



ENERGY FUTURES DASHBOARD

Historical and Assumed Future (to 2050) Population and Electricity Customers by EIoF Region

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Introduction

The Energy Infrastructure of the Future (EIoF) study seeks to provide a robust understanding of the state of the cost and other impacts of energy infrastructure and consumption in the United States. The flagship product of the EIoF project is the Energy Futures Dashboard, a user interactive web-based tool that allows users to see the impacts of their choices for three major categories of energy production and use for the year 2050: electricity generation mix, the percentage of light-duty vehicles driven on electricity versus liquid fuels, and the percentage of homes heated by electricity and natural gas. For the purposes of this study, the country is divided into geographic regions established by the EIoF project (see Figure 1). The regional definitions enable us to investigate broad geographical differences in energy infrastructure quantities, costs, regulations, and customers that can be compared to trends for the continental United States. In total, there are 13 regions comprised of one or more states.



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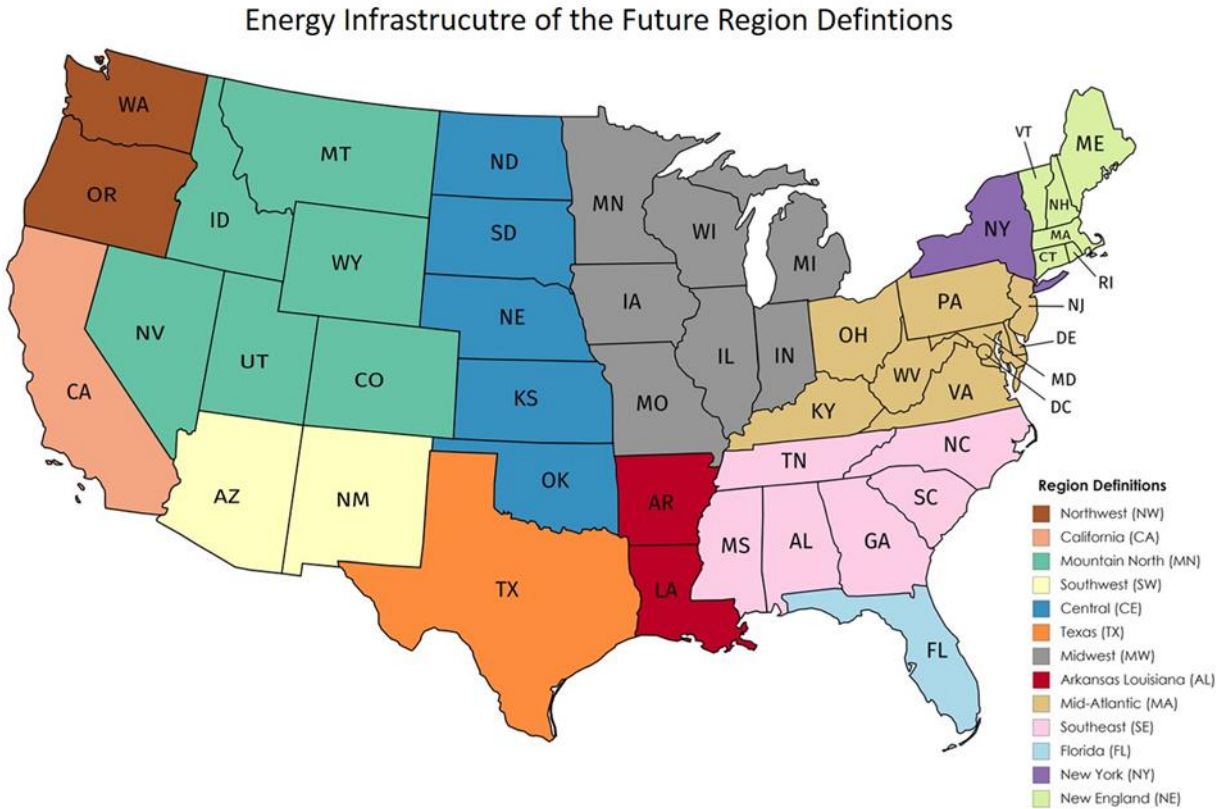


Figure 1. Regional definitions used for analysis in the Energy Infrastructure of the Future (EIoF) study.

This white paper summarized the data and methods used to acquire historical data on regional population and the number of electricity customers. These data are used to give perspective on the historical and future amount of energy spending on energy in each region.

Summary of Methods

Population Projections

Population projections' data is available from the Demographics Research Group at the University of Virginia Weldon Cooper Center for Public Services¹. These projections were released in December 2018 and were produced using the most recent population estimates and census data from the U.S. Census Bureau. Projections are available for the following years:

¹ Website link: <https://demographics.coopercenter.org/national-population-projections>



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2020, 2030, and 2040. Unfortunately, no projections for 2050 have been published by the Weldon Cooper Center.

However, because we seek to understand infrastructure needs in 2050, we need to construct our own 2050 population projections to use as an input in our analysis. To do so we proceed in a very simple and straightforward manner. We compute the predicted population growth rate between 2030 and 2040 using the available projections by the Weldon Cooper Center as follows:

$$\begin{aligned} & \text{2030 – 2040 Projected Population Growth Rate} \\ &= \frac{\text{2040 Projected Population} - \text{2030 Projected Population}}{\text{2030 Projected Population}} \end{aligned}$$

We then assume that the projected population growth rate from 2040 to 2050 will be the same as the projected population growth rate from 2030 to 2040. Hence, our 2050 projection can be computed as follows:

$$\begin{aligned} & \text{2050 Projected Population} \\ &= (1 + (\text{2030 – 2040 Projected Population Growth Rate})) \\ & \times (\text{2040 Projected Population}) \end{aligned}$$

Electricity Customer to Population Ratios

Data on Residential Electricity Customers is published by the Energy Information Administration (EIA) in Form EIA-871M “Monthly Electricity Power Industry Report”. Monthly customer count data is available for the years 2007-2018. Because we only need yearly data, we use January’s electricity customer count to represent the yearly count. To construct electricity customer to population ratios we merge this dataset with yearly population count estimates for the years 2010-2018 available in the National Population Totals and Components of Change: 2010-2018 data from the US Census Bureau.

We first compute the customer to population ratios at the state-level, and then we compute averages at the EIoF region level.



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Results

Population Projections

EIoF Region	2010	2020	2030	2040	2050
AL	7,449,290	7,781,392	8,101,581	8,280,315	8,463,024
CA	37,253,956	40,438,640	43,751,116	46,467,001	49,351,478
CE	9,917,581	10,575,359	11,252,040	11,766,098	12,318,586
FL	18,801,310	21,877,257	25,372,664	28,886,983	32,888,064
MA	54,497,371	56,475,031	58,398,030	59,350,107	60,393,871
MN	12,624,840	14,565,822	16,759,289	18,939,246	21,412,901
MW	44,224,755	45,300,801	46,280,029	46,443,790	46,639,023
NA	8,059,459	8,366,702	8,659,144	8,799,627	8,944,604
NE	14,444,865	14,952,534	15,439,356	15,662,130	15,900,692
NW	10,555,614	11,949,352	13,484,567	14,940,166	16,555,269
NY	19,378,102	20,031,150	20,638,066	20,873,488	21,111,595
SE	37,941,638	41,241,580	44,730,123	47,674,318	50,863,392
SW	8,451,196	9,367,828	10,371,230	11,293,597	12,320,481
TX	25,145,561	29,604,099	34,738,482	40,015,913	46,095,085
US Total	308,745,538	332,527,548	357,975,719	379,392,779	403,258,064



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Electricity Customer to Population Ratios

EIoF Region	2010	2011	2012	2013	2014	2015	2016	2017	2018
AL	0.44	0.44	0.44	0.44	0.44	0.44	0.45	0.45	0.46
CA	0.34	0.33	0.34	0.35	0.34	0.34	0.34	0.34	0.35
CE	0.45	0.45	0.44	0.44	0.44	0.45	0.45	0.45	0.46
FL	0.45	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.43
MA	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.42	0.42
MN	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.41	0.40
MW	0.43	0.43	0.43	0.43	0.43	0.44	0.44	0.44	0.44
NA	0.38	0.38	0.37	0.37	0.37	0.38	0.38	0.38	0.38
NE	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.46
NW	0.42	0.42	0.41	0.42	0.41	0.41	0.41	0.41	0.41
NY	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.37
SE	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.44
SW	0.41	0.40	0.40	0.40	0.41	0.40	0.41	0.41	0.41
TX	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.38	0.38

References

EIA (2018a), Form EIA-861M Data. Retrieved from:

<https://www.eia.gov/electricity/data/eia861m/>

United States Census Bureau (2018). National Population Totals and Components of Change:

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