

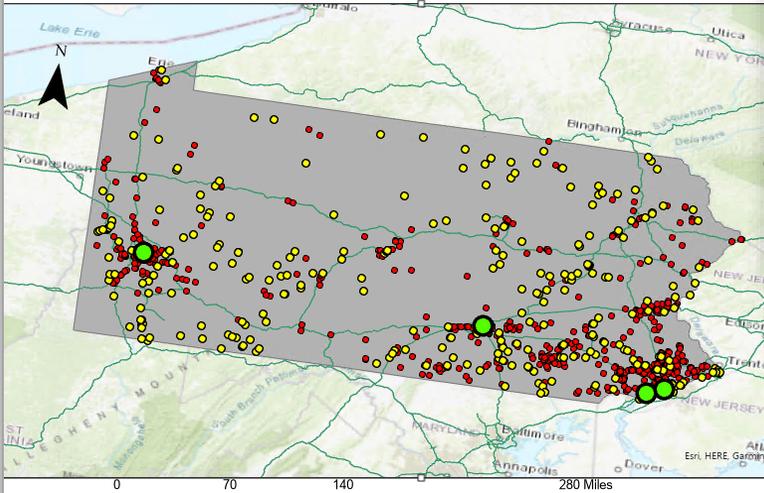
Purpose: The intent of these maps is to answer two questions...

1. Does the existing infrastructure of EV charging stations adequately support PA and its residents?
2. Based on existing power plants, localized income, and population, where should additional stations be placed to support the growth of EV usage in Pennsylvania?

Utilized Data:

Data Set	Type	Source
PA Cities	Point	FacData
PA Power Plants	Point	ArcGIS Hub
Existing PA EV Stations	Point	ArcGIS Hub
US Primary Roads	Line	FacData
PA State Boundary	Polygon	FacData
AVG Household Income	Polygon	ArcGIS Hub
PA Population	Polygon	US Census Bureau

1. PA Charging Stations and Power Plants



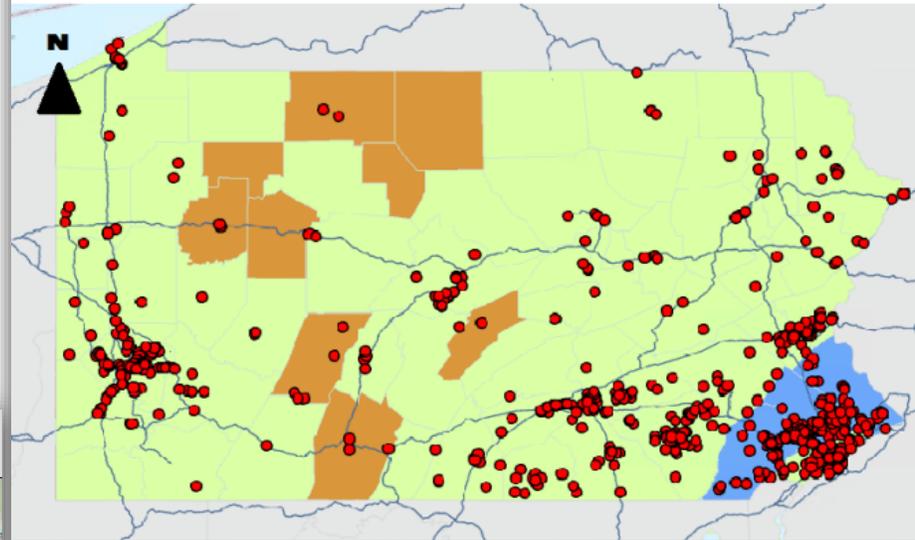
Spatial Reference :
 GCS : WGS 1984
 Datum : D WGS 1984
 Prime Meridian : Greenwich (0.0)
 Spheroid : WGS 1984
 Semimajor Axis : 6378137.0
 Semiminor Axis : 6356752.314245179
 Inverse Flattening : 298.257223563

● PA_Cities
● PA_Power_Plants
● Existing PA Electric Charging Stations
— US Primary Roads
 PA Boundary

EV Charging Dynamics of PA

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 York College of Pennsylvania

2. Average Household Income for PA



Spatial Reference :
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All_Except_PA
 County
 \$0 - 14,900
 \$14,900 - 62,200
 \$62,200 - 109,600
 \$109,600 - 156,900
 \$156,900 - 394,000
— US Primary Roads
● Existing PA Electric Charging Stations

Analysis:

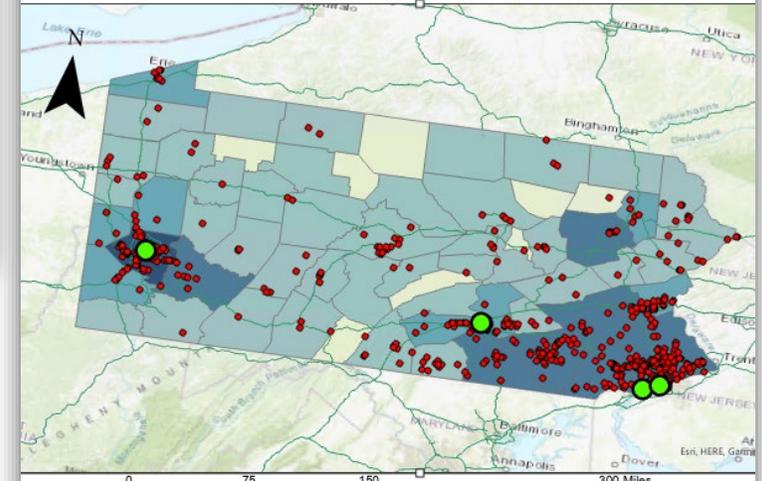
Map 1: From map 1, it's very clear that there are a significant amount of existing EV charging stations that already exist. It's also evident that the average EV in production today, which can travel approximately 200 miles on a charge, could easily travel throughout the entire State. There are zero cases in which a charging station is more than 200 miles away from any others. From this map we can also compare locations of charging stations to locations of power plants. The highest densities of both appear to exist in the same locations. This shows that where there are more people you need more power, and more EV charging stations.

Map 2: In this map, we shift to looking at the average household income for each respective county in PA. This information can allow EV manufacturers to understand what areas are more likely to have more EV buyers. Realistically, at...

... this moment in time, not everyone can afford an EV, so placing more charging stations in lower income areas would not be a worthwhile endeavor. They need to be placed in middle-to-high income areas.
Map 3: Not only do people in perspective areas need to have higher incomes, but there also needs to be a substantial population there as well. As you can see in map 3, the highest number of existing charging stations exist in the cites, where the highest populations are. Both income and population need to be considered, not just one or the other. Also, to be considered, is the fact that the population of PA is expected to grow by 1 million people between now and 2030.

Conclusion: Observing the number of existing charging stations in maps 1-3, it's clear that there are enough charging stations to travel throughout the entire state without running out of charge. Additionally, a large portion of the existing charging stations are located where the highest incomes and highest populations are, which makes sense for them to be available to as many people as possible. To decide on new locations for additional charging stations there are three things that should be accounted for. First, there must be an adequate number of local power plants to yield the power necessary for the charging stations. Next, you must verify that the area has a population that can afford an electric vehicle. Last, there must be enough people to use the new assets for the placement to be justified.

3. PA Population by County



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● PA_Cities
● Existing PA Electric Charging Stations
— US Primary Roads

PA Counties
 2017
 4950 - 27887
 27888 - 83570
 83571 - 150309
 150310 - 279647
 279648 - 475156
 475157 - 758265
 758266 - 1509243