

The Role of Non-Degree Credentials in Developing a Sustainable Workforce in Electrified Transportation Infrastructure



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INTRODUCTION

- A **sustainable skilled workforce** that re/skills and equips workers with new emerging competencies is essential for the future of **electrified transportation infrastructure** (ETI) in the U.S. The transition to **electric vehicles** (EVs) offers opportunities to implement **non-degree credentials** (NDCs), such as certificates and technical training programs, that provide flexible, cost-effective pathways to prepare individuals for roles in **EV manufacturing, maintenance, and infrastructure development** (Joyceinc, 2024).
- Aligning **NDC curricula** with **industry requirements** and **fostering collaborations** between educational institutions and industry stakeholders can effectively **bridge skill gaps**, ensuring a competent workforce to support the nation's shift toward **sustainable transportation**(Srujana, 2024).
- This approach addresses the immediate demand for **skilled labor** and **promotes continuous learning** and **adaptability**, which are crucial in an industry characterized by **rapid technological advancements**. By investing in **targeted education** and **training initiatives**, the U.S. can strengthen its position in the **global EV market, drive economic growth, and achieve environmental sustainability goals** (Jannesar Niri et al., 2024).
- The electrified transportation sector comprises several key components: **EVs, Energy Infrastructure, Manufacturing, Maintenance and Services, Policy and Regulation**.

METHODS

To examine the potential of non-degree credentials (NDCs) for developing a sustainable workforce for the U.S electrified transportation infrastructure (ETI) sector, our study employed a comprehensive approach:

- We analyzed employment projections and occupational data from the **U.S. Bureau of Labor Statistics** (2023) to identify current and future workforce demands in **electric vehicles (EVs) manufacturing, maintenance, and infrastructure development**.
- We reviewed reports from the **International Energy Agency (2021)** to understand shifts toward electric mobility and their implications for specific workforce skills.
- We identified **three NDC programs** relevant to the ET sector, focusing on **certificates and technical training** offerings that align with industry needs.
- We assessed each **program's curriculum** to determine how it impacts competencies essentials for **ET workplaces**.
- We examined the **flexibility and accessibility of these programs**, considering factors such as **duration, cost, and learning formats** (i.e., online, in-person, hybrid)



Figure 1: Non-degree credentialing pathways to workforce development for occupations in Electrified Transportation Infrastructure

RESULTS

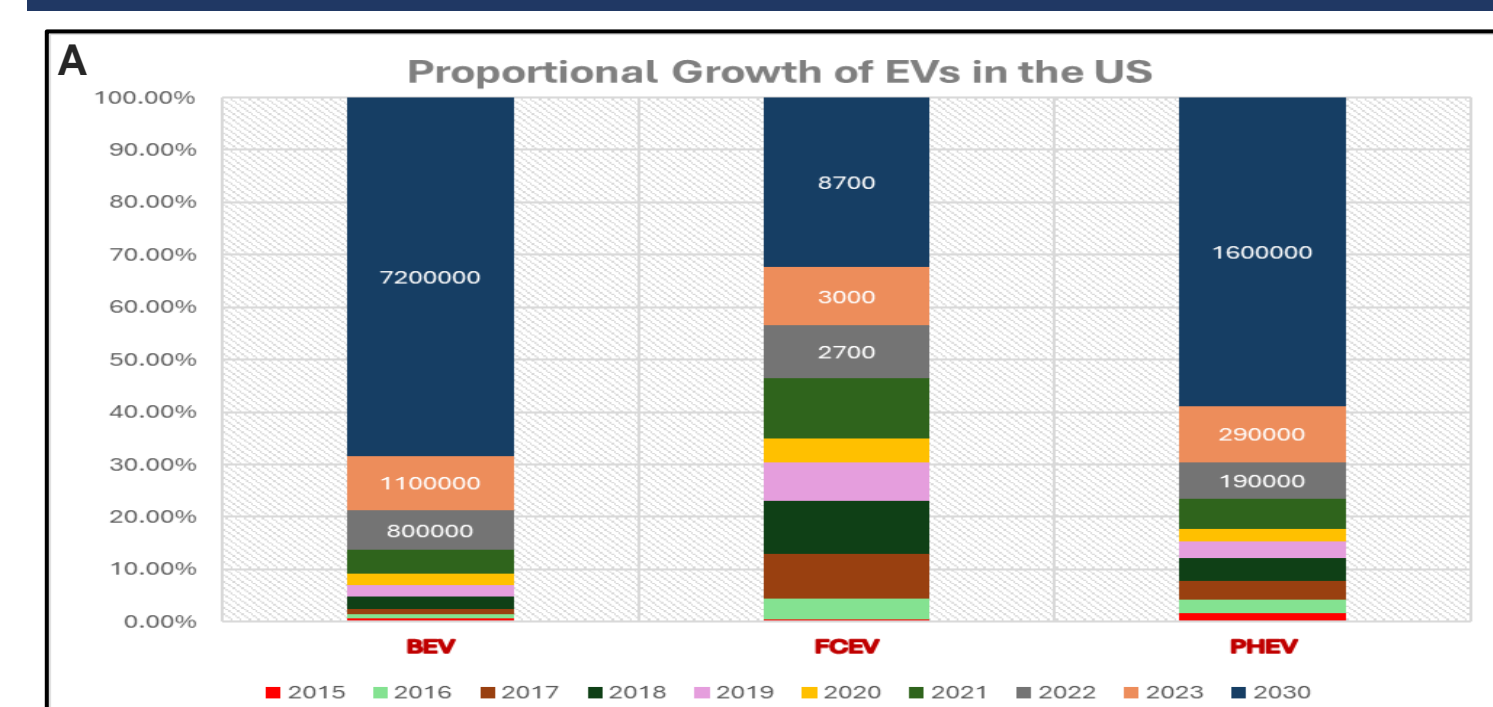


Figure 2A: EV sales in the US (2010-2030). The result highlights that **battery electric vehicle (BEV)** sales are projected to surge from **1.1 million in 2020 to 7.2 million by 2030**, leading the sustainable mobility sector. In contrast, **fuel cell electric vehicles (FCEVs)** and **plug-in hybrid electric vehicles (PHEVs)** will experience minimal growth during this period. Source of Data: The International Energy Agency

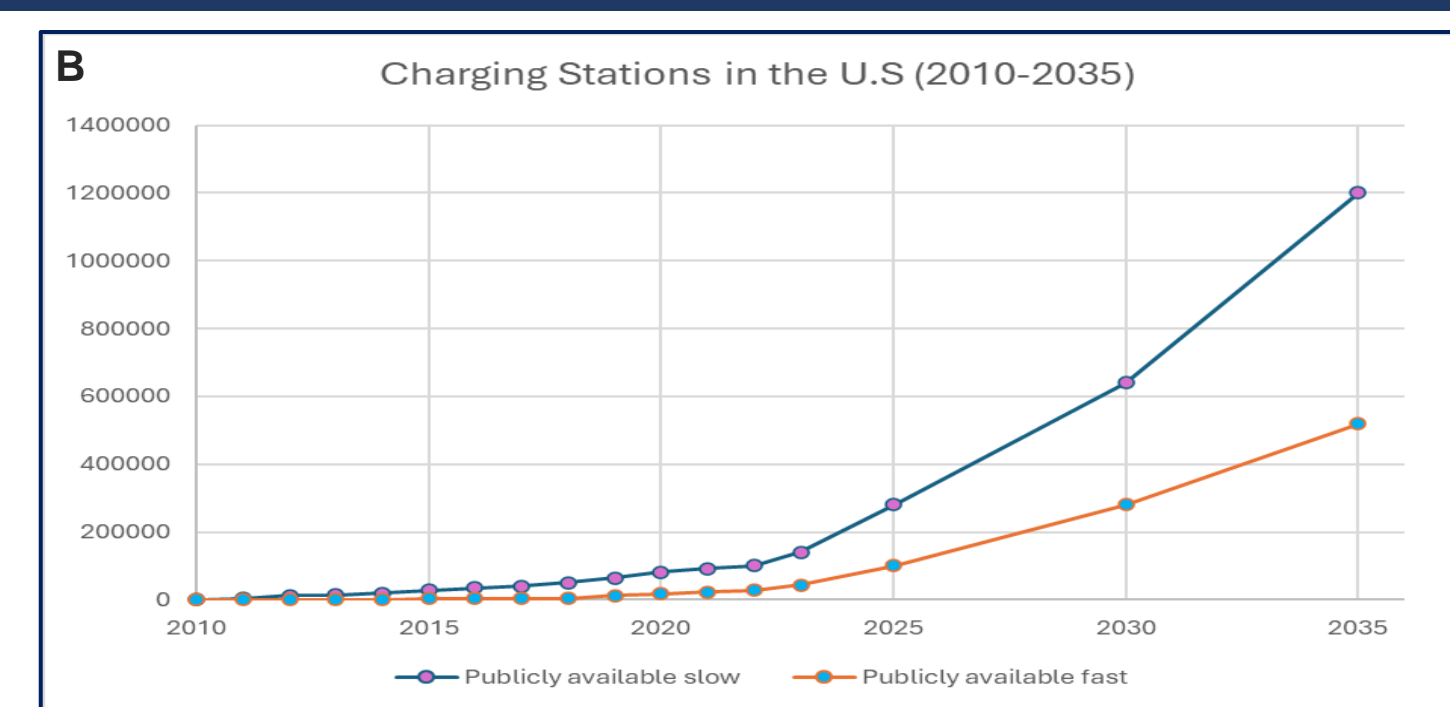


Figure 2B: EV charging points projections in the U.S. for public use from 2010-2035. Projections indicate that by 2035, the United States will need approximately **1.3 million slow-charging stations** and **600,000 fast-charging stations** to support the accelerating adoption of electric vehicles (EVs). These results are essential to meet the **growing demand for accessible and efficient EV charging infrastructure nationwide**. Source of Data: The International Energy Agency

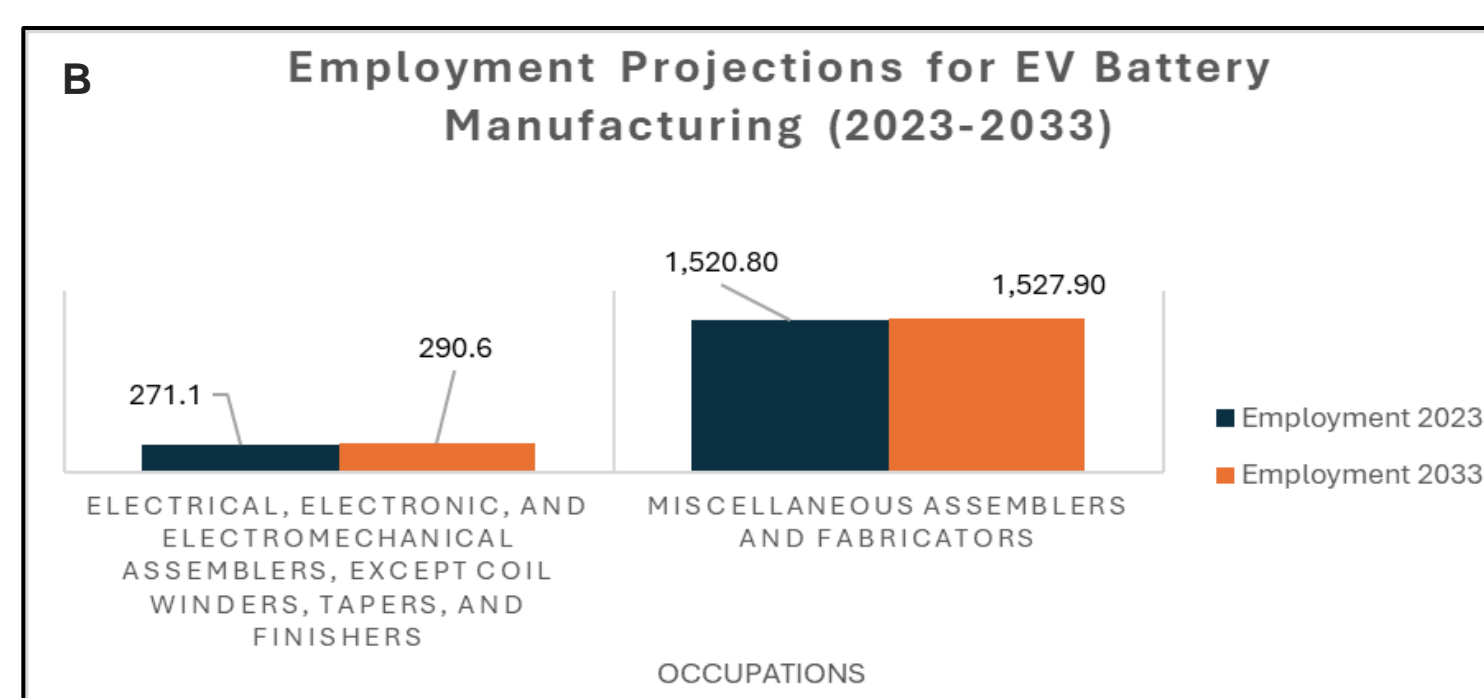
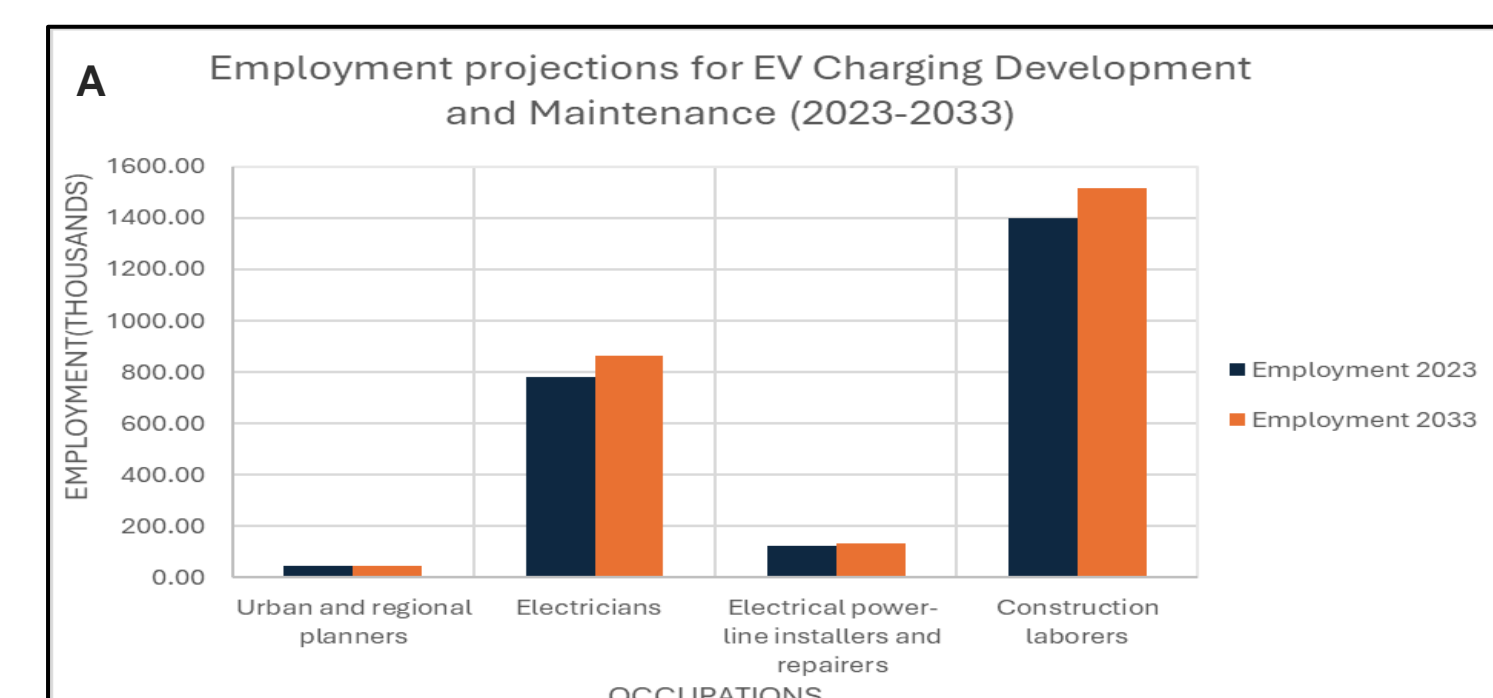
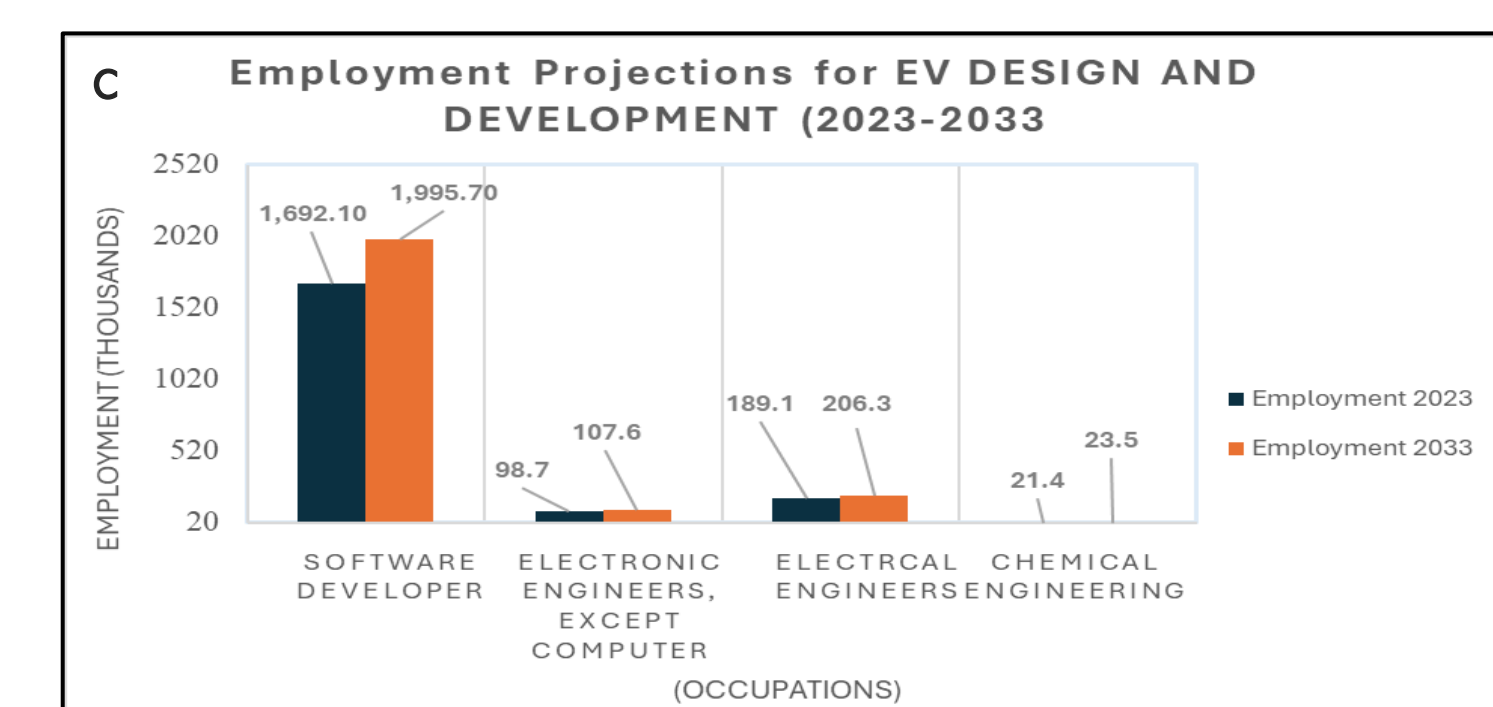


Figure 3: Occupations employment projections from 2023 to 2033 in **charging development and maintenance** (A), **battery manufacturing** (B), and **design and development** (C) for EVs (employment in thousands).

Source: U.S. Bureau of Labor Statistics



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Training Provider	Program name	Impact on ETI Competencies	Duration	Cost	Format	Credentials Awarded	Intended Audience	Website
Legacy EV	EV Fundamentals Certification Bootcamp	Provides expertise in high-voltage safety and gas-to-electric vehicle conversions, including hands-on exercises and virtual coursework.	1-week virtual coursework and hands-on bootcamp	\$5,000	In person	EV Fundamentals Certification Bootcamp	Anyone Interested in learning about EVs	https://legacyev.com/products/ev-fundamentals-certification-bootcamp
Massachusetts Institute of Technology (MIT) Professional Education	Sustainable Infrastructure Systems: Planning and Operations	Focuses on planning and operating sustainable infrastructure systems, including those for electrified transportation, emphasizing sustainable practices and technologies.	8 weeks 8-10 hours a week	\$2,900	Online	Certificate of Completion	Executives, mid-to-senior level managers, Policymakers, engineers and technical professionals, Consultants, Finance leaders and economists	https://professionalprograms.mit.edu/online-program-sustainable-infrastructure-systems/#info
IEEE Continuing and Professional Education	Transportation Electrification Course Program	Comprises 24 self-paced courses focusing on transportation electrification and electric batteries, ideal for professionals in the automotive industry	Self-Pace	\$240	Online	Continuing Education Units (CEU) and Professional Development Hours (PDHs) from IEEE can be used to maintain engineering licenses.	Ideal for technical professionals at organizations in the automotive industry as well as academic students in engineering programs, especially those interested in pursuing careers involving automotive and battery technology	https://innovationnetwork.ieee.org/courses/transportation-electrification/
Weber State University Division of Online & Continuing Education	Automotive Technology Training Program	Phase I: High-Voltage Safety Training (online) Phase II: Hybrid and Electric-Vehicle Systems (online) Phase III: Hybrid and Electric-Vehicle Boot Camp (In-person)	Phase I: Seven hours of course content Phase II: Twenty-one hours Phase III: One week of hands-on	Phase I: \$375 Phase II: \$735 Phase III: \$2,000	Hybrid	ASE xEV and ASE L3 Light Duty Electric/Hybrid Vehicle Certifications	Anyone, EV owners, technicians, managers, high school and college auto shop teachers, factory training instructors, service engineers	https://continue.weber.edu/professional/programs/evtraining/

Table 1: Four non-degree credential (NDC) programs relevant to the electrified transportation Infrastructure (ETI) sector, categorized into **manufacturing, maintenance, infrastructure development, and electrified transportation infrastructure**. Each program is evaluated for its **curriculum's impact on essential ET workplace competencies**, as well as its duration, cost, and learning format. These programs target **specific skills gaps** and **offer flexible schedules** with **effective costs**.

DISCUSSION

- **Growing Demand for EV-Related Occupations:** Employment projections indicate a **significant increase in roles essential to electric vehicle (EV) design and development**. For instance, **software developers** are expected to rise from **1,692.1 thousand in 2023 to 1,995.7 thousand by 2033**, while **electronic engineering** positions are projected to require **107.6 thousand workers in 2033**. This underscores the escalating need for skilled professionals in the EV industry.
- **Gaps in EV Battery Manufacturing Workforce:** The **EV battery manufacturing sector anticipates a workforce gap**, with positions for **electrical, electronic, and electromechanical assemblers increasing from 271.1 thousand in 2023 to 290.6 thousand in 2033—a 6.71% gap**. This growth reflects the sector's rapid expansion and the necessity for targeted training programs to address emerging skill shortages
- **Increasing Demand in EV Charging Infrastructure Development:** Occupations related to **EV charging infrastructure**, such as electrical powerline installers and repairers, are projected to grow from **123.4 thousand in 2023 to 132.8 thousand by 2033**. This trend underscores the importance of developing a workforce capable of supporting the expanding EV charging network.
- **Growth in Battery Electric Vehicle (BEV) Adoption:** Sales of **BEVs are expected to grow substantially, from 1.1 million in 2020 to 7.2 million by 2030**. This growth emphasizes the need for a **skilled workforce** to support the **manufacturing, maintenance, and infrastructure** required for widespread BEV adoption.

ACKNOWLEDGEMENT



This work is supported by National Science Foundation (NSF) Grant 1941524. This work reflects the views of the authors and not necessarily those of NSF.

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