



Washington
**Green
Transportation
Program**

Initial Research Review for Workforce Development

Phase 1

Section 1: Education, Skills &
Training

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Energy Program

WASHINGTON STATE UNIVERSITY



Washington

Green Transportation Program

Moving forward with Washington's public fleets

The Washington State legislature passed legislation in 2019 directing the **WSU Energy Program** to establish and administer a technical assistance and education program for public agencies on the use of alternative fuels and vehicles. The **Green Transportation Program** provides education and assistance about alternative fuels and vehicles to all public agencies in the state, including cities, counties, tribes, transit agencies, ports, school districts, colleges and universities, utilities and PUDs, and other political subdivision.

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Section 3: Education, Skills and Training

This section begins to identify existing workforce education programs in Washington and cites existing studies that identify the need to scale up programs to meet current and projected EV labor demands. Targeted programs will be needed to ensure equitable access to training and employment opportunities for those with the greatest barriers to employment and/or the greatest need for quality employment.

EV Occupation-Level Training

The *Amping Up* report takes a close look at the manufacturing and supply-chain occupations for the EV sector. These occupations require high levels of education. The table below lists the key occupations identified in the study according to the typical level of education required for an entry-level position, required work experience and typical on-the-job training. In all, 21 of the 30 occupations require at least an associate degree, and only seven are open for candidates with only high school diploma. In 2019, those seven occupations employed 24% of the workers in EV-related occupations in Washington.¹

Table 1. Required Education and Experience in EV Occupations

Occupation	Typical Entry Level Education	Work Experience Required	Typical On-The-Job Training
<i>Electricians</i>	High school diploma or equivalent	None	Apprenticeship
<i>Electric Motor, Power Tool, and Related Repairers</i>	High school diploma or equivalent	Less than 5 years	Moderate-term on-the-job training
<i>Electronic Equipment Installers and Repairers, Motor Vehicles</i>	High school diploma or equivalent	None	Moderate-term on-the-job training
<i>Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers and Finishers</i>	High school diploma or equivalent	None	Moderate-term on-the-job training
<i>Assemblers and Fabricators, All Other, Including Team Assemblers</i>	High school diploma or equivalent	None	Moderate-term on-the-job training
<i>Computer-Controlled Machine Tool Operators, Metal and Plastic</i>	High school diploma or equivalent	None	Moderate-term on-the-job training
<i>Machinists</i>	High school diploma or equivalent	None	Long-term on-the-job training
<i>Telecommunications Equipment Installers and Repairers, Except Line Installers</i>	Postsecondary non-degree award	None	Moderate-term on-the-job training
<i>Automotive Service Technicians and Mechanics</i>	Postsecondary non-degree award	None	Short-term on-the-job training

¹ *Amping Up Electric Vehicle Manufacturing in the PNW*. <https://webuildgreencities.com/wp-content/uploads/2020/05/READ-THE-EV-REPORT-HERE.pdf>

Occupation	Typical Entry Level Education	Work Experience Required	Typical On-The-Job Training
<i>Mechanical Drafters</i>	Associate degree	None	None
<i>Electrical and Electronics Engineering Technicians</i>	Associate degree	None	None
<i>Electro-Mechanical Technicians</i>	Associate degree	None	None
<i>Mechanical Engineering Technicians</i>	Associate degree	None	None
<i>Industrial Production Managers</i>	Bachelor degree	5 years or more	None
<i>Computer Systems Analysts</i>	Bachelor degree	None	None
<i>Computer Programmers</i>	Bachelor degree	None	None
<i>Software Developers, Applications</i>	Bachelor degree	None	None
<i>Software Developers, Systems Software</i>	Bachelor degree	None	None
<i>Network and Computer Systems Administrators</i>	Bachelor degree	None	None
<i>Operations Research Analysts</i>	Bachelor degree	None	None
<i>Chemical Engineers</i>	Bachelor degree	None	None
<i>Computer Hardware Engineers</i>	Bachelor degree	None	None
<i>Electrical Engineers</i>	Bachelor degree	None	None
<i>Electronics Engineers, Except Computer</i>	Bachelor degree	None	None
<i>Industrial Engineers</i>	Bachelor degree	None	None
<i>Materials Engineers</i>	Bachelor degree	None	None
<i>Mechanical Engineers</i>	Bachelor degree	None	None
<i>Chemists</i>	Bachelor degree	None	None
<i>Materials Scientists</i>	Bachelor degree	None	None
<i>Urban and Regional Planners</i>	Master degree	None	None

Source: Emsi

Existing Educational Programs – Washington

Below are some existing lists of degree programs which may be relevant in scaling up the EV workforce. Further research is needed for a complete list. It would also be helpful to research apprenticeships in EV-related fields, like electricians, power line installers, etc. This information might be available through Washington Dept. of Labor and Industries. It takes 4 to 5 years in an apprenticeship to become a licensed electrician or a journey-level machinist, and the process requires a very specific work-based learning approach that contains considerable rigor, having a skilled mentor throughout the apprenticeship, and demonstrated competency—not just academic content. Like academic programs, apprenticeship content will also need to be upgraded to reflect higher-level knowledge, skills and abilities in technical occupations.

The following table from the *Amping Up* report identifies the institutions in Washington and Oregon that reported completed degrees in 2018 in the programs that most directly translate into EV manufacturing-related occupations. The institutions in the table below could be candidates for partners in curriculum

development for EV-specific education and training components because they have existing programs training workforce to these occupations.²

Table 2. Completions in EV-Related Programs in Oregon and Washington, 2018

<i>Institution</i>	<i>State</i>	<i>Chemists</i>	<i>Computer Programmers</i>	<i>Material Engineers</i>	<i>Chemical Engineers</i>	<i>Computer Hardware Engineers</i>	<i>Material Scientist</i>	<i>Software Developers</i>
<i>Bates Technical College</i>	WA		6					
<i>Bellevue College</i>	WA		51					
<i>Big Bend Community College</i>	WA		5					
<i>Cascadia College</i>	WA		57		1			
<i>Central Washington University</i>	WA	17						
<i>Centralia College</i>	WA		5					
<i>Clark College</i>	WA				0			
<i>Clover Park Technical College</i>	WA		16					
<i>Columbia Basin College</i>	WA		8					
<i>Concordia University-Portland</i>	OR	2						
<i>Eastern Washington University</i>	WA	13						
<i>Edmonds Community College</i>	WA		69		4			
<i>George Fox University</i>	OR	3						
<i>Gonzaga University</i>	WA	4						
<i>Green River College</i>	WA		77		9			
<i>Heritage University</i>	WA	2						
<i>Highline College</i>	WA		6					
<i>Klamath Community College</i>	OR							31
<i>Lake Washington Institute of Technology</i>	WA		27					
<i>Lane Community College</i>	OR		11					
<i>Lewis & Clark College</i>	OR	17						
<i>Linfield College-McMinnville Campus</i>	OR	2						
<i>Linn-Benton Community College</i>	OR	1						
<i>Lower Columbia College</i>	WA		7		2			
<i>Mt Hood Community College</i>	OR	1						
<i>North Seattle College</i>	WA		6					
<i>Olympic College</i>	WA		6		1			
<i>Oregon Institute of Technology</i>	OR							44
<i>Oregon State University</i>	OR	80			163		12	
<i>Pacific Lutheran University</i>	WA	19						
<i>Pacific University</i>	OR	15						
<i>Peninsula College</i>	WA		10					
<i>Portland State University</i>	OR	33		9				
<i>Reed College</i>	OR	12						

² *Amping Up Electric Vehicle Manufacturing in the PNW.* <https://webuildgreencities.com/wp-content/uploads/2020/05/READ-THE-EV-REPORT-HERE.pdf>

<i>Renton Technical College</i>	WA		77					
<i>Rogue Community College</i>	OR					2		22
<i>Saint Martin's University</i>	WA	1						
<i>Seattle Central College</i>	WA		10					
<i>Seattle Pacific University</i>	WA	7						
<i>Seattle University</i>	WA	5						
<i>Shoreline Community College</i>	WA				2			
<i>Skagit Valley College</i>	WA		1					
<i>South Puget Sound Community College</i>	WA		16					
<i>Southern Oregon University</i>	OR	16						
<i>Spokane Falls Community College</i>	WA				2			
<i>Tacoma Community College</i>	WA				1			
<i>University of Oregon</i>	OR	89						
<i>University of Portland</i>	OR	29						
<i>University of Puget Sound</i>	WA	10						
<i>University of Washington-Bothell Campus</i>	WA	3						
<i>University of Washington-Seattle Campus</i>	WA	130		97	118			
<i>Walla Walla University</i>	WA	3						
<i>Washington State University</i>	WA	34		57	57			
<i>Western Oregon University</i>	OR	6						
<i>Western Washington University</i>	WA	42						
<i>Whitman College</i>	WA	9						
<i>Whitworth University</i>	WA	21						
<i>Willamette University</i>	WA	23						

Source: Emsi

Table 3. Institutions that could Partner in Curriculum Development for EV-specific Education and Training Components

In top 10 for completions in following programs	Institution	State	All Completions	All Certificates	All Degrees	Award of less than 1 year	Award of at least 1 but less than 2 years	Associate's Degree	Award of at least 2 but less than 4 years	BA Degree	Post-baccalaureate Certificate	MA Degree
All programs, BA, MA	UW - Seattle	WA	1,025		1,025					558		372
All programs, BA, MA	WSU	WA	697	40	657					495	40	108
All programs, Certificates, Awards less than 2 years, Associates	Green River College	WA	468	360	108	359	1	73		35		
All programs, Certificates, Awards less than 2 years, Associates	Spokane CC	WA	285	234	51	220	14	51				
All programs, Certificates, Awards less than 2 years	Big Bend CC	WA	266	247	19	227	20	19				
All programs, Certificates, Awards less than 2 years	Shoreline CC	WA	192	166	26	140	26	26				
All programs, Certificates	Perry Technical Institute	WA	163	163	0		58	0	105			
BA	Eastern Washington U	WA	152	1	151					145	1	6
Certificates, Awards less than 2 years	Renton TC	WA	142	104	38	7	84	38	13			
BA, MA	UW - Bothell	WA	129		129					115		14
Certificates, Awards less than 2 years, Associate	Lake Washington Institute of Technology	WA	128	80	48	45	35	48				

In top 10 for completions in following programs	Institution	State	All Completions	All Certificates	All Degrees	Award of less than 1 year	Award of at least 1 but less than 2 years	Associate's Degree	Award of at least 2 but less than 4 years	BA Degree	Post-baccalaureate Certificate	MA Degree
Certificates, awards less than 2 years	Clover Park TC	WA	126	88	38	64	12	38	12			
Certificates, Awards less than 2 years, Associate	Bellingham TC	WA	123	81	42	23	58	42				
Awards less than 2 years, Associate	Everett CC	WA	118	78	40	77	1	40				
BA	Gonzaga University	WA	109		109					103		6
Associate	Bates TC	WA	99	22	77	3	19	77				
BA, MA	Seattle U	WA	91	5	86					77	5	9
Associate	Bellevue College	WA	77	17	60	3	14	60				
MA	Western Washington U	WA	65		65					54		11
Associate	Tacoma CC	WA	47		47			47				
MA	Saint Martin's U	WA	39		39					28		11
MA	UW - Tacoma	WA	9		9					0		9

Appendix A of this document includes a list of all existing automotive programs in Washington's community and technical colleges.

CC = community college

TC = technical college

U = university

Shoreline Community College’s Professional Automotive Training program is an example of a successful public-private partnership. The Center collaborates closely with auto manufacturers to develop curriculum and hosts various Service Technician training programs. The Center has trained more than 1,300 students and the programs have resulted in significant savings in training costs for the partnering employers. The programs have placed students in living wage jobs.³

It is worth noting the Shoreline Community College is currently the only public 2-year institution in Washington operating a dedicated EV technician program, which is sponsored by Tesla (see below).

<i>Table 4. Shoreline Professional Automotive Training Program</i>	
Automotive General Service Technician	45 credits (3 quarters), Certificate of Proficiency Summary: The General Service Technician I certificate is designed to provide you with knowledge and skills that are essential building blocks in the field of Automotive Services Technician. All courses within this certificate are also part of an AAAS degree in Automotive Services Technician.
Automotive Service Technician	Associate of Applied Arts and Sciences, 101 credits Summary: The Automotive Service Technician (AST) degree builds on the General Service Technician I certificate by providing advanced repair and diagnostic skills for placement as an automotive technician. Students alternate between classroom study and a dealership internship to develop additional theory and higher levels of hands-on skills and earn certifications with our industry partners: Subaru University, Nissan Technical Training Academy and National Coalition of Certification Centers (NC3).
Automotive Technician: Honda Professional Automotive Career Training (PACT)	Associate of Applied Arts and Sciences. 125 credits Summary: Gain hands-on experience alternating classroom learning with hands-on, paid training at a Honda or Acura dealership. Master fundamental skills and develop an understanding of automotive service business principles.
Automotive Technician: Mopar Collage Automotive Program (MoparCAP)	Associate of Applied Arts and Sciences, 129 credits, Summary: Gain hands-on experience alternating classroom learning with hands-on, paid training at a Chrysler dealership. Master fundamental skills and develop an understanding of automotive service business principles.
Automotive Technician: Toyota Technician Training and Education Network (T-TEN)	Associate of Applied Arts and Sciences, 139 credits Summary: Gain hands-on experience alternating classroom learning with hands-on, paid training at a Toyota or Lexus dealership. Master fundamental skills and develop an understanding of automotive service business principles.
Electric Vehicle Technician (Tesla)	17.5 credits, \$1,700, Certificate of Completion Summary: The Tesla START program is a manufacturer-college partnership program designed to offer service technician training for qualified applicants. This intensive 12-week training program provides students with the skills necessary for job placement as Service Technicians at Tesla Service Centers across the United States. Students will develop technical expertise and earn Tesla certifications through a blended approach of in-class theory, hands-on labs, and self-paced learning.

³ Amping Up Electric Vehicle Manufacturing in the PNW, <https://webuildgreencities.com/wp-content/uploads/2020/05/READ-THE-EV-REPORT-HERE.pdf>

California has been a leader in workforce training to support growth in the EV industry. Appendix B includes a detailed analysis of workforce training needs identified in California. Much of California's EV workforce development planning originates from California's Sustainable Freight Action Plan. A summary of this plan is included in Appendix C. Appendix D includes additional training organizations which may serve as a model for Washington State.

Summary of Education, Skills and Training

The EV industry is growing rapidly and as a result, new occupations are emerging, new skills are needed and new education and training must be developed to address these changes. However, there is insufficient information available to support job growth projections, identify emerging occupations and identify new and changing skills. Addressing this knowledge gap is needed to inform education and training programs. Targeted programs will be needed to ensure equitable access to training and employment opportunities. A deeper look into model programs in California and elsewhere could be informative. Direct conversations with employers about the changes in skills and job duties would yield useful insight to education and training program design.