sub-divides commercial energy efficiency into two main areas: ***Building Design, Energy Assessment and Performance***, and ***Building Commissioning and Energy Services Contracting***. Selected occupations, most with projected positive job growth, are presented by entry, middle, and higher-skill levels and correspond to more detailed job summaries.

Inventories of college programs, industry certification programs, and registered apprenticeships follow the career information. College programs are presented first sorted into the main areas of Building Design, Energy Assessment and Performance and Building Commissioning and Energy Services. Another category of college programs is included since it may also be of interest to readers: Clean Energy Technology/Renewable Energy. Most programs do not require pre-requisite experience or credentials to qualify for enrollment, so upon graduation or completion students are prepared for entry-level positions.

Standards for industry certifications define the level of experience and education required for certification which assures employers that the individual has mastered the body of knowledge associated with the field and job. The certification inventory is grouped into the areas of Building Design, Energy Assessment and Performance, Building Commissioning, and Energy Services Contracting by skill level (entry, middle, higher):

The last inventory included in the report presents registered apprenticeship programs for the building and construction trades related to energy efficiency in the built environment and available in the four-county Puget Sound region. The programs are listed by occupation.

The report closes with a list of references to additional career and education information so that the reader can continue to explore the many opportunities in the growing commercial energy efficiency field.

Methodology

Occupational data in the report was collected from the U.S Department of Labor O*NET database and the Washington State Workforce Explorer database with supplementary information gained from research using the resources listed in the reference section as well as reviews of local job listings. Highlighted occupations in the report were selected based on their projected growth status, using a combination of O*NET and Washington Workforce Explorer information, and the availability of sufficient information about wages job descriptions, and transferable skills.

Six Occupation Clusters by Skill Level

Skill Level	1. Building Design	2. Energy Assessment	3. Building Performance
Higher	• Architect • Professional Engineer • Sustainability Consultant	• Energy Engineer • Energy Modeler	• Facilities Manager • Building Manager • Sustainability Officer • Resource Conservation Manager • Energy Manager
Middle	• Estimator • Drafter	• Energy Auditor • Building Analyst	• Maintenance Crew Chief • Stationary or Building Engineer • HVAC Mechanic and Installer • Building Controls Technician/Installer • Test and Balance Technician • Energy Accounting Specialist
Entry	• Sustainable Building Advisor	• Lighting Auditor • Energy Audit Technician	• Facilities Maintenance Technician • Facilities Custodial Technician

Skill Level	4. Building Commissioning	5. Energy Services Contracting	6. Building and Construction Trades
Higher	• Commissioning Project Manager • Commissioning Authority • Retro-commissioning Agent	• Mechanical Engineer • Electrical Engineer • Energy Engineer • Project/Program Manager • Construction Manager • Energy Modeler	• Electricians • Plumbers, Pipefitters, and Steamfitters
Middle	• Commissioning Technician	• Energy Auditor • Cost Estimator	• Boilermakers • Sheet Metal Workers • HVAC Mechanics and Installers • Glaziers • Insulation Workers
Entry	• Commissioning Technician Assistant	• Energy Audit Technician	• Construction Laborers • Roofers

Building Design, Energy Assessment and Performance

Selected Occupations and Training Options

Skill Level	Jobs	Skills	Industry Certifications (see pgs. 16-19)	Training Programs * (see pgs. 8-12)
Higher-Skill Level 15+ years experience, *OR* 4-yr Degree + 10-yrs experience, *OR* Advanced degree + 5-yrs experience	**Architect** Median Wage (WA): $35.04	Prepare designs, budgets, timelines; computer skills, creative thinking, decision making, problem solving	• LEED - APBD+C • LEED - APID+C • LEED - AP Homes	Masters Degree: • Sustainable Business: Green Building Two-year Degrees: • Sustainable Building Science • Energy and Science Technology Certificates: • Commercial Building Performance • Green Sustainable Design • Green Real Estate • Sustainable Business • Sustainable Business Best Practices • National Sustainable Building Advisor • Green Construction • Zero Energy Building Practice
	Sustainability Specialist/Officer Median Wage (WA): $31.86	Develop strategies, manage projects, monitor and evaluate programs, media outreach reports and presentations , procure resources	• Certified Sustainable Development Professional (CSDP)	
	Energy Engineer Median Wage (WA): $40.53	Engineering experience, communications, technical aptitude, analyzing data and materials, computer skills	• Cert Facility Mgr (CMP) • Cert. Green Building Engineer (GBE) • Cert Energy Modeling Pro (BEMP) • LEED - AP	
Middle-Skill Level 2 to 10 years experience, *OR* 4-year degree + 5-yrs experience, *OR* 2-yr degree + 7-yrs experience	**Building Controls Technician** Average Wage (WA): $27.92 (estimate)	Install/program/service: mechanical controls, facility management systems, peripheral equipment	• Building Operator Certification (BOC) • High-Performance Building Design Professional (HBDP) • Multifamily Bldg. Analyst Pro • Building Systems Maintenance (SMC)	Certificates: • Bldg Ops and Main for Energy Efficiency • Commercial Building Performance • Energy Accounting Specialist • Energy Audit 1: Residential • Energy Audit 2: Commercial • Energy Efficiency Technician • Energy Management Core • Energy Management Specialist • Energy Technology • Green Sustainable Design • Green Real Estate • Multifamily Energy Auditing • Sustainable Business • Sustainable Business Best Practices • National Sustainable Building Advisor • Res Bldg Envelope • Residential Energy Auditor • Green Construction • Zero Energy Building Practice
	Energy Auditor Median Wage (WA): $31.86	Identify/prioritize energy saving measures, prepare reports, collect and analyze data, inspect or evaluate systems, perform tests, building and construction, customer and personal service, listening, reading, writing, problem sensitivity	• Energy Efficiency Management • Energy Manager in Training (EMIT) • Certified Energy Manager (CEM) • Certified Energy Auditor (CEA) • Certified Business Energy Pro (BEP)	

*Some training programs directly prepare candidates for jobs while others offer an opportunity to upgrade skills or knowledge.

Building Design, Energy Assessment and Performance

Selected Occupations and Training Options

Skill Level	Jobs	Skills	Industry Certifications (see pgs. 16-19)	Training Programs (see pgs. 8-12)
	Building Analyst/ Inspector Median Wage (WA): $30.05	Building science, systems, performance audits; measurement and verification	• Building Analyst Professional • Envelope Professional • Systems Maintenance Technician (SMT) • LEED AP O+M	
Entry Level Two years experience OR High School/GED	Property Manager Median Wage (WA): $29.21	Sales and customer services, collect fees, inspect grounds, facilities and equipment; handle complaints and disturbances, problem solving, listening, time management	• Certified Green Professional (CGP) • LEED Green Associate • Property Administrator Certificate (PAC) • Property Mgmt. Financial Proficiency Certificate (PMFP) • Facilities Mgmt Certificate (FMC)	Certificates: • Commercial Building Performance • Energy Technology • Green Real Estate • Sustainable Business • Sustainable Business Best Practices • Green Construction • Zero Energy Building Practice
	Building Maintenance/ Custodial Technician Median Wage (WA): $12.71	Building security and safety, sweep, mop scrub, vacuum, customer and personal service, reading, listening, talking to others, time management, dependable	• Bldg. Systems Maintenance Certificate (SMC) • LEED Green Associate	

For additional details on each job above, refer to the job summaries on pages 26-27.

Building Commissioning and Energy Services Contracting
Selected Occupations and Training Options

Skill Level	Jobs	Skills	Industry Certifications (see pages 16-19)	Training Programs * (see pages 13-14)
Higher-Skill Level 15+ years experience, *OR* 4-yr Degree + 10-yrs experience, *OR* Advanced degree + 5-yrs experience	**Commissioning Project Mgr** Median Wage (WA): $38.46	Project management, HVAC systems, building/LEED Commissioning, computer skills, technical writing, problem solving, communications	• Cert Commissioning Pro (CCP) • Existing Bldg. Comm. Pro (EBCP) • Comm. Process Mgmt Pro (CPMP)	Masters Degree: • Sustainable Business: Energy Solutions Two-year Degrees: Clean Energy Technology Energy Management EnvironTech &Sustainable Practices
	Electrician Median Wage (WA): $29.72	Diagnose systems and components, decision making, problem solving, communications, listening, math	• Cert Energy Manager	
	Energy Engineer Median Wage (WA): $40.53	Program planning accounting and evaluation, energy management technologies, control systems maintenance, building design and systems, economic analysis, decision making	• Cert Ed Facilities Pro (CEFP) • Cert Facility Mgr (CMP) • Cert. Green Building Engineer (GBE) • LEED - AP	
Middle-Skill Level 2 to 10 years experience, *OR* 4-year degree + 5-yrs experience, *OR* 2-yr degree + 7-yrs experience	**Commissioning Technician** Median Wage (WA): $25.96	Building systems, energy efficiency, project management, day-to-day coordination, planning, construction, maintenance, engineering, field testing, troubleshooting, staff leadership, training	• Cert Commissioning Tech (CxT)	Two-year Degrees: • Clean Energy Technology • Energy Management • EnvironTech &Sustainable Practices Certificates: • HVAC&R Tech • I-BEST Energy Tech • Commercial Energy Audit • Multi-Family Energy Audit • Commercial Lighting Audit • Commercial Bldg Performance • Energy Efficiency Tech • Sustainable Bldg Science Apprenticeship Programs: Commercial Glazier (pg. 23) HVAC (pg. 24)
	Glazier Median Wage (WA): $19.99	Building and construction, hand-eye steadiness, manual dexterity, perform physical activities, math, communication, customer service, listening, reading		
	Building Performance/ Retrofitting Specialist Median Wage (WA): $30.05	HVAC and lighting system installation, state/local energy efficiency requirements, retrofitting standards, communication, reports, recommendations, customer service, building inspections	• Cert Energy Auditor • Cert Lighting Efficiency Pro • Cert Measure & Verification Pro • Facility Mgmt Pro • Building Operator Cert. • Systems Maint Admin • Cert Bldg En Simulation Analyst • Cert Bus Energy Pro	

*Some training programs directly prepare candidates for jobs while others offer an opportunity to upgrade skills or knowledge.

Building Commissioning and Energy Services Contracting

Selected Occupations and Training Options

Skill Level	Jobs	Skills	Industry Certifications (see pgs 16-19)	Training Programs (see pages 8-12)
	HVAC Technician or Installer Median Wage (WA): $25.45	Determine project requirements, layout/measure/mark dimensions and reference lines, install and anchor units, mechanical, math, building and construction, listening, near vision, manual dexterity	• Property Admin Cert (PAC) • Facilities Mgmt Cert (FMC) • Building Sys Maint Cert (SMC) • Building Operator Cert (BOC) • Sys Maint Tech (SMT)	
	Test and Balance Technician Median Wage (WA): $25.45	Testing HVAC Systems, mechanical aptitude, work with common hand tools, math, prepare reports	• Test/Balance Technician • Test/Balance Engineer • Heating Professional	

For additional details on each job above, refer to the job summaries on pages 28-29.

WA Projected Job Growth and Median Wages for Selected Occupations

Primary data sources for the following occupations were the U.S Department of Labor O*NET database and the Washington State Workforce Explorer website. If job numbers are not available for a particular title, growth projections are based on a similar job in the same job classification. For these jobs, salaries were derived in the same way or determined from current (2009-2010) job listings and job descriptions posted on the Internet.

Note: the Growth Projection for *Building Controls System Technician* is an estimate for 2009-2011. The estimate is based upon the higher projection of +24% for Sacramento, CA. The projection for Washington State was lowered to reflect the difference between the state economies.

Skill Level	Growth Projections (2008-2018) # and %	Job Name	Median Wage (2010)	Occupation Cluster
Higher	162 jobs, +2.5% growth	Energy or Mechanical Engineers	$ 40.53	Building Design, Assessment, Energy Services Contracting
Higher	568 jobs, +12.3% growth	Architect	$ 35.04	Building Design
Higher	# for this title not available, +12%	Building Commissioning Project Manager	$ 37.99	Building Commissioning
Higher	# for this title not available, 5.6%	Sustainability Specialist/Officer	$ 31.86	Energy Assessment, Building Performance
Middle	483 jobs, +7.5% growth	HVAC or Test and Balance Technicians	$ 25.45	Building Performance, Energy Services Contracting
Middle	# for this title not available, +21%	Building Controls System Technician	$ 27.92	Building Performance
Middle	266 jobs, +9.3% growth	Building Analyst or Inspector	$ 30.05	Building Assessment and Performance
Middle	# for this title not available, 6%	Energy Auditor	$ 31.86	Building Assessment
Middle	# for this title not available, +6%	Building Performance/Retrofitting Specialist	$ 30.05	Energy Services Contracting
Middle	# for this title not available, +8%	Building Commissioning Agent/Tech	$ 25.96	Building Commissioning
Entry to Mid	177 jobs, +2.5% growth	Property Manager	$ 29.21	Building Assessment and Performance
Entry	7434 jobs, +16.7% growth	Building Maintenance/Custodial	$ 12.71	Building Performance

NOTE: The U.S. Department of Labor expects these green jobs related to commercial energy efficiency and green construction to have the highest growth potential as the economy recovers: Energy Engineers (or Mechanical), Civil Engineers, Energy Auditors, General Managers, Construction Managers, HVAC Mechanics and Installers, General Maintenance and Repair Workers, Refrigeration Mechanics and Installers, Electricians, Plumbers and Pipefitters, and Laborers.

College Degree and Certificate Programs

In Clallam, King, Kitsap, Pierce and Snohomish Counties

As of September 2010, 37 college (private and public) degree and certificate programs are available in the commercial energy efficiency field. In the following tables, programs are sorted into the three categories and some programs may appear in more than one category.

- **Table I: Building Design, Energy Assessment, and Performance**
- **Table II: Building Commissioning and Energy Services Contracting**
- **Table III: Clean Energy Technology/Renewable Energy**

This list includes primarily classroom-based programs, although some online courses are offered by local colleges. Enrollment in some programs is temporarily closed due to restrictions from funding sources or over-enrollment. Most programs do not require pre-requisite experience or credentials to qualify for enrollment, so upon graduation or completion students are qualified to secure entry-level positions. The curriculum for basic industry preparation courses (e.g., HVAC&R Technician) should be further scrutinized to ascertain whether energy efficiency topics have been added.

The following tables are organized by the length of time to complete the program (short term, quarters, years). **NOTE**: **In general, shorter courses (two quarters or less) are geared towards entry level jobs or up-skilling workers already in the field, while longer programs are preparing participants for middle skill jobs or higher**.

Where available, program capacity is also noted.

Table I: Building Design, Energy Assessment and Performance

Length	Curriculum	Credits/ Hrs	Entry Requirements	Capacity	Institution	Website
Short term	* Energy Audit 1: Residential Short Term Certificate Single-family residences: energy auditing and weatherization inspection, building shell, air leakage, insulation, windows and doors, HVAC, indoor air quality, lighting and appliances, water heating	4 credits	No special requirements		Shoreline Community College	http://www.shoreline.edu/shorelinepdfs/PlanningSheets20092010/Short%20Term%20Energy%20Audit%201%20Residential.pdf
Short term	*Energy Audit 2: Commercial Short Term Certificate Commercial buildings: energy auditing and weatherization inspection, building shell, air leakage, insulation, windows and doors, HVAC, indoor air quality, lighting and appliances, water heating	4 credits	No special requirements	30-48	Shoreline Community College	http://www.shoreline.edu/shorelinepdfs/PlanningSheets20092010/Short%20Term%20Energy%20Audit%202%20Commercial.pdf
1 quarter	Commercial Building Performance Certificate	4 credits	Enrollment temporarily closed - TBD	15	South Seattle Community College	

College Degree and Certificate Programs

Table I: Building Design, Energy Assessment and Performance, *continued*

Length	Curriculum	Credits/ Hrs	Entry Requirements	Capacity	Institution	Website
1 quarter	Multifamily Energy Auditing Certificate Report writing, energy modeling and 8-9 energy audits.	9 credits	Enrollment temporarily closed - TBD	15	South Seattle Community College	
1 quarter	Residential Energy Auditor Certificate of Completion Report writing, energy modeling and 8-9 energy audits.	9 credits	Enrollment temporarily closed - TBD	15	South Seattle Community College	
1 quarter (approx.)	*Building Operations and Maintenance for Energy Efficiency Energy accounting, commercial lighting, building operations and maintenance	13 credits	Prerequisite: Energy Management Core Cert. of Completion	30	Edmonds Community College	http://www.edcc.edu/requirements/2009_2010/COC_ENRGY.pdf
1 quarter (approx.)	*Commercial Lighting Auditor Certificate of Completion Energy assessment & analysis, commercial lighting	10 credits	Prerequisite: Energy Management Core Cert. of Completion	30	Edmonds Community College	http://www.edcc.edu/energy/comm_light_aud.php
1 quarter (approx.)	*Energy Accounting Specialist Certificate Energy assessment and analysis, energy accounting	8 credits	Prerequisite: Energy Management Core Cert. of Completion	30	Edmonds Community College	http://www.edcc.edu/energy/energy_acct_spec.php
1 quarter (approx.)	*Residential Energy Auditor Certificate of Completion Energy efficiency technician, energy assessment & analysis	7 credits	Prerequisite: Energy Management Core Cert. of Completion	30	Edmonds Community College	http://www.edcc.edu/energy/res_energy_aud.php
1-2 quarters	*Energy Technology Certificate of Completion Alternative energy & energy management, biomass/bio-fuels, photovoltaic systems, wind power systems	17 credits	No special requirements.	20-30	Lake Washington Technical College	http://www.lwtc.edu/Academics/Programs_of_Study/Energy_and_Science_Technician/Energy_and_Science_technician_program_Outline.xml
Short term	*Zero Energy Building Practices Short Term Certificate Solar electric design and applications, solar thermal design, zero energy building design	15 credits	No special requirements.	30-48	Shoreline Community College	http://www.shoreline.edu/shorelinepdfs/PlanningSheets20092010/Short%20Term%20Zero%20Energy%20Bldg%20Practices.pdf
2 quarters (approx.)	*Energy Efficiency Technician Certificate of Completion Core construction skills, energy basics, energy efficiency design & construction	19 credits	No special requirements.	30	Edmonds Community College	http://www.edcc.edu/energy/energy_eff_tech.php
2 quarters (approx.)	*Energy Management Core Certificate of Completion Energy management basics, Sustainability, energy efficiency design, construction & retrofit	16 credits	No special requirements.	30	Edmonds Community College	http://www.edcc.edu/energy/

College Degree and Certificate Programs

Table I: Building Design, Energy Assessment and Performance, *continued*

Length	Curriculum	Credits/ Hrs	Entry Requirements	Capacity	Institution	Website
2 quarters	*Green Sustainable Design Certificate (SDC) Design "green" interior environments, become a specialist in healthy interiors, learn practical applications, healthy and sustainable interiors	15 credits	No special requirements	42	Bellevue College	http://bellevuecollege.edu/artshum/interiordesign/sdc/program.html
2 quarters	*Sustainable Business Best Practices Topics include communications, carbon footprint and resource economics, sustainable business analysis	19 credits	No special requirements	42	Bellevue College	http://bellevuecollege.edu/programs/degrees/proftech/bsust/
2-3 quarters	*Online Green Construction Certificate of Training. Curriculum includes building materials, air and water quality, marketing and sales	10 credits	No special requirements		Bates Technical College	http://www.bates.ctc.edu/eo/ContinuingEd/pdf/GreenConstructionSeriesv2.pdf
2 quarters (approx.)	*Green Real Estate Certificate Green building materials, energy efficient design and development, integrated communities, sustainable sites, water protection, indoor air quality	16.5 credits	Experiential Learning and transfer-in credits can not be applied to this certificate		North Seattle Community College	https://northseattle.edu/certificates/green-real-estate-certificate
9 months (100 hours)	*National Sustainable Building Advisor Certificate Sustainable building and design, energy efficiency, integrated lighting design, green material selection, indoor environmental quality & health, water conservation and quality protection, sustainable job site operations, building operations and maintenance	8 CEUs American Institute for Architects	No special requirements	25	Olympic College	http://www.olympic.edu/NR/rdonlyres/8FD2B093-B09A-452E-A21F-CB5DB39991B6/0/OCstudentoverview201011jl.pdf
9 months (100 hours)	*National Sustainable Building Advisor Certificate Sustainable building and design, energy efficiency, integrated lighting design, green material selection, indoor environmental quality & health, water conservation and quality protection, sustainable job site operations, building operations and maintenance	8 CEUs American Institute for Architects	No special requirements	No capacity limit	Seattle Central Community College	http://www.sustainablesccc.com/About_The_Program.html
3 quarters	*Sustainable Business Certificate Foundations of sustainable business, systems thinking, social justice and business	9 credits	• Bachelor degree • At least 2-yrs of work experience (recommended) • Accounting diagnostic exam	25	Bainbridge Graduate Institute	http://bgi.edu/academic-programs/certificate/sustainable-business.html
4 quarters (approx.)	*Heating & Air Conditioning Refrigeration/Service Technician Graduates will be prepared for entry-level Service Technicians, Building Maintenance Technicians, Equipment Assemblers and Start-Up Residential and Light Commercial Installers. Curriculum includes: basic electricity and circuits, electric motors, heating, refrigeration, control and troubleshooting	106 credits	No special requirements	18	Clover Park Technical College	http://www.cptc.edu/index.php/programs/degrees_certificates/heating_air_conditioning_refrigeration_service_technician/

College Degree and Certificate Programs

Table I: Building Design, Energy Assessment and Performance, *continued*

Length	Curriculum	Credits/ Hrs	Entry Requirements	Capacity	Institution	Website
4 quarters	*Zero Energy Building Practices Certificate of Proficiency Residential and commercial photovoltaic systems design, maintenance, troubleshooting, installation; thermal, hydro, wind and solar domestic water systems; solar and radiant heating systems; energy supply structure, policy issues, global impacts, renewable energy systems, building energy use patterns; site audits, high performance building design.	59-63 credits	No special requirements.	20-30	Shoreline Community College	http://www.shoreline.edu/shorelinepdfs/PlanningSheets20092010/ZEH%20Practices%20Cert%20of%20Proficiency.pdf
5 quarters	*Clean Energy Technology - Associate in Applied Arts & Science (AAAS) Degree Residential and commercial building design with specialties in passive solar, photovoltaic and sustainable building design; alternative energy systems, green building techniques, designing and installing electric, metering and control systems.	90-95 credits	Current background in Environ. Sciences, Engineering, Physics, Business. Recommended field experience: electrical work and/or the design, build, construction trade	20-30	Shoreline Community College	http://www.shoreline.edu/shorelinepdfs/PlanningSheets20092010/Clean%20Energy%20Technology%20AAAS%20Degree.pdf
5-6 quarters (full time)	*Energy Management Specialist Certificate Environmental ethics, alternative energy systems, power generation and conventional energy systems, documenting/reporting energy use, environmental regulations & compliance, energy system analysis & auditing, carbon footprint & sustainability analysis, energy conservation & building retrofit	64-68 credits	No special requirements *(LM 8/3 Faculty Support)*		Cascadia Community College	http://www.cascadia.edu/programs/professional_technical_certificates/energy_management_specialist.aspx
5 quarters (approx.)	*Sustainable Building Science - Associate of Applied Science Transfer Degree (AAS-T) Site leveling, plans, codes & materials; framing, energy rating and systems, building envelope, solar basics, diagnostics and testing	103 credits	No special requirements	25	Clover Park Technical College	http://www.cptc.edu/index.php/programs/degrees_certificates/sustainable_building_science/
5 quarters	*Energy and Science Technology - Associate in Applied Science (AAS) Degree Curriculum includes courses in environmental, chemical, agricultural, or manufacturing specializations.	91-99 credits	No special requirements.	20-30	Lake Washington Technical College	http://www.lwtc.edu/Academics/Programs_of_Study/Energy_and_Science_Technician/Energy_and_Science_technician_program_Outline.xml
6 quarters (approx.)	*Heating, Ventilation, Air Conditioning and Refrigeration Technician Certificate of Competency Refrigeration systems, residential and light commercial systems, commercial environmental systems, water and heating systems, installation, maintenance and troubleshooting, AHRI Industry Competency Exam	99 credits			Bates Technical College	http://www.bates.ctc.edu/page.asp?view=166
2 years	*Energy Management - Associate of Technical Arts (ATA) Degree Principles of energy and energy management, energy efficiency and conservation, energy end -use analysis, monitoring systems, energy-use accounting, project management.	90 credits	No special requirements.	30	Edmonds Community College	http://requirements.edcc.edu/current/674T.pdf

College Degree and Certificate Programs

Table I: Building Design, Energy Assessment and Performance, *continued*

Length	Curriculum	Credits/ Hrs	Entry Requirements	Capacity	Institution	Website
	*Heating, Ventilation, Air Conditioning and Refrigeration Technician Associate of Technology Degree Refrigeration systems, electrical systems, commercial environmental systems, water and heating systems, installation, maintenance, and troubleshooting, Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Industry Competency Exam	103 credits	No special requirements.		Bates Technical College	http://www.bates.ctc.edu/page.asp?view=166
	Residential Building Envelope Whole House Air Leakage Installer - Building Performance Institute (BPI) Certification		*Program is developed, college is waiting for verification from BPI as training site. No further program information is available at this time.*		*South Seattle Community College*	
2-3 years	*Sustainable Business - Master of Business Administration (MBA) – Create and manage businesses while infusing sustainability. Industry concentrations include: Sustainable Energy Solutions, Sustainable Green Building	60 credits	• Baccalaureate degree • At least 2 years of work experience (recommended) • Accounting diagnostic exam	75	Bainbridge Graduate Institute	http://bgi.edu/academic-programs/mba.html
2-years	*Environmental Technologies and Sustainable Practices - Associate of Applied Science Transfer Degree (AAS-T) Practical and scientific methods for measuring, monitoring, and recommending actions to reduce and innovate energy use and applications in commercial settings. A degree with a business emphasis includes commercial energy savings and spending. A degree with a technology emphasis includes designing and executing environmentally sensitive and sustainable practices.	95-98 credits	No special requirements		Cascadia Community College	http://www.cascadia.edu/programs/professional_technical_transfer_degrees/environmental_technologies_sustainable_practices.aspx

College Degree and Certificate Programs

Table II: Building Commissioning and Energy Services Contracting

Length	Curriculum	Credits/ Hrs	Entry Requirements	Capacity	Institution	Website
Short term	*Energy Audit 2: Commercial Short Term Certificate Commercial buildings: energy auditing and weatherization inspection, building shell, air leakage, insulation, windows and doors, HVAC, indoor air quality, lighting and appliances, water heating	4 credits	No special requirements	30-48	Shoreline Community College	http://www.shoreline.edu/shorelinepdfs/PlanningSheets20092010/Short%20Term%20Energy%20Audit%202%20Commercial.pdf
1 quarter	Multifamily Energy Auditing Certificate Report writing, energy modeling and 8-9 energy audits.	9 credits	Enrollment temporarily closed - TBD	15	South Seattle Community College	
1 quarter (approx.)	*Commercial Lighting Auditor Certificate of Completion Energy assessment & analysis, commercial lighting	10 credits	Prerequisite: Energy Management Core Cert. of Completion	30	Edmonds Community College	http://www.edcc.edu/energy/comm_light_aud.php
1 quarter	Commercial Building Performance Certificate	4 credits	Enrollment temporarily closed - TBD	15	South Seattle Community College	
1 quarter (approx.)	*Building Operations and Maintenance for Energy Efficiency Energy accounting, commercial lighting, building operations and maintenance	13 credits	Prerequisite: Energy Management Core Cert. of Completion	30	Edmonds Community College	http://www.edcc.edu/requirements/2009_2010/COC_ENRGY.pdf
2 quarters (approx.)	*Energy Efficiency Technician Certificate of Completion Core construction skills, energy basics, energy efficiency design & construction	19 credits	No special requirements.	30	Edmonds Community College	http://www.edcc.edu/energy/energy_eff_tech.php
2 quarters (approx.)	*Energy Management Core Certificate of Completion Energy management basics, Sustainability, energy efficiency design, construction & retrofit	16 credits	No special requirements.	30	Edmonds Community College	http://www.edcc.edu/energy/

College Degree and Certificate Programs

Table II: Building Commissioning and Energy Services Contracting

Length	Curriculum	Credits/ Hrs	Entry Requirements	Capacity	Institution	Website
9 months (100 hours)	*National Sustainable Building Advisor Certificate Sustainable building and design, energy efficiency, integrated lighting design, green material selection, indoor environmental quality & health, water conservation and quality protection, sustainable job site operations, building operations and maintenance	8 CEUs American Institute for Architects	No special requirements	No capacity limit	Seattle Central Community College	http://www.sustainablesccc.com/About_The_Program.html
5 quarters (approx.)	*Sustainable Building Science - Associate of Applied Science Transfer Degree (AAS-T) Site leveling, plans, codes & materials; framing, energy rating and systems, building envelope, solar basics, diagnostics and testing	103 credits	No special requirements	25	Clover Park Technical College	http://www.cptc.edu/index.php/programs/degrees_certificates/sustainable_building_science/
2 years	*Energy Management - Associate of Technical Arts (ATA) Degree Principles of energy and energy management, energy efficiency and conservation, energy end -use analysis, monitoring systems, energy-use accounting, project management.	90 credits	No special requirements.	30	Edmonds Community College	http://requirements.edcc.edu/current/674T.pdf
2-years	*Environmental Technologies and Sustainable Practices - Associate of Applied Science Transfer Degree (AAS-T) Practical and scientific methods for measuring, monitoring, and recommending actions to reduce and innovate energy use and applications in commercial settings. A degree with a business emphasis includes commercial energy savings and spending. A degree with a technology emphasis includes designing and executing environmentally sensitive and sustainable practices.	95-98 credits	No special requirements		Cascadia Community College	http://www.cascadia.edu/programs/professional_technical_transfer_degrees/environmental_technologies_sustainable_practices.aspx

College Degree and Certificate Programs

Table III: Clean Energy Technology / Renewable Energy

Length	Curriculum	Credits/ Hrs	Entry Requirements	Capacity	Institution	Website
Short term	*Solar Photovoltaic Designer Short Term Certificate Residential and commercial systems, site analysis, sun path assessment, roofing assessment, alternative mounting options, installation and troubleshooting, maintenance and design criteria, evaluating energy use patterns.	5 credits	Current background in Environ. Sciences, Engineering, Physics, Business. Recommended field experience: electrical work and/or the design, build, construction	30-48	Shoreline Community College	http://www.shoreline.edu/shorelinepdfs/PlanningSheets20092010/Short%20Term%20Solar%20Photovoltaic%20Designer.pdf
1 quarter	*Bio Energy Certificate Curriculum includes: alternative energy & energy management, biomass/bio-fuels, photovoltaic systems, water and wind power	19 credits	No special requirements.	20-30	Lake Washington Technical College	http://www.lwtc.edu/Academics/Programs_of_Study/Energy_and_Science_Technician.xml
2-3 quarters	*I-BEST Bio-Energy Certificate of Completion Fundamental knowledge in the energy, biological technology industry and biological energy systems. Curriculum includes: energy technology applications, Alternative Energy, biomass/ bio-fuels	25 credits	ESL/ABED student	20-30	Lake Washington Technical College	http://www.lwtc.edu/Academics/Programs_of_Study/Energy_and_Science_Technician/Energy_and_Science_technician_program_Outline.xml
3 quarters	*I-BEST Energy Technology Certificate of Completion For students seeking a career in energy management or site assessment. Curriculum includes: alternative energy & energy management, biomass and bio-fuels, photovoltaic systems, water and wind power, energy technologies	28 credits	ESL/ABED student	20-30	Lake Washington Technical College	http://www.lwtc.edu/Academics/Programs_of_Study/Energy_and_Science_Technician/Energy_and_Science_technician_program_Outline.xml
4-5 quarters (full-time)	*Solar Photovoltaic Systems Specialist Certificate Specify, configure, inspect, and maintain solar electric systems, incorporate high-quality craftsmanship, comply with all applicable safety codes and standards.	51-57 credits	No special requirements		Cascadia Community College	http://www.cascadia.edu/programs/professional_technical_certificates/solar_photovoltaic_system_specialist.aspx
2 years	*Energy Technology Power Operations - Associate in Applied Science (AAS) Degree Electricity and motors, renewable sources of power generation, power transmission and distribution grid, energy efficiency and conservation applications (including Smart Grid)	94 credits			Peninsula College, via Centralia College	http://www.centralia.edu/academics/EdPlanners/AASENERGYTECHPOWER.htm

Industry Certification Programs

Most industries have established standards for its members to be recognized, or certified, as a qualified professional. The standards — developed, tested and administered by industry practitioners, define the level of knowledge, skills, experience and education that are expected, and assures employers and clients that the certificant has mastered the body of knowledge associated with the respective field and job.

Following are four tables describing professional certifications available in these areas:

- Table I: Building Design
- Table II: Building Performance
- Table III: Building Commissioning
- Table IV: Energy Services Contracting

Each table is sorted by the Career Ladder position of the certificant – Entry Level, Middle-skill Level and Higher-skill Level. The skill level for the certifications was determined by the following criteria, which was commonly expressed by certifying agencies:

- Entry Level = Two years experience, OR High School/GED
- Middle-Skill Level = 2-10 years experience, OR 4-year degree + 5-yrs exp., OR 2-yr degree + 7-yrs exp.
- Higher-Skill Level = 15+ years experience, OR 4-yr Degree + 10-yrs exp., OR Advanced degree + 5-yrs exp.

Table I: Building Design

Career Level	Certification Name	Definition	Organization	Website
Middle	Certified Sustainable Development Professional (CSDP)	High level of technical expertise in sustainable development for buildings, industrial plants and governmental facilities, energy management and environmental practices, energy efficiency, and pollution prevention practices.	Association of Energy Engineers (AEE)	http://www.aeecenter.org/i4a/pages/index.cfm?pageid=3330
Middle	Building Energy Modeling Professional (BEMP)	Competent using and applying energy modeling software to building and systems energy performance and economics, modeling new and existing buildings and systems.	American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)	http://www.ashrae.org/certification/
Middle	Healthcare Facility Design Professional (HFDP)	Knowledgeable of medical terminology and facility operations as they affect HVAC&R design in healthcare facilities	American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)	http://www.ashrae.org/certification/
Middle	High-Performance Building Design Professional (HBDP)	Knowledgeable of how HVAC&R design is integrated into high performing buildings to achieve the overall goal of producing a sustainable HVAC&R design	American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)	http://www.ashrae.org/certification/

Career Ladder Definitions:
Higher-Skill Level = 15+ years experience, OR 4-yr Degree + 10-yrs exp., OR Advanced degree + 5-yrs exp.
Middle-Skill Level = 2-10 years experience, OR 4-year degree + 5-yrs exp., OR 2-yr degree + 7-yrs exp.
Entry Level = Two years experience, OR High School/GED

Industry Certification Programs

Table I: Building Design, *continued*

Career Level	Certification Name	Definition	Organization	Website
Middle	Green Associate	Demonstrated green building expertise in non-technical fields of practice, basic knowledge of green design, construction and operations.	U.S. Green Building Council - LEED	http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1815
Higher	Certified Green Building Engineer (GBE)	Highly competent in green building related disciplines and governing laws; is a Certified Energy Manager and current licensed U.S. Professional Engineer	Association of Energy Engineers (AEE)	http://www.aeecenter.org/i4a/pages/index.cfm?pageid=3330
Higher	LEED AP	Advanced depth of knowledge in green building practices, has the ability to specialize in a particular LEED Rating System.	U.S. Green Building Council - LEED	http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1815
Higher	LEED AP Building Design + Construction (AP BD+C)	Knowledgeable in the design and construction of high-performance, healthful, durable, affordable and environmentally sound commercial, institutional, and high-rise residential buildings; plus LEED ratings for New Construction, Schools, Core + Shell.	U.S. Green Building Council - LEED	http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1815
Higher	LEED AP Interior Design + Construction (AP ID+C)	Knowledgeable in design and construction of environmentally responsible, high-performance commercial spaces and tenant improvements.	U.S. Green Building Council - LEED	http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1815

Table II: Building Performance

Career Level	Certification Name	Definition	Organization	Website
Entry	Property Administrator Certificate (PAC)	Proficient in budgeting, accounting, design, operation and maintenance of Building Systems. PAC applicable to the Real Property Administrator (RPA) designation	BOMI International (Building Operators and Managers)	http://www.bomi.org/Educational_Offerings/Designations_and_Certificates.aspx
Entry	Property Management Financial Proficiency Certificate (PMFP)	Proficient in asset management, real estate investment, finance, budgeting and accounting of building systems. PMFP applicable to the Real Property Administrator (RPA) designation	BOMI International (Building Operators and Managers)	http://www.bomi.org/Educational_Offerings/Designations_and_Certificates.aspx
Entry	Facilities Management Certificate (FMC)	Proficient in the fundamentals of facilities management and the design, operation, and maintenance of building systems. FMC applicable to the Facilities Management Administrator (FMA) designation	BOMI International (Building Operators and Managers)	http://www.bomi.org/Educational_Offerings/Designations_and_Certificates.aspx

Industry Certification Programs

Table II: Building Performance, *continued*

Career Level	Certification Name	Definition	Organization	Website
Entry	Building Systems Maintenance Certificate (SMC)	Proficient in air handling, water treatment, plumbing systems, energy management and controls and either boilers, heating systems, and applied mathematics OR refrigeration systems and accessories for building systems. SMC applicable to the Systems Maintenance Administrator (SMA) designation	BOMI International (Building Operators and Managers)	http://www.bomi.org/Educational_Offerings/Designations_and_Certificates.aspx
Entry	Systems Maintenance Technician (SMT®)	Proficient in refrigeration systems and accessories; air handling, water treatment and plumbing systems; electrical systems and illumination; boilers, heating systems and applied mathematics; energy management and controls.	BOMI International (Building Operators and Managers)	http://www.bomi.org/Educational_Offerings/Designations_and_Certificates.aspx
Middle	Facility Management Professional (FMP)	Competent in facilities operations and maintenance, real estate, human and environmental factors, planning and project management, leadership and management, finance, quality assessment and innovation, communication, technology.	International Facility Management Association (IFMA)	http://www.ifma.org/learning/fm_credentials/fmp_index.cfm
Middle	Building Operator Certification (BOC)	Proficient in best practices for energy efficiency for all aspects of building management and maintenance including technologies, tools and methods to build records on each organization's electrical systems, HVAC operations, lighting levels and controls, and annual profiles of energy consumption, troubleshooting. Two levels: Level I training emphasizes energy-efficient building maintenance practices. Level II stresses advanced equipment troubleshooting and preventive maintenance.	Building Operator Certification	http://www.boccentral.org/page.php?content=about
Middle	Real Property Administrator (RPA)	Proficient in ethics, law and risk management, budgeting & accounting, design, operation, and maintenance of building systems, real estate investment and finance, environmental health and safety issues	BOMI International (Building Operators and Managers)	http://www.bomi.org/Educational_Offerings/Designations_and_Certificates.aspx
Middle	Facilities Management Administrator (FMA)	Proficient in business ethics, technologies for facilities management, facilities planning and project management, design, operation, and maintenance of building systems, real estate investment and finance, environmental health and safety issues	BOMI International (Building Operators and Managers)	http://www.bomi.org/Educational_Offerings/Designations_and_Certificates.aspx
Middle	Operations & Performance Management Professional (OPMP)	Knowledgeable of the management of facility operations and maintenance and their impact on HVAC&R systems' performance	American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)	http://www.ashrae.org/certification/
Middle	Systems Maintenance Administrator (SMA)	Proficient in refrigeration systems and accessories; air handling, water treatment and plumbing systems; electrical systems and illumination; boilers, heating systems and applied mathematics; energy management and controls, administration, building design and maintenance, environmental health and safety issues.	BOMI International (Building Operators and Managers)	http://www.bomi.org/Educational_Offerings/Designations_and_Certificates.aspx

Industry Certification Programs

Table II: Building Performance, *continued*

Career Level	Certification Name	Definition	Organization	Website
Middle	Educational Facilities Professional Credential (EFP)	Familiarity with standards and best practices in general administration and management, operations and maintenance, energy and utilities, planning, design and construction; facts, ideas and principles that contribute to creative and sound decisions. Performs research-backed stewardship.	APPA: The Association of Higher Education Facilities Officers	http://certification.appa.org/
Middle	AP	Signifies an advanced depth of knowledge in green building practices, the ability to specialize in a particular LEED Rating System.	U.S. Green Building Council - LEED	http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1815
Mid to Higher	AP Operations and Maintenance (AP O+M)	Knowledgeable in existing building operation, maintenance, sustainable practices, reducing the environmental impacts; LEED rating systems for Green O+M, Existing Buildings O+M.	U.S. Green Building Council - LEED	http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1815
Higher	Certified Educational Facilities Professional (CEFP)	Superior in core competencies of educational facilities management including general administration and management, operations and maintenance, energy and utilities, planning, design and construction.	APPA: The Association of Higher Education Facilities Officers	http://certification.appa.org/
Higher	Certified Facility Manager (CMP)	Knowledgeable and experienced in facilities operations and maintenance, real estate, human and environmental factors, planning and project management, leadership and management, finance, quality assessment and innovation, communication, technology.	International Facility Management Association (IFMA)	http://www.ifma.org/learning/fm_credentials/cfm_faq.cfm

Table III: Building Commissioning

Career Level	Certification Name	Definition	Organization	Website
Entry	Certified Commissioning Technician (CxT)	Has technical field experience and knowledge of commissioned systems and documentation; overall design intent and construction process, contracting and construction management and design development, construction models.	Associated Air Balance Council Commissioning Group	http://www.aabc.com/commissioning/
Middle	Certified Commissioning Professional (CCP)		Building Commissioning Association (BCA)	http://www.bcxa.org/certification/index.htm

Industry Certification Programs

Table III: Building Commissioning, *continued*

Career Level	Certification Name	Definition	Organization	Website
Middle	Certified Building Commissioning Professional (CBCP)	Ensures building systems are designed, installed, functionally tested and capable of being operated and maintained. Knowledgeable in restoring existing buildings to high productivity through renovation, upgrade and tune -up of existing systems. Proficient in the technical details of all aspects of building commissioning including: project scheduling, project team, new building commissioning, retro and recommissioning of existing buildings, system by system commissioning requirements, TAB and verification procedures, LEED, project economic analysis, building code issues, and commissioning tools and technologies, producing Cx deliverables and solutions.	Association of Energy Engineers (AEE)	http://www.aeecenter.org/i4a/pages/index.cfm?pageid=3330
Middle	Existing Building Commissioning Professional (EBCP)	Demonstrated skills and knowledge on concepts and experiences basic to the building commissioning process. Knowledgeable in restoring existing buildings to high productivity through renovation, upgrade and tune-up of existing systems.	Association of Energy Engineers (AEE)	http://www.aeecenter.org/i4a/pages/index.cfm?pageid=3330
Middle	Commissioning Process Management Professional (CPMP)	Capable of managing the whole building commissioning process. Oversee and coordinate the commissioning process and communicates on behalf of the building owner with the commissioning provider and the commissioning team.	American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)	http://www.ashrae.org/certification/

Table IV: Energy Services Contracting

Career Level	Certification Name	Definition	Organization	Website
Middle	Certified Building Energy Simulation Analyst (BESA)	Demonstrated special expertise and experience in the area of utilizing building energy simulation software to assess a facility's energy performance.	Association of Energy Engineers (AEE)	http://www.aeecenter.org/i4a/pages/index.cfm?pageid=3330
Middle	Certified Business Energy Professional (BEP)	Demonstrated competence and ethical fitness for business/marketing, energy management, laws governing and affecting energy professionals. Knowledgeable on basic concepts and experiences, codes and standards, energy fundamentals, energy audits, energy economics, metering issues, performance contracting and project financing, measurement and verification, energy-efficient equipment and applications, building systems, and procurement of energy.	Association of Energy Engineers (AEE)	http://www.aeecenter.org/i4a/pages/index.cfm?pageid=3330

Industry Certification Programs

Table IV: Energy Services Contracting, *continued*

Career Level	Certification Name	Definition	Organization	Website
Middle	Certified Carbon Reduction Manager (CRM)	Demonstrated high levels of technical expertise in energy management and environmental practices, applicable codes and standards; carbon auditing; emissions reporting/verification; emissions conversions; energy efficiency technologies; renewable energy sources and green power; fleet management; emissions trading; recycling and water management; and applicable financing and marketing strategies.	Association of Energy Engineers (AEE)	http://www.aeecenter.org/i4a/pages/index.cfm?pageid=3330
Middle	Certified Energy Auditor (CEA)	Experienced and knowledgeable in energy auditing methodology, instrumentation and tools; economic analysis, building systems technology, lighting, HVAC, building envelope, controls, boilers and steam systems, water auditing and reviewing auditing reports.	Association of Energy Engineers (AEE)	http://www.aeecenter.org/i4a/pages/index.cfm?pageid=3330
Middle	Certified Energy Manager (CEM)	Experienced in energy management codes and standards, energy accounting, audits and instrumentation; electrical, HVAC, boiler and steam systems; building envelope, CHP systems and renewable energy, green buildings, thermal energy storage systems, maintenance and commissioning, lighting.	Association of Energy Engineers (AEE)	http://www.aeecenter.org/i4a/pages/index.cfm?pageid=3330
Middle	Certified Energy Procurement Professional (CEP)	Demonstrated knowledge in the purchase, sale and marketing of electricity and natural gas. Qualified expert within the restructured energy marketplace.	Association of Energy Engineers (AEE)	http://www.aeecenter.org/i4a/pages/index.cfm?pageid=3330
Middle	Certified Energy Procurement Professional (CEP)	Demonstrated knowledge in the purchase, sale and marketing of electricity and natural gas. Qualified expert within the restructured energy marketplace.	Association of Energy Engineers (AEE)	http://www.aeecenter.org/i4a/pages/index.cfm?pageid=3330
Middle	Certified Lighting Efficiency Professional (CLEP)	Demonstrated experience in the principles, practices and laws governing the field of lighting efficiency within the commercial, industrial, institutional and governmental market sectors.	Association of Energy Engineers (AEE)	http://www.aeecenter.org/i4a/pages/index.cfm?pageid=3330
Middle	Certified Measurement & Verification Professional (CMVP)	Demonstrated experience in internationally recognized protocol for accurate and reliable measurement and verification methodologies.	Association of Energy Engineers (AEE)	http://www.aeecenter.org/i4a/pages/index.cfm?pageid=3330
Middle	Certified Power Quality Professional (CPQ)	Knowledgeable of a broad range of power quality applications and issues including: national power distribution networks, concepts and experiences basic to wiring, grounding, powering, and protecting of electrical and electronic circuits and equipment used in industrial and commercial facilities	Association of Energy Engineers (AEE)	http://www.aeecenter.org/i4a/pages/index.cfm?pageid=3330
Middle	Certified Renewable Energy Professional (REP)	Demonstrated expertise in the specification and application of renewable and alternative energy technologies, assessment of renewable energy projects, development of achievable low-carbon and sustainability goals for organizations, renewable energy basics, solar energy, wind energy, bio-mass, waste conversion, ocean thermal energy, installation and approval process.	Association of Energy Engineers (AEE)	http://www.aeecenter.org/i4a/pages/index.cfm?pageid=3330

Industry Certification Programs

Table IV: Energy Services Contracting, *continued*

Career Level	Certification Name	Definition	Organization	Website
Middle	Customer Service Management	Knowledgeable in power operations and integrated resource planning, managing successful customer service operations, employee leadership, meter reading and Customer Information Systems technology, utility collections process	American Public Power Association	http://www.appanet.org/education/index.cfm?ItemNumber=9851
Middle	Energy Efficiency Management	Knowledgeable in all aspects of energy efficiency program development, implementation, budgeting, marketing and management, and an understanding of the industry, marketplace, planning and budgeting, strategies for customer participation, measuring and evaluating program effectiveness.	American Public Power Association	http://www.appanet.org/education/index.cfm?ItemNumber=9851
Middle	Energy Manager in Training (EMIT)	Technical strengths in codes and standards, energy accounting, audits and instrumentation; electrical, HVAC, boiler and steam systems; building envelope, CHP systems and renewable energy, green buildings, thermal energy storage systems, maintenance and commissioning, lighting.	Association of Energy Engineers (AEE)	http://www.aeecenter.org/i4a/pages/index.cfm?pageid=3330
Middle	Test and Balance Engineer	Demonstrated knowledge in the technical operations of a company including reviewing and certifying test and balance reports, supervision and training of technicians.	Associated Air Balance Council	http://www.aabc.com/certifications/
Middle	Test and Balance Technician	Demonstrated proficiency in performing field tests and analysis of HVAC systems; making system adjustments; recording readings; and preparing test and balance reports for agency approval.	Associated Air Balance Council	http://www.aabc.com/certifications/
Middle	Heating Professional	Proficient in optimizing the performance of heating equipment, health and safety, heating system replacement and new installations, general heating system inspections, gas systems, oil systems, furnaces and forced air distribution, boilers and hydronic distribution, steam distribution, domestic hot water systems	Building Performance Institute (BPI),	http://www.bpi.org/schedules_training.aspx
Higher	NATE Certification	Working knowledge of HVAC and HVACR systems, certification in one or more specialty areas: installation, service or senior certification. Certifications are based on Residential, Light Commercial HVAC Systems and Refrigeration systems.	North American Technician Excellence (NATE)	http://www.natex.org/HVAC_HVACR/certification_home.html

Registered Apprenticeship Programs

Apprenticeship is a combination of on-the-job training (OJT) and classroom instruction under the supervision of a journey-level craft person or trade professional in which workers learn the practical and theoretical aspects of a highly skilled occupation. Apprentices earn a living wage throughout the education process. After completing an apprenticeship program, the worker's journey-level status provides an additional benefit of nationwide mobility at journey level scale.

Employers interested in establishing their own apprenticeship program, or job seekers interested in learning more about entering a program should review the Washington State Department of Labor and Industries Apprentice Registration and Tracking System ARTS) website: http://www.lni.wa.gov/TradesLicensing/Apprenticeship/Become/default.asp.

The following table lists active registered apprenticeships programs in Clallam, King, Kitsap, Pierce and Snohomish counties (August 2010) that relate to energy efficiency in commercial and public buildings.

There are some occupations listed more than once since different agencies provide training for the same occupation. If a training program is offered in all five counties (Clallam, King, Kitsap, Pierce, Snohomish), it is indicated as "ALL".

Washington State Department of Labor and Industries Registered Apprenticeship Programs

Occupation	Program Name	County	Program ID
Appliance & Refrigeration Serviceman	Southwest Washington Electrical Joint Apprenticeship and Training Committee	PIERCE	150
Boilermaker (Field Const/Repair)	Western States Boilermakers Apprenticeship Committee	ALL	246
Commercial Glazier	Glaziers, Architectural Metal and Glassworkers Commercial Apprenticeship Committee	ALL	294
Const Elect (Inside Wireman)	Northwest Washington Electrical Industry Joint Apprenticeship and Training Committee	SNOHOMISH	65
Construction Electrician	Puget Sound Electrical Joint Apprenticeship and Training Committee	CLALLAM KING KITSAP	134
Construction Electrician	Southwest Washington Electrical Joint Apprenticeship and Training Committee	PIERCE	150
Construction Electrician	I.E.C. of Washington Apprenticeship and Training Committee	ALL	519
Construction Electrician	Construction Industry Training Council of Washington	ALL	592
Electrician Constructor	City of Seattle, Washington Apprenticeship Committee	KING	208
Electrician Tech (City of Seattle)	Puget Sound Electrical Joint Apprenticeship and Training Committee	CLALLAM KING KITSAP	134

Source: WA State Dept. of Labor and Industries Apprentice Registration and Tracking System ARTS), August 2010

Registered Apprenticeship Programs

Washington State Department of Labor and Industries Registered Apprenticeship Programs, *continued*

Occupation	Program Name	County	Program ID
Electronic Systems Tech	Washington State EST Apprenticeship Committee	ALL	1760
Energy Control Dispatcher	Snohomish County P.U.D. Number 1 Apprenticeship Committee	SNOHOMISH	76
Facilities Custodial Serv Tech	Western Washington Operating Engineers Facilities Custodial Services Apprenticeship Committee	ALL	397
Facilities Custodial Service Technician	Yelm School District #2 Apprenticeship Committee	PIERCE	148
Facilities Custodial Services Technician I	Washington Public School Classified Employees Apprenticeship Committee	ALL	188
Facilities Custodial Services Technician II	Washington Public School Classified Employees Apprenticeship Committee	ALL	188
Facilities Maintenance Mechanic	Western Washington Stationary Engineers Apprenticeship Committee	ALL	227
Facilities Maintenance Mechanic	Pierce Transit/ATU Local #758 Apprenticeship Committee	PIERCE	300
Facilities Maintenance Mechanic	Port of Tacoma Apprenticeship Committee	PIERCE	648
Generation Electrician Constructor	City of Seattle, Washington Apprenticeship Committee	KING	208
Heating/Air Conditioning Installer & Servicer	Construction Industry Training Council of Washington	ALL	635
Operating Engineer	Operating Engineers Regional Training Program JATC	All	58
HVAC Service Tech	Western Washington Sheet Metal JATC	ALL	74
HVAC Test, Adjust and Balance Tech	Western Washington Sheet Metal JATC	ALL	74
HVAC/Refrigeration Mechanic	Northwest Washington Pipe Trades Apprenticeship Committee	SNOHOMISH	94
HVAC/Refrigeration Mechanic	West Sound Pipe Trades Apprenticeship Committee	KITSAP	112
HVAC/Refrigeration Mechanic	Seattle Area Plumbers, Housing Plumbers, Pipefitters, HVAC/Refrigeration Mechanics, and Marine Pipefitters Apprenticeship Committee	CLALLAM KING	115
HVAC/Refrigeration Mechanic	Southwest Washington Pipe Trades Apprenticeship Committee	PIERCE	405
Insulation Applicator	Washington State UBC JATC	ALL	128
Maint Plumber/Steamfitter	Seattle Area Plumbers, Housing Plumbers, Pipefitters, HVAC/Refrigeration Mechanics, and Marine Pipefitters Apprenticeship Committee	CLALLAM KING	115
Maintenance Electrician	Northwest Washington Electrical Industry Joint Apprenticeship and Training Committee	SNOHOMISH	65
Maintenance Electrician	Puget Sound Electrical Joint Apprenticeship and Training Committee	CLALLAM KING KITSAP	134
Maintenance Plumber/Steamfitter	Northwest Washington Pipe Trades Apprenticeship Committee	SNOHOMISH	94

Registered Apprenticeship Programs

Washington State Department of Labor and Industries Registered Apprenticeship Programs, *continued*

Occupation	Program Name	County	Program ID
Maintenance Plumber/Steamfitter	West Sound Pipe Trades Apprenticeship Committee	KITSAP	112
Maintenance Plumber/Steamfitter	Southwest Washington Pipe Trades Apprenticeship Committee	PIERCE	405
Millwright	Washington State UBC JATC	ALL	128
Pipefitter	Seattle Area Plumbers, Housing Plumbers, Pipefitters, HVAC/Refrigeration Mechanics, and Marine Pipefitters Apprenticeship Committee	CLALLAM KING	115
Plumber	Northwest Washington Pipe Trades Apprenticeship Committee	SNOHOMISH	94
Plumber	West Sound Pipe Trades Apprenticeship Committee	KITSAP	112
Plumber	Seattle Area Plumbers, Housing Plumbers, Pipefitters, HVAC/Refrigeration Mechanics, and Marine Pipefitters Apprenticeship Committee	CLALLAM KING	115
Plumber	Southwest Washington Pipe Trades Apprenticeship Committee	PIERCE	405
Plumber	Construction Industry Training Council of Washington	ALL	636
Roofer	Seattle Area Roofers Apprenticeship Committee	ALL	113
Roofer	Pierce County Roofers Apprenticeship Committee	PIERCE	116
Sealant Applicator	Glaziers, Architectural Metal and Glassworkers Commercial Apprenticeship Committee	ALL	294
Sheet Metal Worker	Western Washington Sheet Metal JATC	ALL	74
Sheet Metal Worker	Construction Industry Training Council of Washington	ALL	637
Stationary Engineer	Western Washington Stationary Engineers Apprenticeship Committee	ALL	227
Steamfitter	Northwest Washington Pipe Trades Apprenticeship Committee	SNOHOMISH	94
Steamfitter	West Sound Pipe Trades Apprenticeship Committee	KITSAP	112
Steamfitter	Southwest Washington Pipe Trades Apprenticeship Committee	PIERCE	405
Technical Engineer	Operating Engineers Regional Training Program JATC	All	58
Technical Engineer	Operating Engineers Regional Training Program JATC	CLALLAM	58
Water Pipe Worker	City of Seattle, Washington Apprenticeship Committee	KING	208

Summaries of Selected Occupations in Building Design, Energy Assessment and Performance

Job Title: Architect

Median Wage (2010): $35.04

Projected Job Growth (2008-18): 588 jobs, 12.3% growth in WA

Job description. Plan and design structures like private residences, office buildings, theaters, factories, other structural property

Transferable Skills: Prepare designs, budgets, timelines; computer skills, creative thinking, decision making, problem solving

Other Industries: Land subdivision, Scientific research & development, Construction

Job Title: Sustainability Specialist/Officer

Median Wage (2010): $31.86

Projected Growth (2008-18): Job # not available, 5.6% growth in WA

Job description. Develop and execute sustainability strategies, manage projects, handle internal and external communications

Transferable Skills: Strategic planning, project management, communications, building experience, research

Other Industries: Business Operations, Business and Financial Services

Job Title: Energy Engineer (or Mechanical)

Median Wage (2010): $40.53

Projected Growth (2008-18): 162 jobs, 2.5% growth in WA

Job description. Design, develop, and evaluate energy-related projects and programs to reduce energy costs or improve energy efficiency during the designing, building, or remodeling stages of construction.

Transferable Skills: Engineering experience, communications, technical aptitude, analyzing data and materials, computer skills

Other Industries: Aerospace Product & Parts Manufacturing, Scientific Research & Development Services, Remediation & Waste Services

Job Title: Building Controls System Technician

Ave. Hrly Wage (2010): $27.92 (est., derived from OR State Univ. 2010 job posting)

Projected Job Growth (2008-18): +21% (***2009-2011, est., based on growth projection for Sacramento, CA****)

Job description. Program controls to integrate building systems to manage quality control.

Transferable Skills: Install/program/service: mechanical controls, facility management systems, peripheral equipment

Read plans and specs, site preparation, customer service, communications, teamwork

Other Industries: Construction, Manufacturing

Job Title: Energy Auditor

Median Wage (2010): $31.86

Projected Job Growth (2008-18): Job # not available, 6% growth in WA

Job description. Conduct energy audits of buildings, building systems and process systems; may also conduct investment grade audits of buildings or systems.

Transferable Skills: Identify/prioritize energy saving measures, prepare reports, collect and analyze data, inspect or evaluate systems, perform tests, building and construction, customer and personal service, listening, reading, writing, problem sensitivity

Other Industries: Government, educational services

Job Title: Building Analyst or Inspector

Median Wage (2010): $30.05

Projected Job Growth (2008-18): 266 jobs, 9.3% growth in WA

Job description. Inspect structures using engineering skills to determine structural soundness and compliance with specifications, building codes, and other regulations.

Transferable Skills: Building science, systems, performance audits; measurement and verification

Other Industries: Construction, government, professional/ scientific/technical services

Summaries of Selected Occupations in Building Design, Energy Assessment and Performance

Job Title:	Building Maintenance/Custodial Technician
Median Wage (2010):	$12.71
Projected Job Growth (2008-18):	7734 jobs, 16.7% growth in WA
Job description.	Keep buildings in clean and orderly condition. Perform heavy cleaning duties, tend furnace and boiler, performing routine maintenance activities, notifying management of need for repairs, and cleaning snow or debris from sidewalk.
Transferable Skills:	building security and safety, sweep, mop scrub, vacuum, customer and personal service, reading, listening, talking to others, time management, dependable
Other Industries:	Admin. & Support Services, Educational services

Job Title:	Property Manager
Median Wage (2010):	$29.21
Projected Job Growth (2008-18):	177 jobs, 2.5% growth in WA
Job description.	Plan, direct, or coordinate selling, buying, leasing, or governance activities of commercial, industrial, or residential real estate properties
Transferable Skills:	Sales and customer services, collect fees, inspect grounds, facilities and equipment; handle complaints and disturbances, problem solving, listening, time management
Other Industries:	Real Estate and Rental and Leasing

Summaries of Selected Occupations in Building Commissioning and Energy Services Contracting

Job Title: Commissioning Project Manager

Median Wage (2009): $38.46 *(Source: www.Indeed.com, Sept. 2010)*

Projected Job Growth (2008-18): +12.3% *(Source: www.Indeed.com, Sept. 2010)*

Job description. Plan, direct, supervise all tasks/activities included within the scope of commissioning projects including technical, financial.

Transferable Skills: Project management, HVAC systems, building/LEED Commissioning, computer skills, technical writing, problem solving, communications

Other Industries: *Not available*

Job Title: Commissioning Technician

Ave. Hrly Wage (2010): $25.96

Projected Job Growth (2008-18): Job # not available, +8% growth in WA

Job description. Commission and balance activities on a variety of HVAC systems to obtain engineering specifications. Perform functional testing, review construction documentation and providing recommendations, complete documentation for publication.

Transferable Skills: Building systems, energy efficiency, project management, day-to-day coordination, planning, construction, maintenance, engineering, field testing, troubleshooting, staff leadership, training

Other Industries: *Not available*

Job Title: Energy Manager/Energy Engineer

Median Wage (2010): $40.53

Projected Job Growth (2008-18): 162 jobs, 2.5% growth in WA

Job description. Analyzes current energy usage, develops energy management plan, responsible for HVAC control and energy tracking system.

Transferable Skills: Program planning accounting and evaluation, energy management technologies, control systems maintenance, building design and systems, economic analysis, decision making

Other Industries: Manufacturing, Professional, Scientific and Technical Services

Job Title: Electrician

Median Wage (2010): $29.72

Projected Job Growth (2008-18): -816, -4.3% in WA

Job description. Install, maintain, and repair electrical wiring, equipment, and fixtures. Ensure that work is in accordance with relevant codes.

Transferable Skills: Diagnose systems and components, decision making, problem solving, communications, listening, math

Other Industries: Construction

Job Title: Glazier

Median Wage (2010): $19.99

Projected Job Growth (2008-18): -144, -5.8% in WA

Job description. Install glass in windows, skylights, store fronts, and display cases, or on surfaces, such as building fronts, interior walls, ceilings, and tabletops

Transferable Skills: Building and construction, hand-eye steadiness, manual dexterity, perform physical activities, math, communication, customer service, listening, reading

Other Industries: Construction, Retail

Job Title: Building Performance/Retrofitting Specialist

Median Wage (2010): $31.86

Projected Job Growth (2008-18): Job # not available, 6% growth in WA

Job description. Improve the energy efficiency of homes or buildings by installing insulation, windows, lighting and other energy efficient products

Transferable Skills: HVAC and lighting system installation, state/local energy efficiency requirements, retrofitting standards, communication, reports, recommendations, customer service, building inspections

Other Industries: Professional Services, Manufacturing

Summaries of Selected Occupations in Building Commissioning and Energy Services Contracting

Job Title:	HVAC Technician or Installer
Median Wage (2010):	$25.45
Projected Job Growth	483 jobs, 7.5% growth in WA
Job description.	Install, service and repair heating and air conditioning systems in residences and commercial establishments
Transferable Skills:	Determine project requirements, layout/measure/mark dimensions and reference lines, install and anchor units, mechanical, math, building and construction, listening, near vision, manual dexterity
Other Industries:	Construction, Manufacturing

Job Title:	Test and Balance Technician
Median Wage (2010):	$25.45
Projected Job Growth	Job # not available, 7.5% growth in WA
Job description.	Performs field tests and analysis of HVAC systems, makes system adjustments, records readings, and prepares test and balance reports.
Transferable Skills:	Testing HVAC Systems, mechanical aptitude, work with common hand tools, math, prepare reports
Other industries:	Construction, Self Employed

Additional References

Reports

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Environmental and Energy Study Institute, *Jobs from Renewable Energy and Energy Efficiency*, October 2009

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Washington State Community and Technical Colleges, *Approved Green Economy Programs and Certificates*, June 2010

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Websites

U.S Department of Labor Career One Stop, http://www.careeronestop.org/

U.S Department of Labor O*NET, http://www.onetcenter.org/

Washington State Career Bridge, ttp://www.careerbridge.wa.gov/

Washington State Workforce Explorer, http://workforceexplorer.com/

Washington State Department of Labor and Industries Apprenticeship Programs, http://www.lni.wa.gov/TradesLicensing/Apprenticeship/