

Key Locations for Electric Vehicle Charger Implementation on Campus

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Introduction

The U.S. heavily relies on motorized transport, primarily from combustion engines sourced on petroleum. Transportation accounts for 70% of all our petroleum consumption, accounting for roughly 31% of all energy related carbon emissions. This consumption directly exacerbates the dreaded effects of climate change. Electric vehicle (EV) usage can greatly reduce this petroleum reliance. Sales of EV in the U.S. are projected to reach 40%-50% of total passenger car sales by 2030. The need for supporting electric vehicle charger (EVC) infrastructure is imminent. The CWU Climate Action Plan states to install 30 EVC's on campus by 2030. Less than half of this goal has been met, with no direct expansion plans in place. CWU needs to be prepared for a shifting market that favors EV's. This project bridges CWU's EV charging gap with strategic locations, a phased installation plan, and a map that properly supports sustainable transportation on campus.

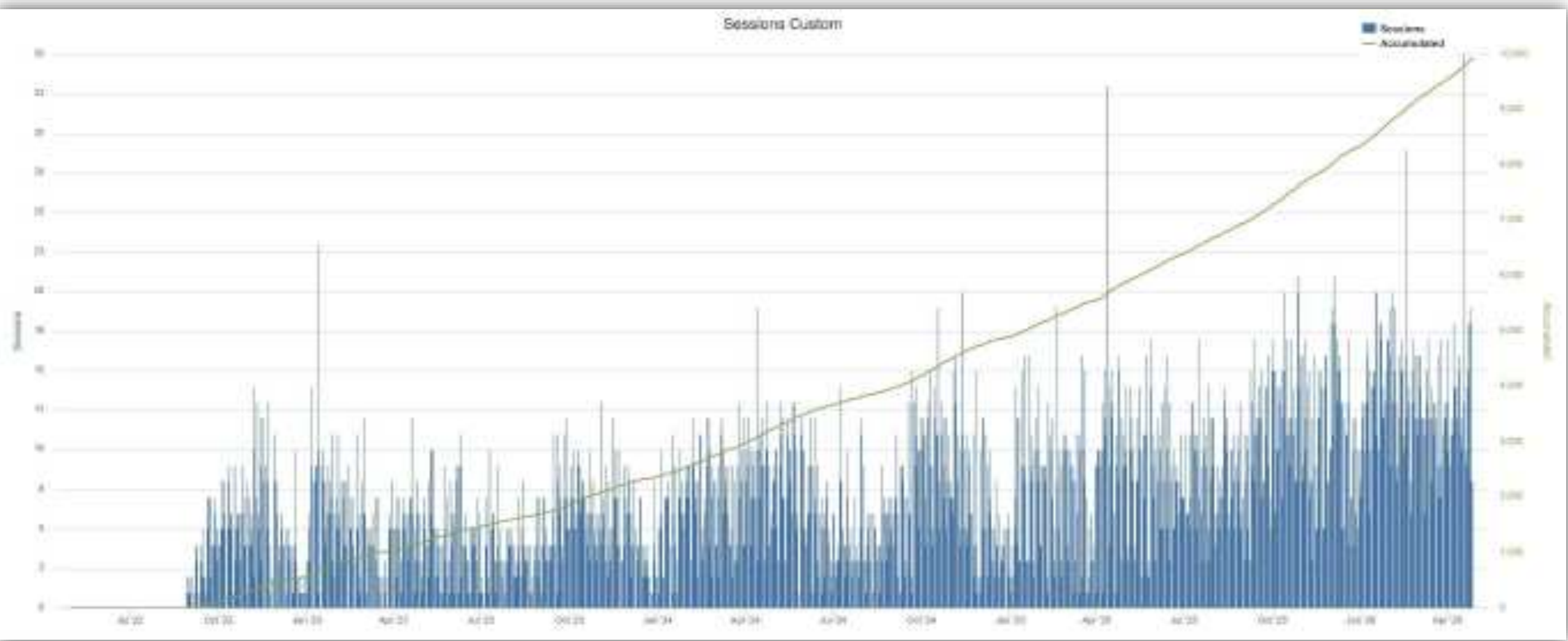


Figure 1. Column chart of daily and total accumulated EVC charging sessions at CWU from the first EVC's to the current quarter; showing a gradual increase over time via green trendline and spikes in daily use indicated by blue. Representing the number of times EVC's have been utilized on campus

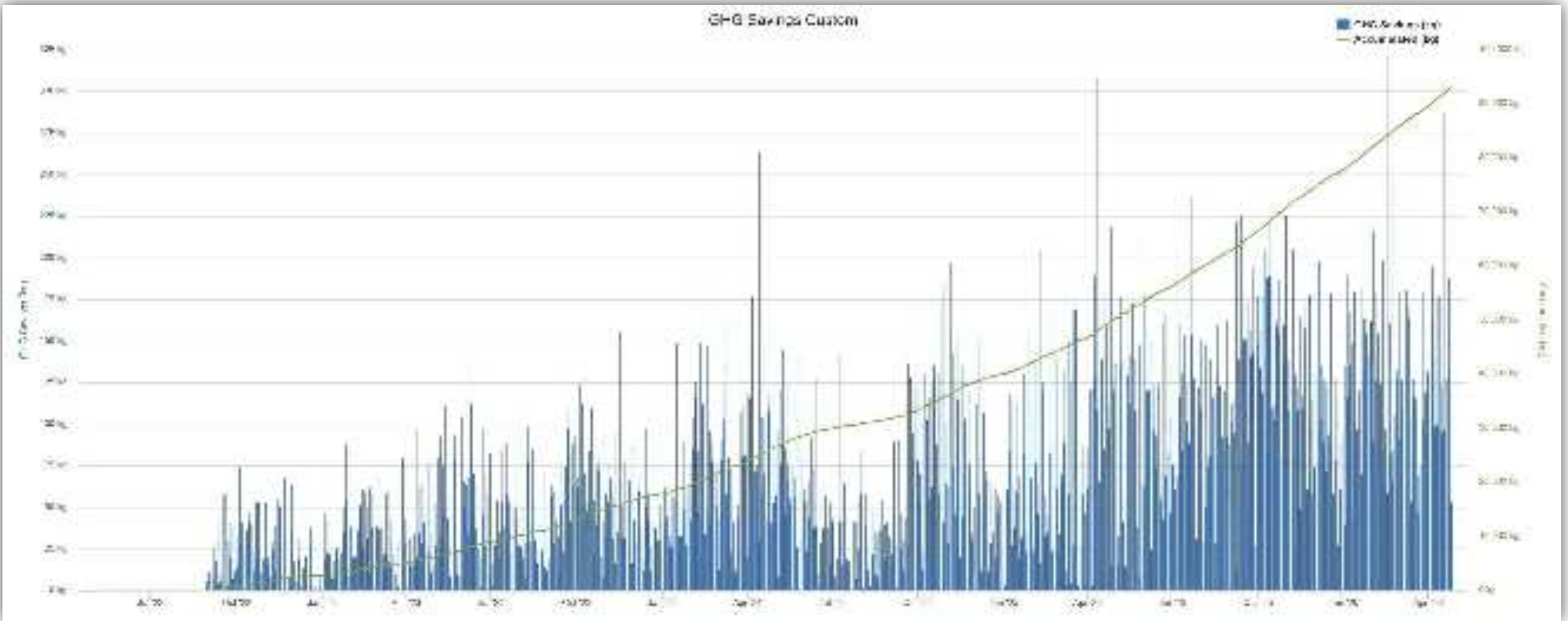


Figure 2. Column chart of daily and total accumulated GHG savings from EVC's at CWU from the first EVC's to the current quarter; showing a gradual increase over time via green trendline and spikes in daily use indicated by blue. Representing the reduction of harmful emissions

CWU's EVC History

- Currently 12 Charge Point EVC's supporting a maximum of 14 EV's
- First implemented in 2022
 - Science Building lot H-6
- One additional expansion in 2024
 - Nicholson Pavilion lot Q-14
- Health Science and Dugmore Hall previously planned EVC's
 - Budget constraints did not allow implementation
- Expansion Plan of EVC's integrated into Decarbonization Plan
 - NO** roadmap to install remaining 18 charging stations to ensure Climate Action Plan Goals

Project Accomplishments

Update of CWU Interactive Map Infographics

- CWU map updated to include Nicholson Pavilion active EVC's
 - Absent from map since implementation in 2024
- Shows all available EVC's on campus (Figure 5)

Implementation Map for Future Electric Vehicle Charger Expansion *The short term*

- Locations for direct implementation of 3 level 2 dual head EVC's into Dugmore lot T-8 (Figure 5)
- Supporting electrical routing infrastructure present in lot T-8
 - Provides support for 6 EV's

The long term

- Future implementation and expansion into locations: North Academic Complex, McIntyre Building, and Nicholson Pavilion (Figure 5)
- The remaining 15 EVC's to be implemented for CWU Climate Action Plan
- Provides support for 30 EV's
- Locations more central to major campus buildings, with increased visitor traffic



Figure 3. Picture of EV Charging at Nicholson Pavilion



Figure 4. Picture of Dugmore hall

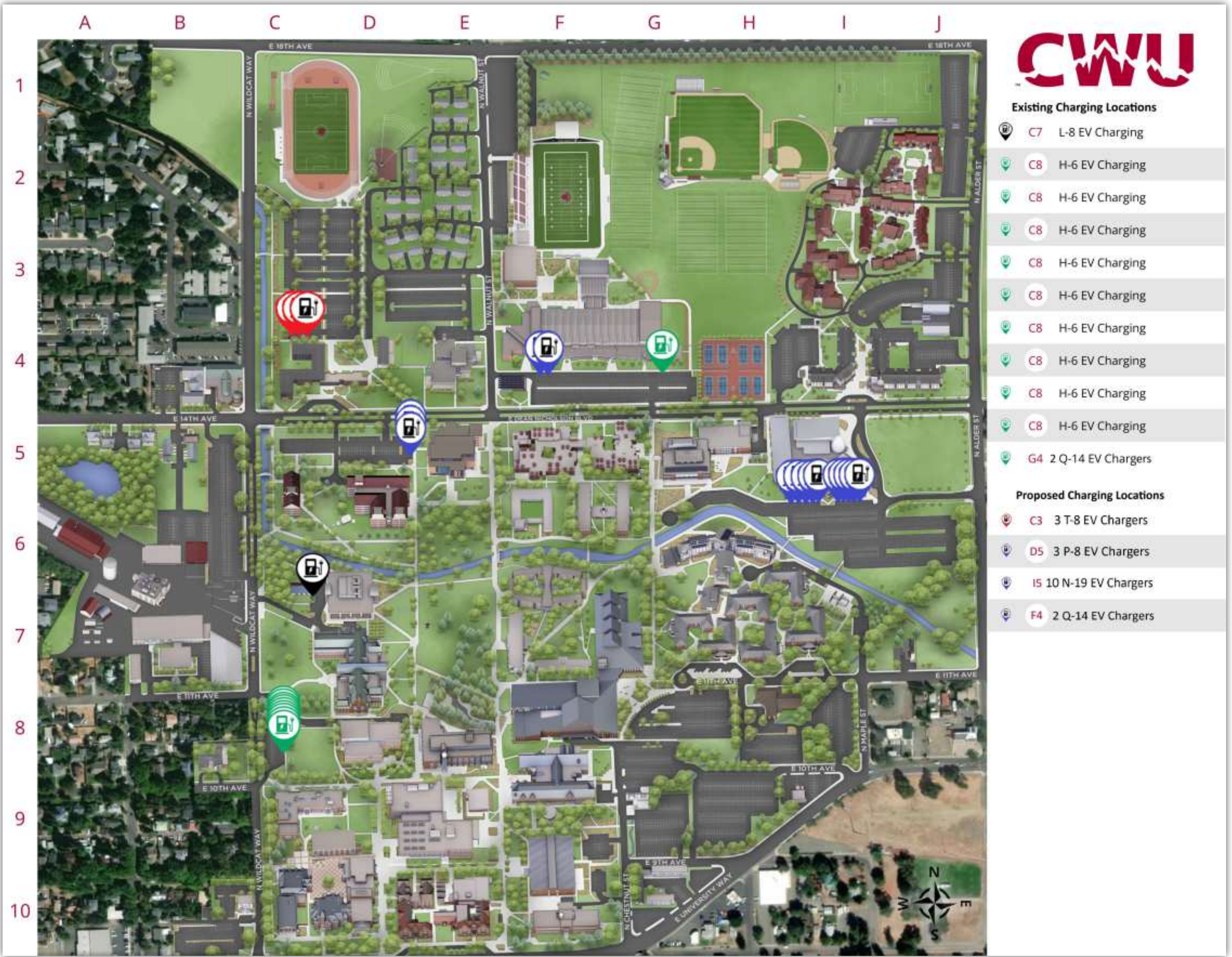


Figure 5. CWU map showing all existing and accessible EVC's in green and black (as on the CWU interactive map) and additional proposed charging locations for implementation not found on the interactive map. Short-term proposed locations indicated by red and long-term locations indicated by blue.

General Limitations

- Electrical routing present in parking lots tied to adjacent buildings
 - Restricted to the electrical capacity of spare electrical load availability
- Older buildings may have electrical mismatches that are unable to support EVC's
- Chargers must have a dedicated electrical routing branch
 - If not supported through an energy management system (EMS)

Recommendations

Approval should first be obtained for charger installation at Dugmore. Once approved, funding can be pursued to implement the project. Subsequently, feasibility research for expanding to other proposed locations, such as the North Academic Complex and McIntyre Building, should then be prioritized. These sites are recommended due to their accessibility as major campus buildings. Additionally, the CWU map should be updated to reflect EVC expansions accordingly.

This Project Supports UN Sustainable Development Goals:



Acknowledgements

Susan Rivera, Jordan Spradlin, Joe Bach, Christine Bowers, Parking Services, Jeremiah Eilers, Delano Palmer, Joanne Hillemann, Cheyanne Stilwater

References:

<https://afdc.energy.gov/fuels/electricity-benefits#:~:text=Energy%20security&text=Overall%2C%20the%20transportation%20sector%20accounts,diversify%20the%20U.S.%20transportation%20fleet.>
[https://www.eia.gov/tools/faqs/faq.php?id=307&t=10#:~:text=EIA%20estimates%20that%20in%202023,%20emissions%20\(4%2C794%20MMmt\).](https://www.eia.gov/tools/faqs/faq.php?id=307&t=10#:~:text=EIA%20estimates%20that%20in%202023,%20emissions%20(4%2C794%20MMmt).)
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