TECHNICAL BRIEF

MAY 2025

A method of estimating workforce needs from charging infrastructure build-out for medium- and heavy-duty vehicles

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In recent years, clean energy companies and advocates have promoted the jobs benefits of public and private investments that support electric vehicles, charging infrastructure, and battery manufacturing.[1] Not as well understood is the specific job demand potential from constructing and installing charging infrastructure around the country. This brief outlines the analytical steps developed by the ICCT to estimate this charging infrastructure-related work, including electricity grid upgrades, to support projected zero-emission medium- and heavy-duty vehicle (ZE-MHDV) deployment in the United States. The example analysis presented here considers potential job demand from 2026 to 2032 that results from the investments driven by the Commercial Clean Vehicle Credit (45W) and the Advanced Manufacturing Production Tax Credit (45X) from the Inflation Reduction Act (IRA) of 2022.

PROJECTING ZERO-EMISSION SALES AND STOCK DRIVEN BY TAX INCENTIVES

The ICCT's global emissions model, Roadmap, simulates different policy scenarios that affect the development of the ZE-MHDV market.[2] Roadmap results include estimates of future vehicle stock, sales, and performance metrics like fuel efficiency. The Market Potential scenario that we modeled for this brief is an update of the ZE-MHDV deployment scenario from a 2023 ICCT paper and reflects ZE-MHDV market growth fueled by electric

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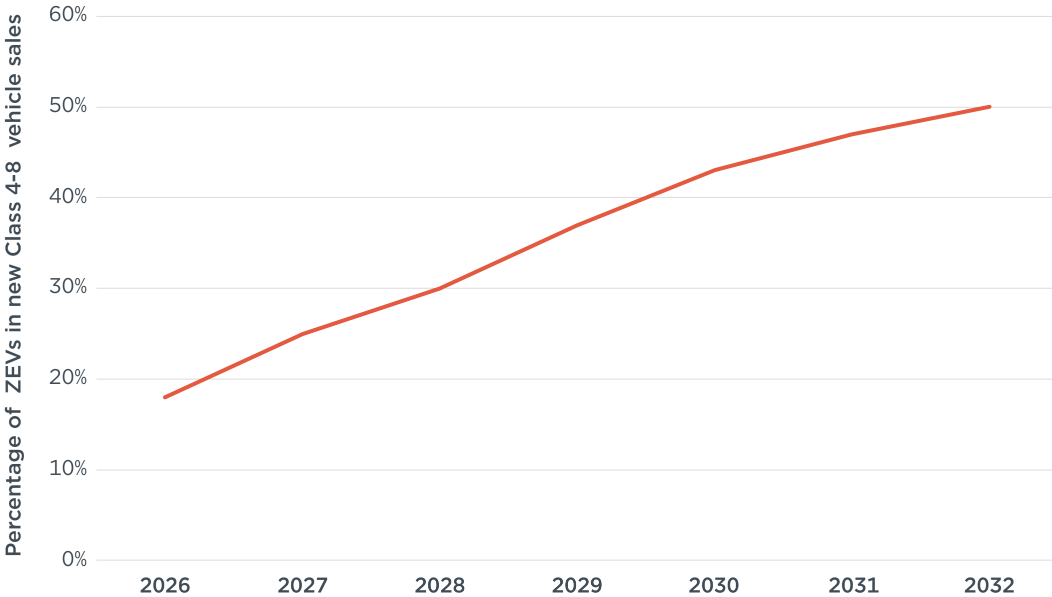
1 Environmental Defense Fund, "Production Underway at Dozens of U.S. Electric Vehicle Manufacturing Sites after Historic Levels of Investment," press release, January 8, 2025, https://www.edf.org/media/production-underway-dozens-us-electric-vehicle-manufacturing-sites-after-historic-levels.

2 Jonathan Benoit and Gabe Hillman Alvarez, *Roadmap v2.7 Documentation*, computer software, International Council on Clean Transportation, 2024, https://theicct.github.io/roadmap-doc/versions/v2.7/.

vehicle tax incentives.[3] As illustrated in Figure 1, the Market Potential scenario assumes immediate and robust acceleration of sales and a stock of approximately 1 million ZE-MHDVs by 2030.

Figure 1

Annual ZE-MHDV sales share in the Market Potential scenario from 2026 to 2032



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MODELING CHARGING INFRASTRUCTURE NEEDS

The primary tool we used to project the energy needs of ZE-MHDVs and the associated charging needs is called HDV CHARGE.[4] It inputs the Roadmap model and publicly available traffic data. The aforementioned 2023 ICCT paper and a 2024 ICCT report provide full details of our charging infrastructure modeling methods.[5] A simplified schematic that illustrates our modeling framework used for this workforce needs assessment is in Figure 2.

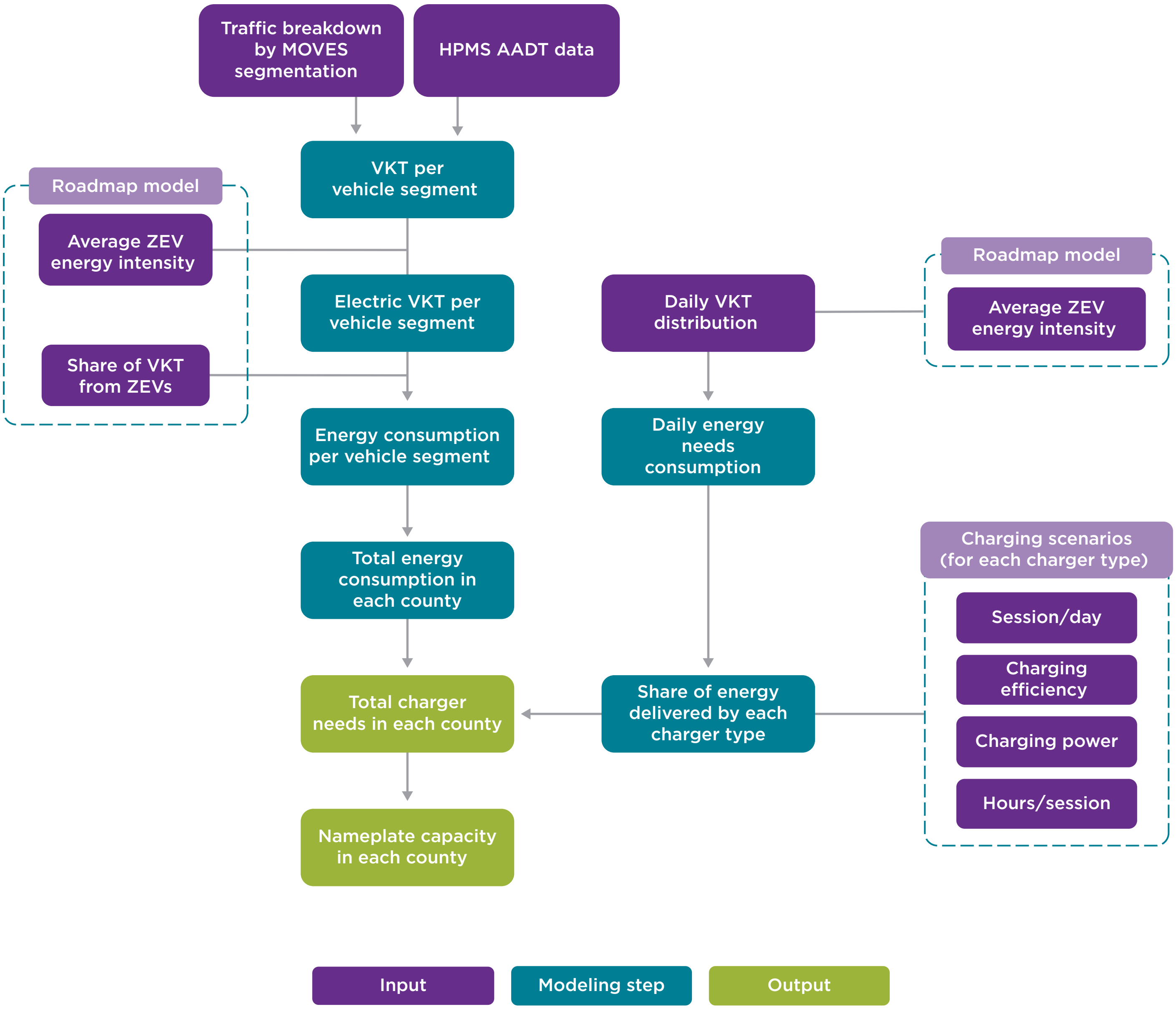
3 Pierre-Louis Ragon et al., *Near-Term Infrastructure Deployment to Support Zero-Emission Medium- and Heavy-Duty Vehicles in the United States* (International Council on Clean Transportation, 2023), https://theicct.org/publication/infrastructure-deployment-mhdv-may23/.

4 Pierre-Louis Ragon, et al., *HDV CHARGE v 1.0 Documentation*, computer software, International Council on Clean Transportation, 2025, https://theicct.github.io/HDVCHARGE-doc/.

5 Hamilton Steimer et al., *Powering Seattle Fleets: A Charging Infrastructure Strategy for Battery Electric Medium- and Heavy-Duty Vehicles* (International Council on Clean Transportation, 2024), https://theicct.org/publication/powering-seattle-fleets-charging-infrastructure-strategy-for-battery-electric-medium-and-heavy-duty-vehicles-may24/.

Figure 2

Simplified schematic of the ICCT's charging infrastructure modeling approach for this analysis



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We first estimate the daily vehicle kilometers (VKT) traveled by using publicly accessible data of annual average daily traffic (AADT) from the Highway Performance Monitoring System and the U.S. Environmental Protection Agency's Motor Vehicle Emission Simulator (MOVES4) model.[6] Using the energy efficiency factors from the Roadmap model, we then estimate the current energy demand from ZE-MHDVs and project their future energy needs in each county.

6 U.S. Department of Transportation. *Data Access for Highway Performance Monitoring System (HPMS)*, accessed July 23, 2024, https://data.transportation.gov/stories/s/Data-Access-for-Highway-Performance-Monitoring-Sys/3uu4-47sa/; Office of Transportation and Air Quality, *MOtor Vehicle Emission Simulator: MOVES4*, computer software, U.S. Environmental Protection Agency, 2023, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P10186IV.pdf; Steimer et. al, *Powering Seattle Fleets.*

To estimate the number and types of chargers, we then develop different charging power levels and charging session durations. Each vehicle segment is assumed to use up to three different charger power levels: overnight (19.2 kW to 200 kW), fast (350 kW), and ultrafast (1 MW). Table 1 lists the overnight charging power levels based on vehicles' battery capacities using the assumption that vehicles will charge at lower power during their longest dwell period, especially during off-peak periods, to avoid the need for expensive high-powered chargers and potential grid upgrades, and to avoid elevated electricity prices. Overnight dwell times for each segment are based on research from the National Renewable Energy Laboratory.[7] Fast and ultrafast charging times are set at 30 minutes for all vehicle segments.

Table 1
Overnight charging session duration and power levels by vehicle segment

Vehicle segment	Charger type	Charging session duration (hours)	Charger power level (kw)
Combination long-haul truck	Overnight	5	200
Combination short-haul truck	Overnight	9	100
Single unit long-haul truck (Class 4-5)	Overnight	9.5	50
Single unit long-haul truck (Class 6-8)	Overnight	9.5	50
Single unit short-haul truck (Class 4-5)	Overnight	11	50
Single unit short-haul truck (Class 6-8)	Overnight	11	19.2
Refuse truck	Overnight	11	50
School bus	Overnight	17	19.2
Transit bus	Overnight	10.5	100
Other bus	Overnight	10.5	100

Results include county-level energy consumption, total charger counts, and nameplate capacity for different charger types and vehicle types. We then aggregate the results at the national level to reflect total cumulative demand. Table 2 presents national-level results for 2026–2032 under the Market Potential scenario and Table 3 shows the additional charging needs that arise each year, which is the difference between the two consecutive years.

7 Matthew Bruchon et al., *Depot-Based Vehicle Data for National Analysis of Medium- and Heavy-Duty Electric Vehicle Charging* (National Renewable Energy Laboratory, 2024), https://docs.nrel.gov/docs/fy24osti/88241.pdf.

Table 2

Projections of total cumulative chargers installed in the United States and nameplate capacity, 2026–2032

Year	Number of chargers	Nameplate capacity (MW)
2026	111,867	8,753
2027	173,075	15,449
2028	244,041	20,749
2029	328,043	26,718
2030	429,115	33,918
2031	528,055	40,805
2032	633,461	48,343

Table 3

Projections of annual additional chargers installed and nameplate capacity 2026–2032

Year	Number of chargers	Nameplate capacity (MW)
2026	45,823	3,245
2027	61,208	6,696
2028	70,966	5,300
2029	84,002	5,969
2030	101,072	7,201
2031	98,940	6,886
2032	105,406	7,538

CHARGING FACILITY PROTOTYPES

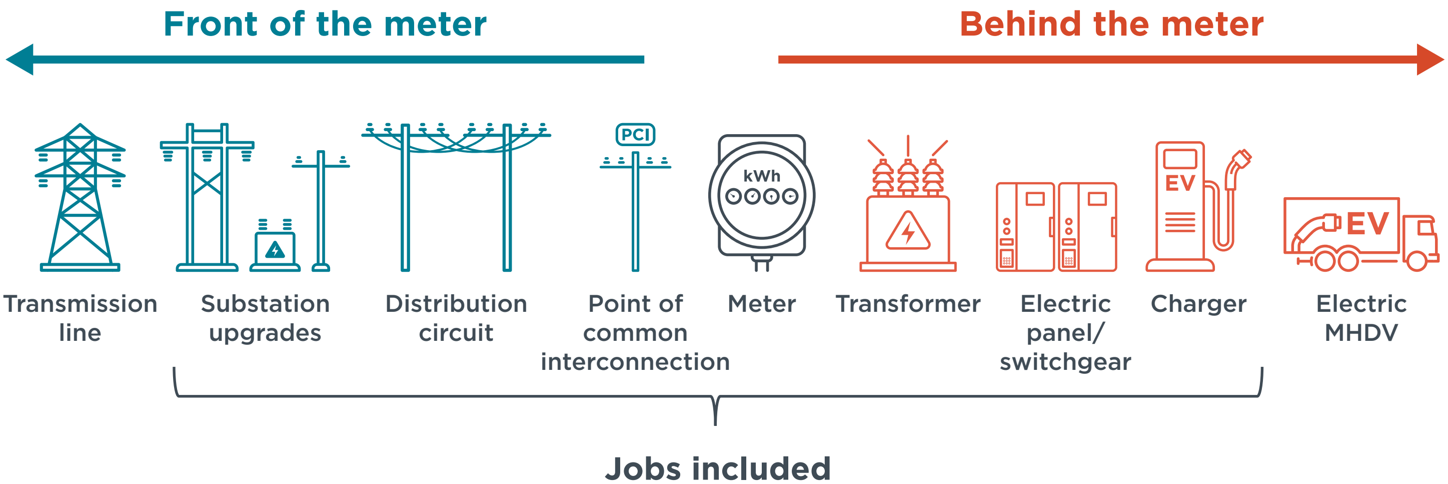
We contracted Black & Veatch (BV), an engineering, procurement, and construction consulting firm, to create prototypes of charging facilities using its extensive industry expertise. BV designed three prototypes: (1) a small depot charging facility; (2) a medium-size shared charging hub; and (3) a large corridor charging facility. BV assumed no managed charging systems are in place, and that new circuit upgrades are necessary to power each charging facility.

For each prototype, BV designed a representative schematic and data tables (see Appendix for all) that outline the tasks required to develop and construct each charging facility. The tables detail the job types involved in each task and the time required to complete those tasks, expressed in person-days and labor hours. A single task may involve multiple job types, such as construction manager, electrician, electrical engineer, lineman, equipment operator, and general laborer. For example, installing a distribution feeder typically involves two job types, lineman and general labor. The person-day metric reflects the number of full working days performed by an individual for a specific job type. Therefore, a job task requiring 4 person-days is assumed to be performed by an individual working over 4 working days. Labor hours are calculated by multiplying person-days by 8 hours per workday.

The tasks outlined in BV's tables reflect each facility's on-site behind-the-meter (BTM) infrastructure and the local electricity grid's front-of-the-meter (FTM) infrastructure.

As illustrated in Figure 3, under BTM infrastructure is the customer-owned equipment downstream of the electric meter, including things such as on-site switchgear, charging stations, and wiring. Under FTM infrastructure is the utility-owned equipment upstream of the electric meter up to the distribution substation, including service feeders and transformers. The FTM infrastructure includes the addition of substation banks but not new substations; this leads to a conservative estimate of potential FTM work needed.

Figure 3
Scope of infrastructure job impact analysis



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ESTIMATING POTENTIAL JOBS

With the estimates from BV and our own charging infrastructure modeling results, we estimated potential job demand from 2026–2032. For depot chargers, the job estimates are based on the small depot charging facility prototype, and for public chargers, they are based on the large corridor charging facility prototype.

HDV CHARGE models only charging infrastructure needs based on vehicle energy requirements and not individual charging facilities. Additionally, as the prototypes from BV reflect a high-powered charging network, they are misaligned with our charging infrastructure modeling, which reflects greater reliance on lower-powered chargers for ZE-MHDVs. Therefore, for BTM job needs, we assume lower-powered chargers would have comparable labor needs to higher-powered chargers. To estimate the full-time equivalent (FTE) for each job task, we multiply its associated person-days per charger by HDV CHARGE's charging results (Table 3) and divide the product by 240 workdays.[8] This is reflected in Equation 1:

$$\textit{Job type FTE each year} = \frac{\textit{total person-days}}{\textit{240 workday}} = \frac{\text{new chargers each year} \times \dfrac{\textit{job type person-days}}{\textit{charger}}}{\textit{240 workdays}} \qquad (1)$$

8 Anh Bui et al., *Charging up America: The Growth of United States Electric Vehicle Charging Infrastructure Jobs* (International Council on Clean Transportation, 2024), https://theicct.org/publication/us-ev-charging-infrastructure-jobs-jan24/.

For FTM infrastructure jobs, we calculate how many charging facilities each county would have by comparing the county's total nameplate capacity to the capacity of BV's facility. We then multiply the ratio by the FTM job demand, measured as person-days per job type for the respective charging facility. Equation 2 reflects this process for a depot charging facility.

$$\textit{Job type FTE each year} = \frac{\textit{total person-days}}{240\ \textit{workday}} = \frac{\dfrac{\textit{nameplate capacity}}{4.4\ \textit{MW}} \times \dfrac{\textit{job type person-days}}{\textit{project type}}}{240\ \textit{workdays}} \qquad (2)$$

In addition to producing FTM and BTM infrastructure job estimates based on BV's research, we also calculate jobs associated with BTM software and electrical maintenance and repair for chargers; this aligns with methods from prior ICCT work.[9] These jobs are calculated using Equation 1 but reflect the cumulative number of chargers that are operational each year (Table 2).

IMPACT OF STUDY SCOPE

Before we present the results, it is important to understand the impact of the study's scope. First, the modeled job projections do not reflect individual jobs but rather the collective effort necessary to build the modeled charging infrastructure network, expressed as FTE. As there are many factors that may impact job needs, the study's FTE projections likely reflect a lower-bound estimate of discrete jobs. For example, the schedule and geographic location of charging projects may prevent workers from working on projects concurrently. Thus, if construction project schedules overlap, or if the distance between projects is too great, the resulting work will likely have to be done by different individuals. This would result in a greater number of jobs, even though the employees may not be working full-time.

Second, job demand results are greatly influenced by our charging infrastructure modeling from HDV CHARGE. Using the data from National Renewable Energy Laboratory meant we modeled a widespread charging network with relatively long dwell periods that allow for lower-powered charging. A different charging network that relies heavily on fast and ultrafast charging infrastructure may require additional grid upgrades and result in greater FTM job demand. Indeed, the prototypes designed by BV assume a greater portion of fast and ultrafast chargers than our charging infrastructure modeling. If all charging facilities for ZE-MHDVs reflected BV's prototypes, additional FTM jobs will be needed due to more extensive grid upgrades.

Third, we do not estimate job growth from the construction of new substations or transmission lines. Assessing information about a given region's distribution grid capacity, including whether a new substation or transmission line is required to serve the load from a new truck charging facility, would expand the scope of analysis and result in higher FTM job demand estimates associated with ZE-MHDV charging facility construction.

Fourth, the estimates are based on fixed prototype designs that lead to the same distribution of job types across states. Because charging facilities are expected to be designed based on customer needs, each will differ in things like number of chargers and power levels. Such differences in charging facility design would result in more

9 Bui et al., *Charging up America*.

variable BTM and FTM job demand. These results are based on the metrics from BV and scale linearly with our charging estimates.

Lastly, BV's work was based on its industry knowledge. Another company or utility performing similar work may have different estimates. The market is also rapidly changing, and the job demands for infrastructure build-out will likely change as designs evolve and firms gain more experience constructing charging facilities. Note, too, that early charging facilities are mostly in locations with existing grid capacity, which minimizes the need for grid upgrades that may delay project energization and increase costs. The job demands for future projects may be different if they are deployed in a more constrained grid environment. These impacts of the study scope are summarized in Table 4.

Table 4
Study design features and their impact on modeled job estimates

Study design feature	Impact on resulting job estimates
Job demand expressed as FTE, not employed individuals	Results likely reflect minimum job demand
Emphasis on lower-powered chargers means fewer grid upgrades	Reduced FTM job demand
FTM scope does not extend beyond new substation banks and thus does not account for all possible upstream job types	Reduced FTM job demand
Fixed prototype design means no variability in project job demand	Reduced BTM job demand
Prototypes based on first generation facilities do not account for efficiency improvements or future grid challenges	Uncertain impact on BTM and FTM job demand

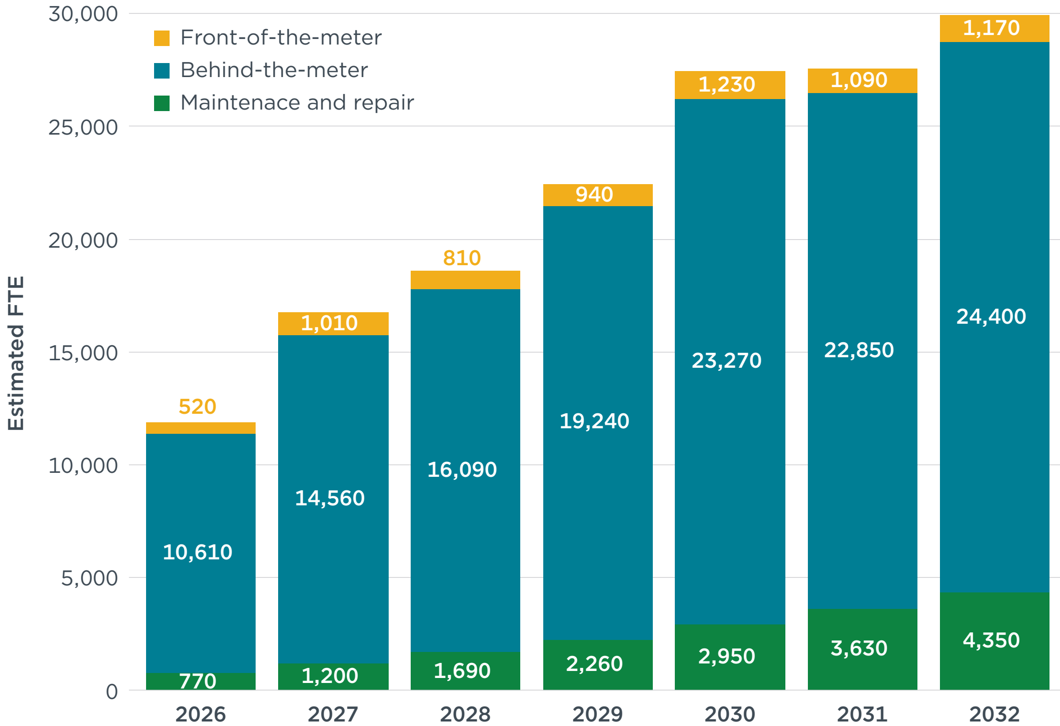
NATIONAL-LEVEL RESULTS

The national- and state-level results for the Market Potential scenario are illustrated in the figures below and include which job types are in the highest demand. These estimates reflect the total FTE employment in each calendar year.

Figure 4 displays the projected FTM, BTM, and maintenance and repair job demand nationwide from 2026 to 2032. Based on the BV metrics, BTM jobs are 82% of job demand in 2032. As mentioned above, higher charger power levels or an expanded FTM infrastructure scope would increase the portion of jobs that are related to FTM infrastructure.

Figure 4

Estimates of additional FTM, BTM, and BTM, maintenance and repair job demand in the United States, 2026–2032



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Note: FTM and BTM jobs reflect the work needed each year to build out the new infrastructure, and maintenance and repair jobs reflect work devoted to service for all the chargers installed.

Figure 5 highlights the various BTM job types. Electrician, equipment operator, and repair technician are the three most dominant and together comprise 71% of BTM job demand.

Figure 5

Estimated BTM demand by job type in the United States in 2032

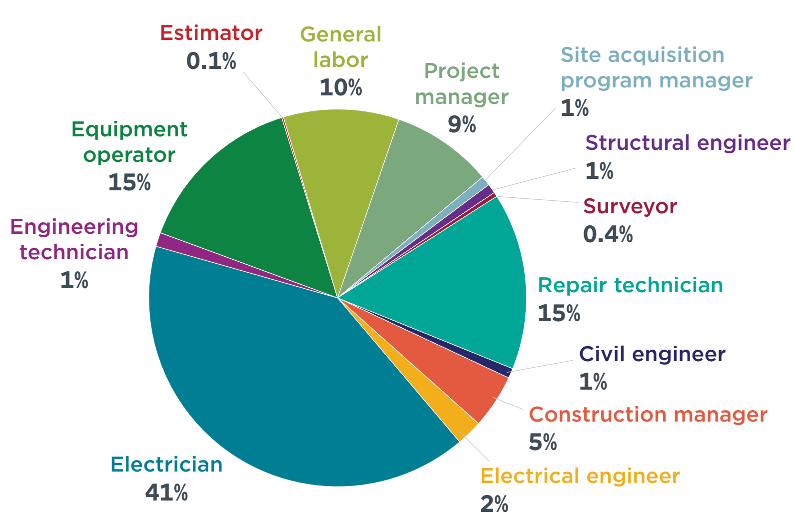

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Figure 6 shows the FTM job types. For these, lineman, electrical engineer, and general labor are the three most dominant. Together these three comprise 95% of FTM job demand.

Figure 6
Estimated FTM demand by job type in the United States in 2032

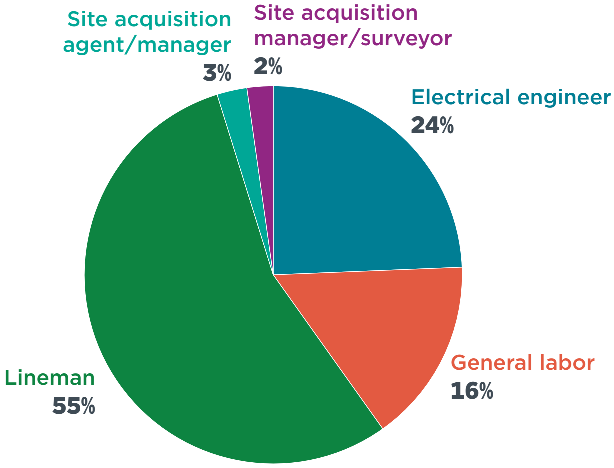

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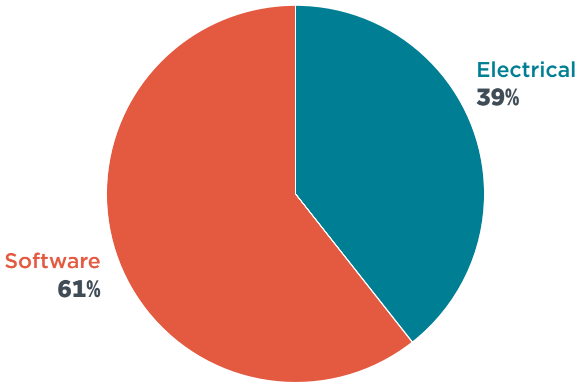
Figure 7 illustrates the software and electrical maintenance and repair job demand. Software positions are the majority.

Figure 7
Estimated maintenance and repair job demand comparison in the United States in 2032



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STATE-LEVEL RESULTS

To provide a more detailed view of each state's grid modernization needs and to support grid planning efforts, we also present the results at the state level for selected states. Here we also group the job types based on their role in a project to provide a more granular understanding of workforce needs (Table 5).

Table 5

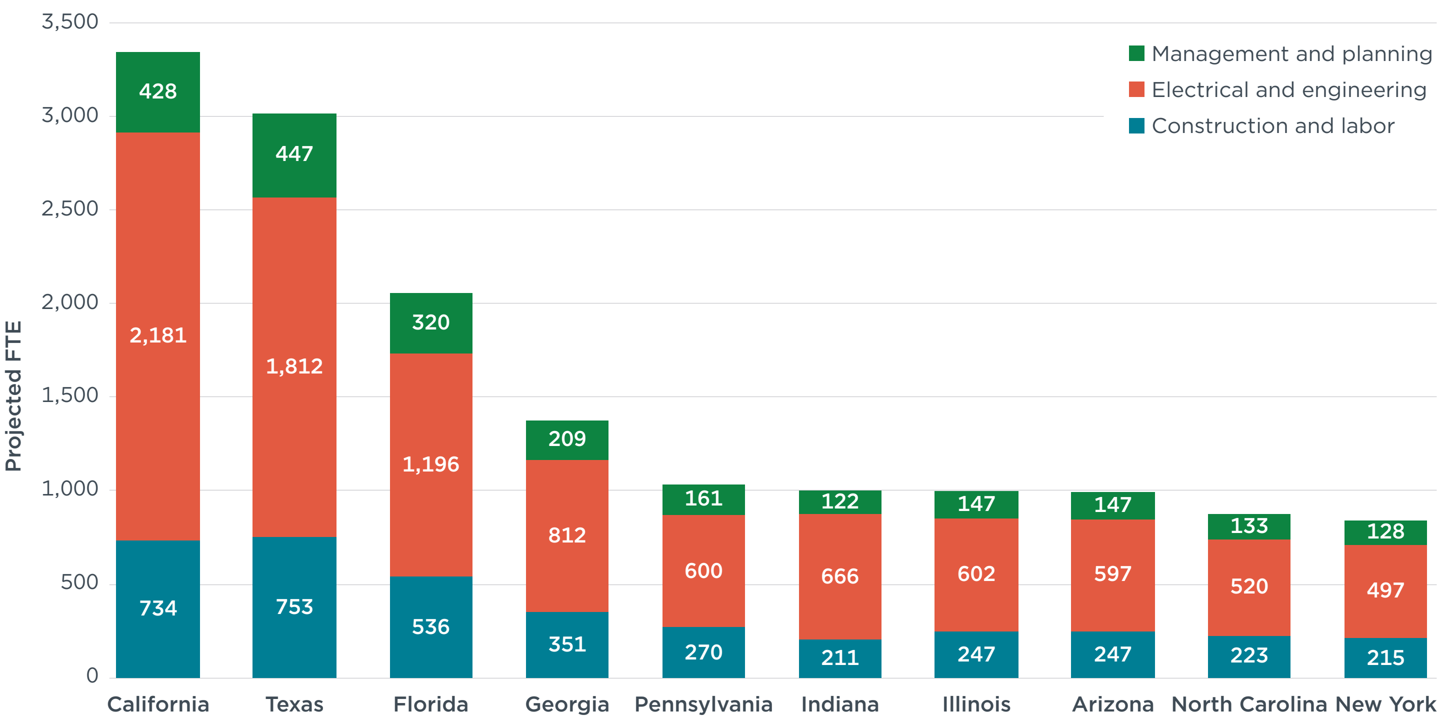
Classification of job type by project role

Job type	Project role
Equipment operator	Construction and labor
General labor	
Electrician	Electrical and engineering
Repair technician	
Electrical engineer	
Lineman	
Engineering technician	
Civil engineer	
Structural engineer	
Project manager	Management and planning
Construction manager	
Site acquisition agent/manager	
Surveyor	
Estimator	

Figure 8 shows the top 10 states based on job demand for charging and utility infrastructure. At the national level, electrical and engineering jobs are the most prevalent based on our classification, accounting for 62% of the total, followed by construction and labor at 24%, and management and planning at 14%. However, these proportions vary by state—for instance, in 2032, electrical and engineering roles comprise 65% of job demand in California and 60% in Texas.

Figure 8

Top 10 U.S. states by estimated job demand for charging and grid infrastructure in 2032



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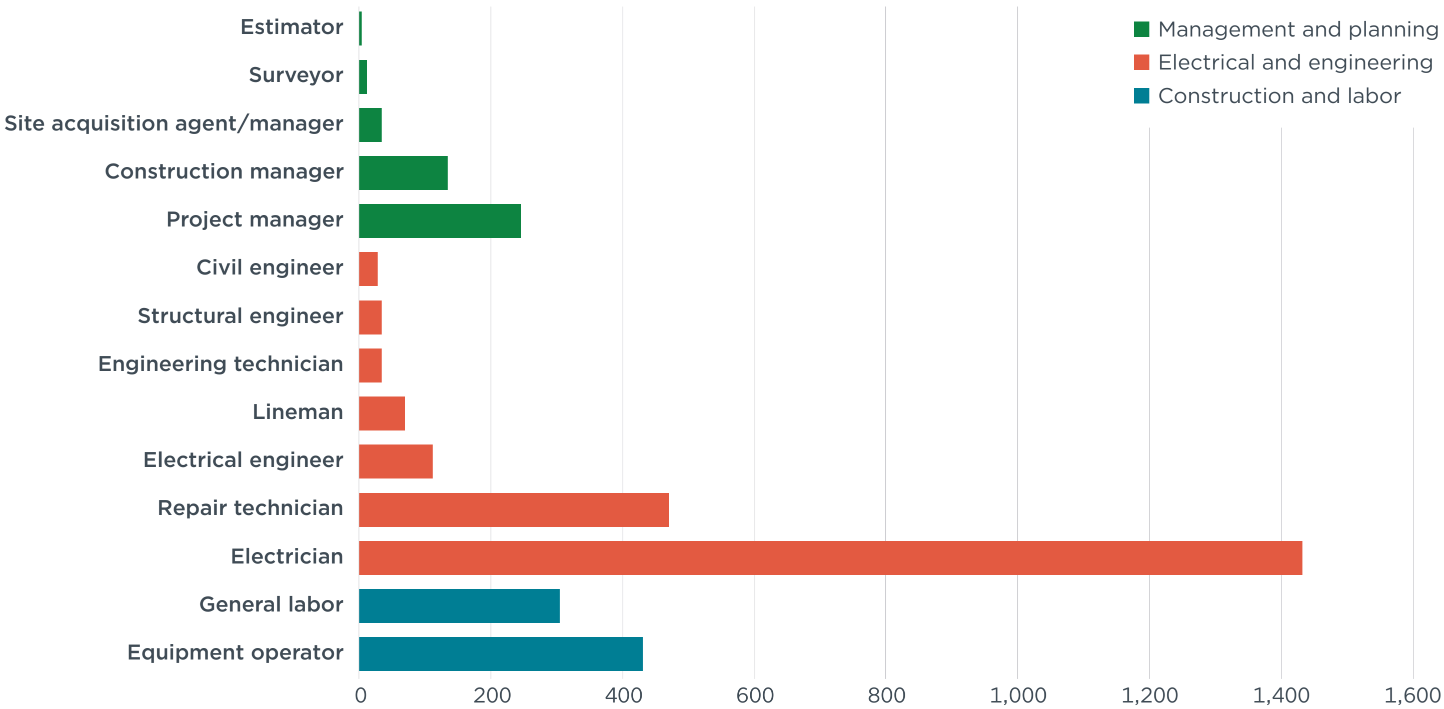
Figures 9, 10, and 11 display job demand by job type and classification for California, Illinois, and New Jersey in 2032. California was selected because it has the highest job demand, and Illinois and New Jersey stand out for their active legislative efforts related to grid electrification.[10]

Electricians make up the largest share of job demand. Because our estimates are based on the fixed prototypes from BV, the relative share of job types is the same between states. However, the scale of job demand differs between states based on their different charger and grid upgrade needs.

Figure 9

Estimated job demand in California by job type in 2032



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10 Illinois General Assembly, HB5610, https://www.ilga.gov/legislation/fulltext.asp?DocName=&SessionId=112&GA=103&DocTypeId=HB&DocNum=5610&GAID=17&LegID=&SpecSess=&Session=; SB3794, https://www.ilga.gov/legislation/fulltext.asp?DocName=&SessionId=112&GA=103&DocTypeId=SB&DocNum=3794&GAID=17&LegID=&SpecSess=&Session= ; New Jersey Senate Bill 258, https://legiscan.com/NJ/text/S258/id/2960966; Natural Resources Defense Council, "Labor, Industry, Public Health, and Environmental Advocates Urge NJ to Pass Grid Modernization," press release, October 16, 2024, https://www.nrdc.org/press-releases/labor-industry-public-health-and-environmental-advocates-urge-nj-pass-grid.

Figure 10

Estimated job demand in Illinois by job type in 2032

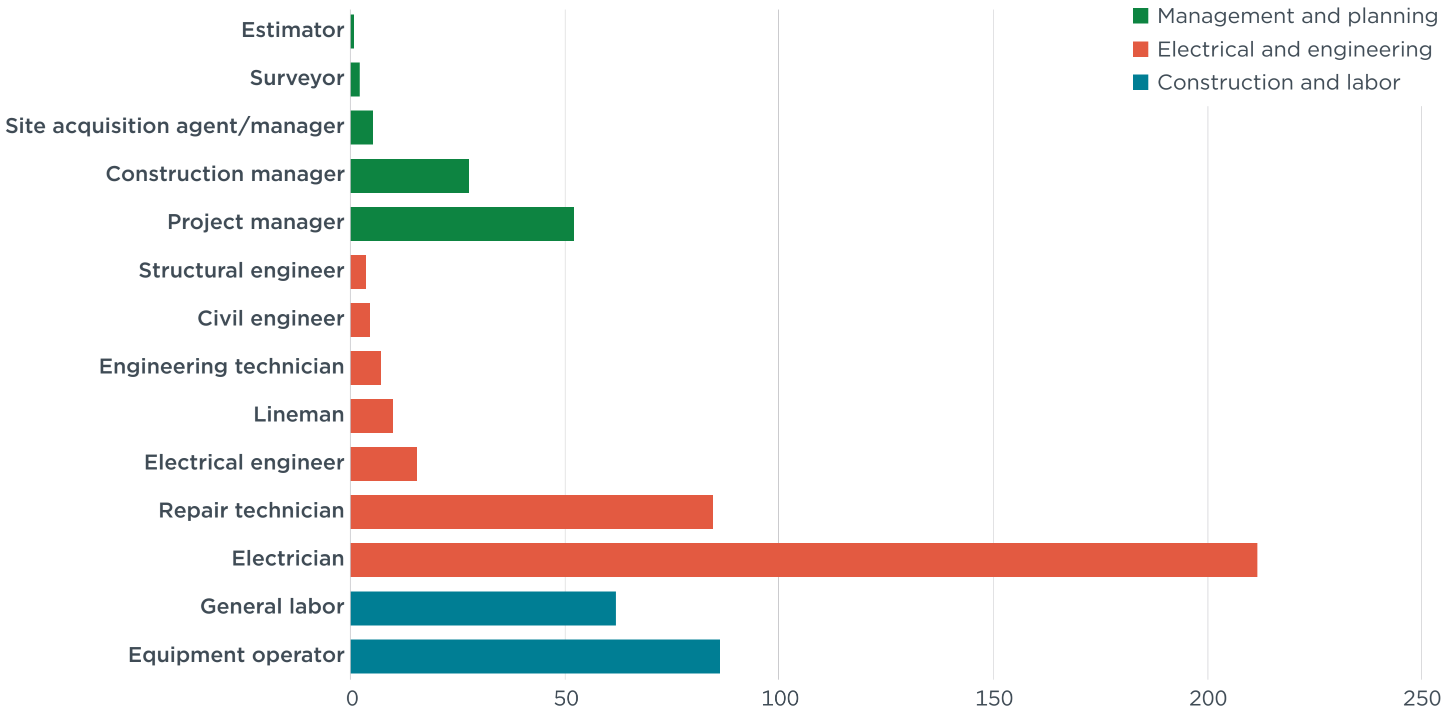

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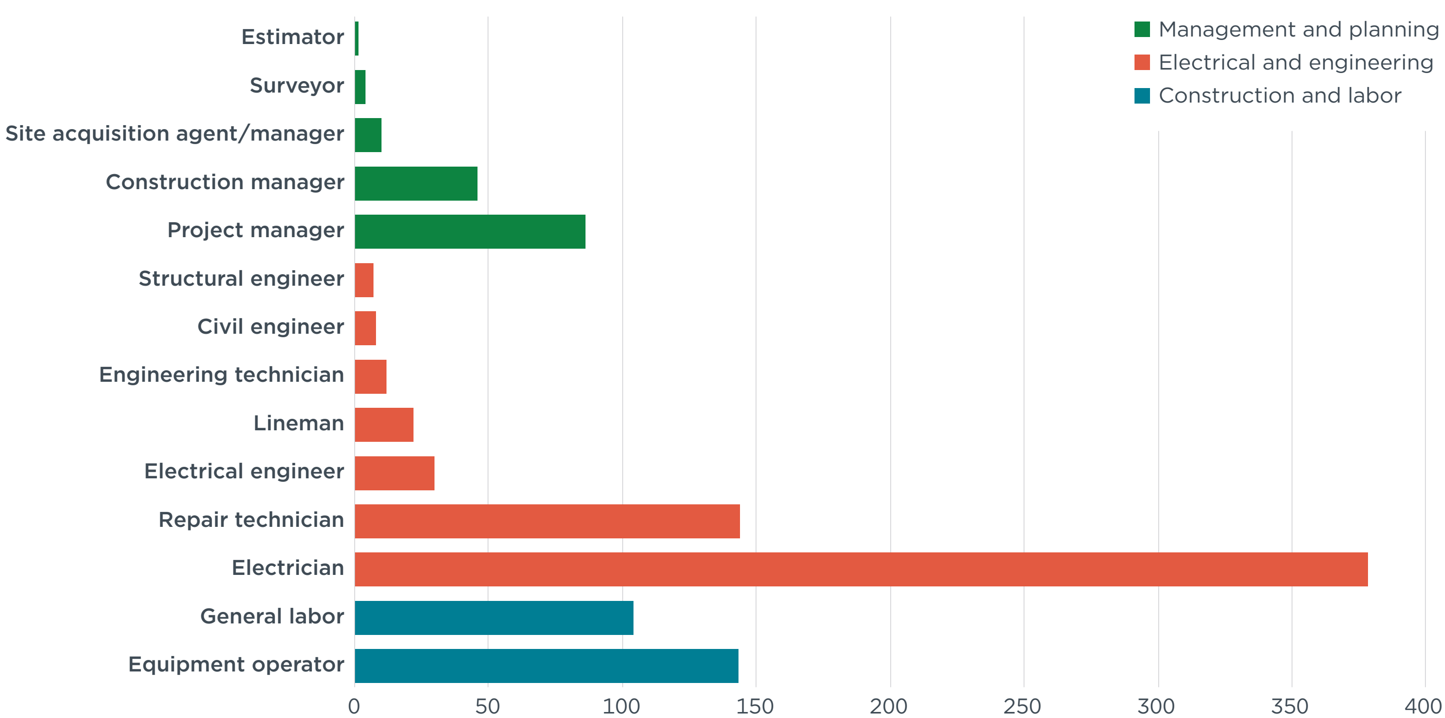
Figure 11

Estimated job demand in New Jersey by job type in 2032



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CONCLUDING REMARKS

Billions of dollars of public and private investment are being directed toward building out charging infrastructure for ZE-MHDVs in the United States. Understanding the labor impact of these investments will help policymakers evaluate the economic effect of this market's growth and how to best structure incentive programs. Using charging facility prototypes from Black & Veatch and charging infrastructure projections from the ICCT, this brief detailed a method we developed to estimate the labor needs associated with charging and utility infrastructure investments. The example analysis showed the needs driven by federal electric vehicle tax incentives. Projected labor estimates include state-by-state results and reflect the variation in BTM and FTM infrastructure work. These methods and results will be further outlined in a forthcoming report that will also discuss the implications in more detail.

APPENDIX

The three prototypes designed by Consulting firm Black & Veatch (BV) for the ICCT are illustrated in Figures A1 through A3. Table A1 summarizes key design elements of the three prototypes in this study. Following that, Tables A2 through A7, also from BV, outline the BV's estimates of the tasks and job needs required to develop and construct each charging facility.

Figure A1
Small depot charging facility

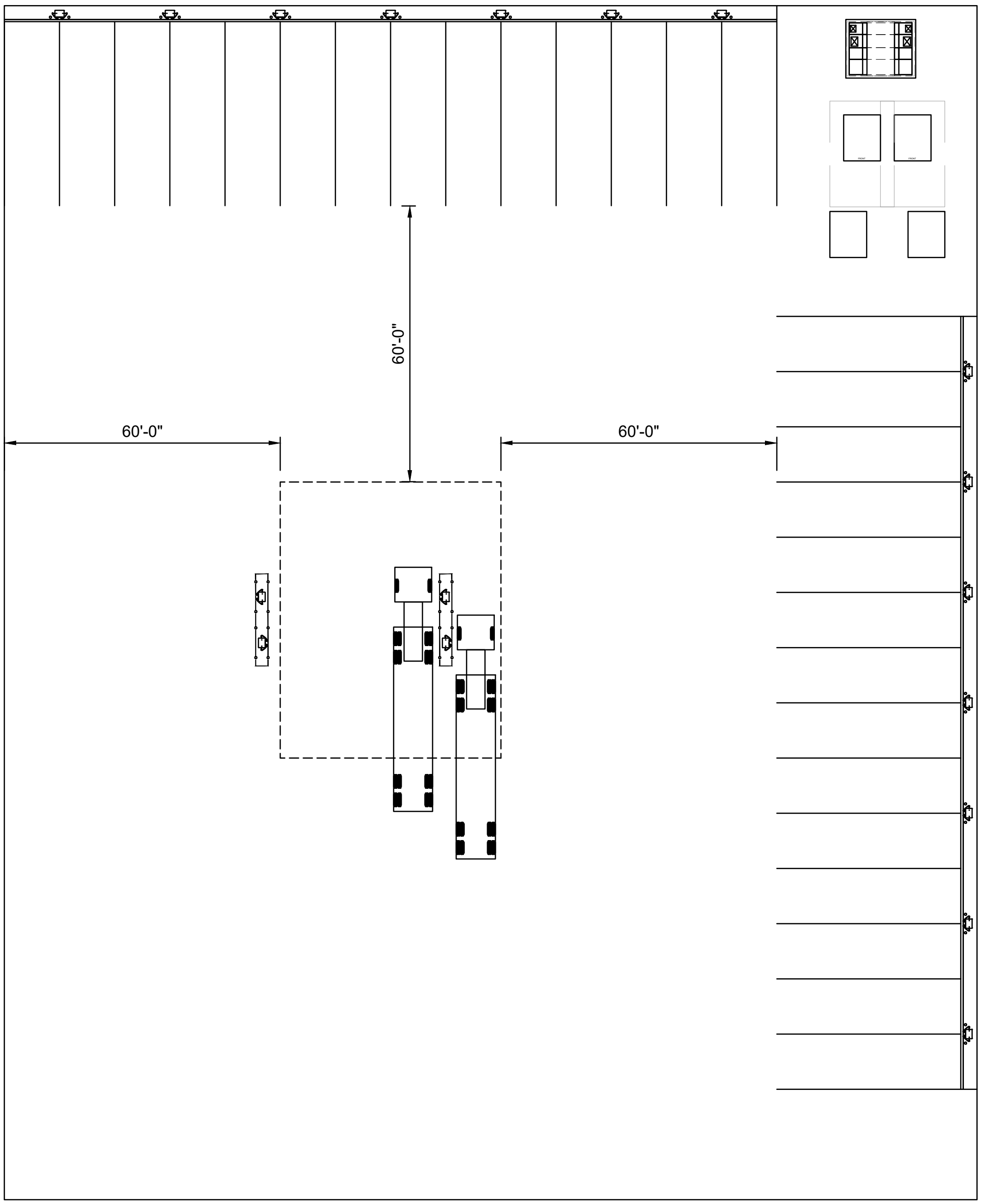

Figure A2

Medium charging hub

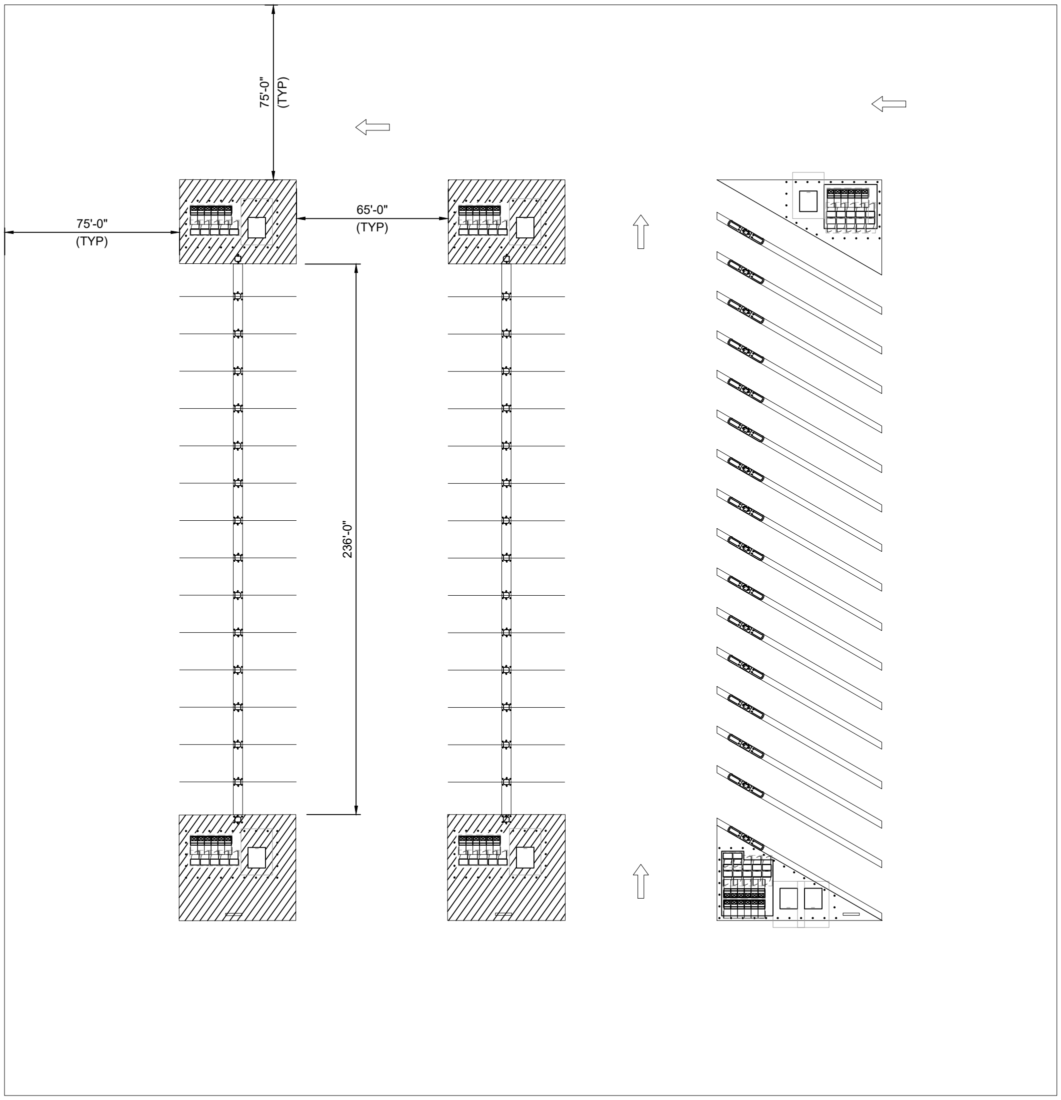

Figure A3

Large corridor charging facility

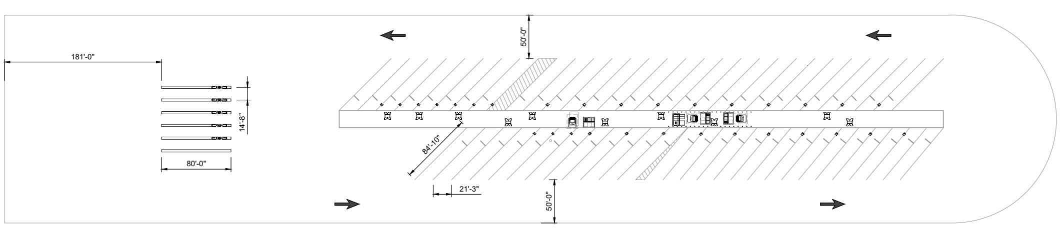

Table A1

Summary of truck charging prototype design

Prototype size	Expected use case	Number of charging stalls	Total nameplate capacity (MW)	Expected land requirement (acres)
Small	Depot charging	28 pull-in stalls without trailers 4 pull-through stalls with trailers	4.4	≥ 1 acre
Medium	Hub charging	60 pull-in stalls without trailers 16 pull-through stalls with trailers	8.4	6 acres
Large	Corridor charging	5 pull-in stalls without trailers 50 pull-through stalls with trailers	15.6	≥ 8 acres

Table A2

Small depot charging facility BTM tasks and job needs

	Type of task	Occupation type	Number of person-days	Labor hours
Behind-the-meter	**Project management**	Project manager	117	930
	Design and engineering		38	303
	Site walk	Civil engineer	1	8
		Electrical engineer	1	8
	Estimating	Estimator	2	16
	Electrical engineering	Electrical engineer	8	60
	Civil engineering	Civil engineer	7	51
	Structural engineering	Structural engineer	5	33
	Engineering graphics	Engineering technician	16	127
	Switchboard coordination	Electrical engineer	3	24
	Utility coordination	Electrical engineer	7	50
	Permitting (land services)	Site acquisition program manager	9	72
	Land survey	Civil engineer	1	5
		Surveyor	5	40
	Construction management	Construction manager	61	482
	Demolition	Equipment operator	44	351
		General labor	24	191
	Trenching and backfill	Equipment operator	22	172
		General labor	12	94
	Hardscape (asphalt and concrete work)	Equipment operator	40	314
		General labor	50	397
	Site improvements	Equipment operator	82	654
		General labor	45	355
	Electrical work	Electrician	236	1,883
	Electrical equipment – procurement and installation	Electrician	98	782
	Charging equipment – procurement & installation	Electrician	33	259
	Commissioning support	Electrician	18	138

Table A3

Small depot charging facility FTM tasks and job needs

	Type of task	Occupation type	Number of person-days	Labor hours
Front-of-the-meter	Substation planning analysis to determine bank size, breaker additions, and protection	Electrical engineer	20	160
	Planning analysis to ensure sufficient supplied capacity across feeder	Electrical engineer	20	160
	Determine distribution routing and a subsequent preliminary design	Electrical engineer	15	120
	Coordination review, and settings development	Electrical engineer (protection and controls)	4	32
	Permitting	Site acquisition manager/surveyor	5	40
	Real estate easement acquisition	Site acquisition agent/manager	8	60
	Construction/installation – substation bank	Substation/site crew	60	480
	Electrical work	Lineman	40	322
	Civil work	General labor	20	158
	Construction/installation – distribution feeder	Line/site crew	90	720
	Electrical work	Lineman	77	612
	Civil work	General labor	14	108
	Construction/installation – Point of interconnection	Line/site crew	40	320
	Electrical work	Lineman	30	240
	Civil work	General labor	10	80
	Testing and commissioning	Electrical engineer (protection and controls)	6	48

Table A4

Medium charging hub BTM tasks and job needs

	Type of task	Occupation type	Number of person-days	Labor hours
Behind-the-meter	**Project management**	Project manager	129	1,028
	Design and engineering		118	942
	Site walk	Civil engineer	1	8
		Electrical engineer	1	8
	Estimating	Estimator	10	80
	Electrical engineering	Electrical engineer	18	142
	Civil engineering	Civil engineer	17	134
	Structural engineering	Structural engineer	21	165
	Engineering graphics	Engineering technician	50	396
	Switchboard coordination	Electrical engineer	10	75
	Utility coordination	Electrical engineer	16	126
	Permitting (land services)	Site acquisition program manager	21	166
	Land survey	Civil engineer	2	10
		Surveyor	5	40
	Construction management	Construction manager	57	454
	Demolition	Equipment operator	94	749
		General labor	51	407
	Trenching and backfill	Equipment operator	79	630
		General labor	43	342
	Hardscape (asphalt and concrete work)	Equipment operator	222	1,775
		General labor	281	2,248
	Site improvements	Equipment operator	353	2,818
		General labor	192	1,530
	Electrical work	Electrician	1,732	13,849
	Electrical equipment – procurement and installation	Electrician	320	2,559
	Charging equipment – procurement and installation	Electrician	208	1,662
	Commissioning support	Electrician	31	248

Table A5

Medium charging hub FTM tasks and job needs

	Type of task	Occupation type	Number of person-days	Labor hours
Front-of-the-meter	Substation planning analysis to determine bank size, breaker additions, and protection	Electrical engineer	30	240
	Planning analysis to ensure sufficient supplied capacity across feeder	Electrical engineer	20	160
	Determine distribution routing and a subsequent preliminary design	Electrical engineer	15	120
	Coordination review, and settings development	Electrical engineer (protection and controls)	4	32
	Permitting	Site acquisition manager/ surveyor	7	56
	Real estate easement acquisition	Site acquisition agent/ manager	15	120
	Construction/installation - substation bank	Substation/site crew	60	480
	Electrical work	Lineman	40	322
	Civil work	General labor	20	158
	Construction/installation - distribution feeder	Line/site crew	90	720
	Electrical work	Lineman	77	612
	Civil work	General labor	14	108
	Construction/installation - point of interconnection	Line/site crew	40	320
	Electrical work	Lineman	30	240
	Civil work	General labor	10	80
	Testing and commissioning	Electrical engineer (protection and controls)	6	48

Table A6

Large corridor charging facility BTM tasks and job needs

	Type of task	Occupation type	Number of person-days	Labor hours
Behind-the-meter	**Project management**	Project manager	123	981
	Design and engineering		103	817
	Site walk	Civil engineer	3	20
		Electrical engineer	1	2
	Estimating	Estimator	2	10
	Electrical engineering	Electrical engineer	39	310
	Civil engineering	Civil engineer	18	141
	Structural engineering	Structural engineer	42	334
	Engineering graphics	Engineering technician	18	141
	Switchboard coordination	Electrical engineer	13	99
	Utility coordination	Electrical engineer	35	277
	Permitting (land services)	Site acquisition program manager	23	183
	Land survey	Civil engineer	4	26
		Surveyor	6	44
	Construction management	Construction manager	73	576
	Demolition	Equipment operator	40	318
		General labor	22	173
	Trenching and backfill	Equipment operator	59	464
		General labor	32	252
	Hardscape (asphalt and concrete work)	Equipment operator	21	162
		General labor	26	205
	Site improvements	Equipment operator	134	1,067
		General labor	73	579
	Electrical work	Electrician	1,157	9,253
	Electrical equipment - procurement and installation	Electrician	143	1,141
	Charging equipment - procurement and installation	Electrician	70	559
	commissioning support	Electrician	43	340

Table A7

Large corridor charging facility FTM tasks and job needs

	Type of task	Occupation type	Number of person-days	Labor hours
Front-of-the-meter	**Substation planning analysis to determine bank size, breaker additions, and protection**	Electrical engineer	30	240
	Planning analysis to ensure sufficient supplied capacity across feeder	Electrical engineer	30	240
	Determine distribution routing and a subsequent preliminary design	Electrical Engineer	15	120
	Coordination review, and settings development	Electrical engineer (protection and controls)	4	32
	Permitting	Site acquisition manager/surveyor	10	80
	Real estate easement acquisition	Site acquisition agent/manager	8	60
	Construction/installation - substation bank	Substation/site crew	60	480
	Electrical work	Lineman	40	322
	Civil work	General labor	20	158
	Construction/installation - distribution feeder	Line/site crew	135	1080
	Electrical work	Lineman	115	918
	Civil work	General labor	20	162
	Construction/installation - point of interconnection	Line/site crew	50	400
	Electrical work	Lineman	38	300
	Civil work	General labor	13	100
	Testing and commissioning	Electrical engineer (protection and controls)	6	48

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