EV Infrastructure Methodology

For the station/infrastructure costs, we used the AFDC 2015 report, Costs Associated With Non-Residential Electric Vehicle Supply Equipment. This report provided the estimates for the units costs and the installation costs. The calculations used the mid-range estimates, un-adjusted prices for inflation. The report mentioned that costs were likely to fall over time, but recent projects and upgrades in the charging units suggest that prices have not fallen dramatically. Therefore it seemed a reasonable assumption to avoid the high-end cost estimates.

The supporting information for the unit and installation costs is reproduced below:

AFDC Unit Costs

Ballpark Cost Ranges for Level 2 EVSE

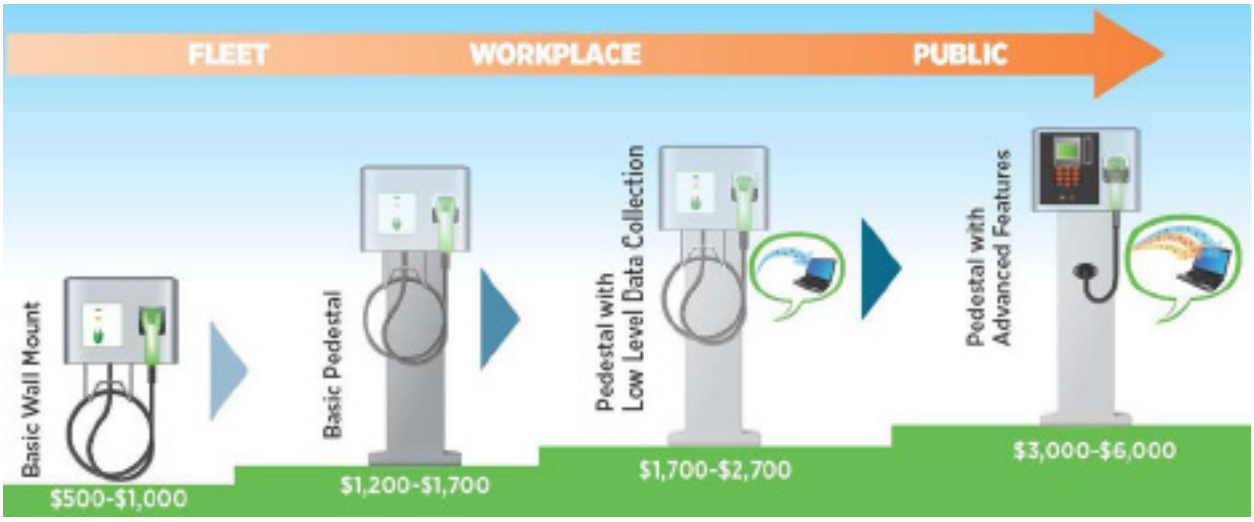

Figure 5. Ballpark cost ranges for different tiers of Level 2 EVSE units. Image from Kristina Rivenbark, New West Technologies.
Source: AFDC (2015), Costs Associated With Non-Residential Electric Vehicle Supply Equipment.

EVSE Unit Costs

EVSE Type (single port)	EVSE Unit Cost Range
Level 1	$300-$1,500
Level 2	$400-$6,500
DCFC	$10,000-$40,000

Table 1. EVSE unit cost ranges based on units available in 2015

Source: AFDC (2015), Costs Associated With Non-Residential Electric Vehicle Supply Equipment.

In 2015, most DCFC were only 50kW. Today many new installs are 150kW, and therefore the cost is higher, about $75,000 each. Fourth Economy included the higher unit cost of $75,000 for DCFC installations.

AFDC Unit Costs

Ballpark EVSE Installation Costs

EVSE Type	Average Installation Cost (per unit)	Installation Cost Range (per unit)
Level 1	not available	$0-$3,000* *Source: Industry Interviews*
Level 2	~$3,000 *EV Project (INL 2015b)*	$600-$12,700 *EV Project (INL 2015b)*
DCFC	~$21,000 *EV Project (INL 2015d)*	$4,000-$51,000 *EV Project (INL 2015d) and (OUC 2014)*

Table 2. Ballpark costs for installation of Level 1, Level 2, and DCFC EVSE (not including the EVSE unit.)

**The $0 installation cost assumes the site host is offering an outlet for PEV users to plug in their Level 1 EVSE cordsets and that the outlet already has a dedicated circuit.*

Source: AFDC (2015), Costs Associated With Non-Residential Electric Vehicle Supply Equipment.

Not included in our cost estimates are the costs for utility service upgrades. These costs are highly variable and not needed for every location:

> *DCFC sites or sites with many Level 2 units are more likely to require a service upgrade than a single Level 1 or Level 2 EVSE. For the DCFC stations along the [West Coast Electric Highway] WCEH, it cost $10,000-$25,000 for service upgrades such as installing a new transformer (Botsford 2014). Some installations may need to bring in new electrical service from the grid to the host site. (INL 2015a).*[1]

Estimates Used in the Calculations

The specific estimates used in the calculations are provided in the Table 1 below:

Table 1

	Unit Costs	Installation Cost	Total Cost
Level 2 Charging Plugs	$3,500	$3,000	$6,500
DC Fast Charging Plugs	$85,000	$75,000	$160,000

Cost Assumptions

- L2 Per Port Cost – $3,500 (This includes hardware, network, shipping, commissioning)
- L2 per Port Installation/Construction Cost – $3,000 (This includes all infrastructure needed on customer side of the meter)
- DCFC Per Unit Cost – $85,000 - assumes a 150 KW unit
- DCFC Per Unit Installation/Construction Cost - $75,000 (This includes all infrastructure needed on the customer side of the meter).

The unit costs are derived from the AFDC, estimates from EPRI, and the experience of several EV pilot projects with a Pennsylvania utility. These costs were assigned to the electrical equipment industry in our model. For the model, the installation costs in table 1 were allocated to the Non-Residential Construction sector.

In order to estimate the costs statewide, AFDC data from the Alternative Fueling Station Locator provided data on existing EV stations in PA. On March 24, 2021, Fourth Economy downloaded and summarized that data in the Existing column on Table 3 (below). THE EVI-Pro Lite tool was used to estimate the need for EV infrastructure to support 1.8 million EVs, which represents the EPRI 2030 scenario of 1.2 million EVs plus the 50% called for in SB 596. The number of stations needed to support that number of EVs is in 2030 Need in Table 2.

Table 2: Existing Charging Plugs and Projected 2030 Need

	Existing	2030 Need
Level 2 Charging Plugs	1,545	178,680
DC Fast Charging Plugs	120	4,483
Total	**1,665**	**183,163**

See Costs Associated With Non-Residential Electric Vehicle Supply Equipment, 2015. Prepared by New West Technologies, LLC for the U.S. Department of Energy Vehicle Technologies Office, page 15. See also EPRI's Product Abstract.

Table 3 presents the additional charging infrastructure (2030 Need - Existing) that will need to be built to support the projected level of EV adoption.

Table 3: Units Needed and Investment Required

	2030 Need - Existing	Investment
Level 2 Charging Plugs	177,135	$451,165,000
Public DC Fast Charging Plugs	4,363	$698,080,000
Total	**181,498**	**$1,149,245,000**

Table 4 presents the breakdown of costs for units, modeled as IMPLAN Sector 339 (All other miscellaneous electrical equipment and component manufacturing) and installation, modeled as IMPLAN Sector 52 (Construction of new power and communication structures).

Table 4: Costs for Units and Installation

	Unit	Installation	Total
Level 2 Charging Plugs	$242,935,000	$208,230,000	$451,165,000
DC Fast Charging Plugs	$370,855,000	$327,225,000	$698,080,000
Total	**$613,790,000**	**$535,455,000**	**$1,149,245,000**

THE EVI-Pro Lite tool was used to generate the estimated need for charging infrastructure in Pennsylvania for 2030 based on the following assumptions:

Assumptions	
Number of EVs to support	1,752,000
Vehicle Mix	
Plug-in Hybrids, 20-mile electric range	18%
Plug-in Hybrids, 50-mile electric range	18%
All Electric, 100-mile electric range	3%
All Electric, 250-mile electric range	61%
Total	100%
Percent of drivers with access to home charging	83%

The model also assumed that the future charging infrastructure would provide full support for plug-in hybrid electric vehicles (PHEVs). Full support means that most PHEV drivers wouldn't need to use gasoline on a typical day.