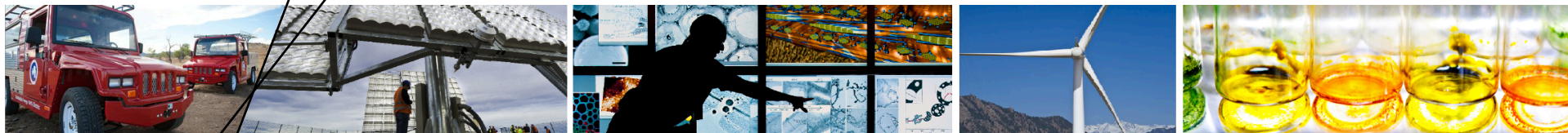


A Survey of U.S. Demand Charges



Clean Energy Group Webinar

Joyce McLaren

September 19, 2017

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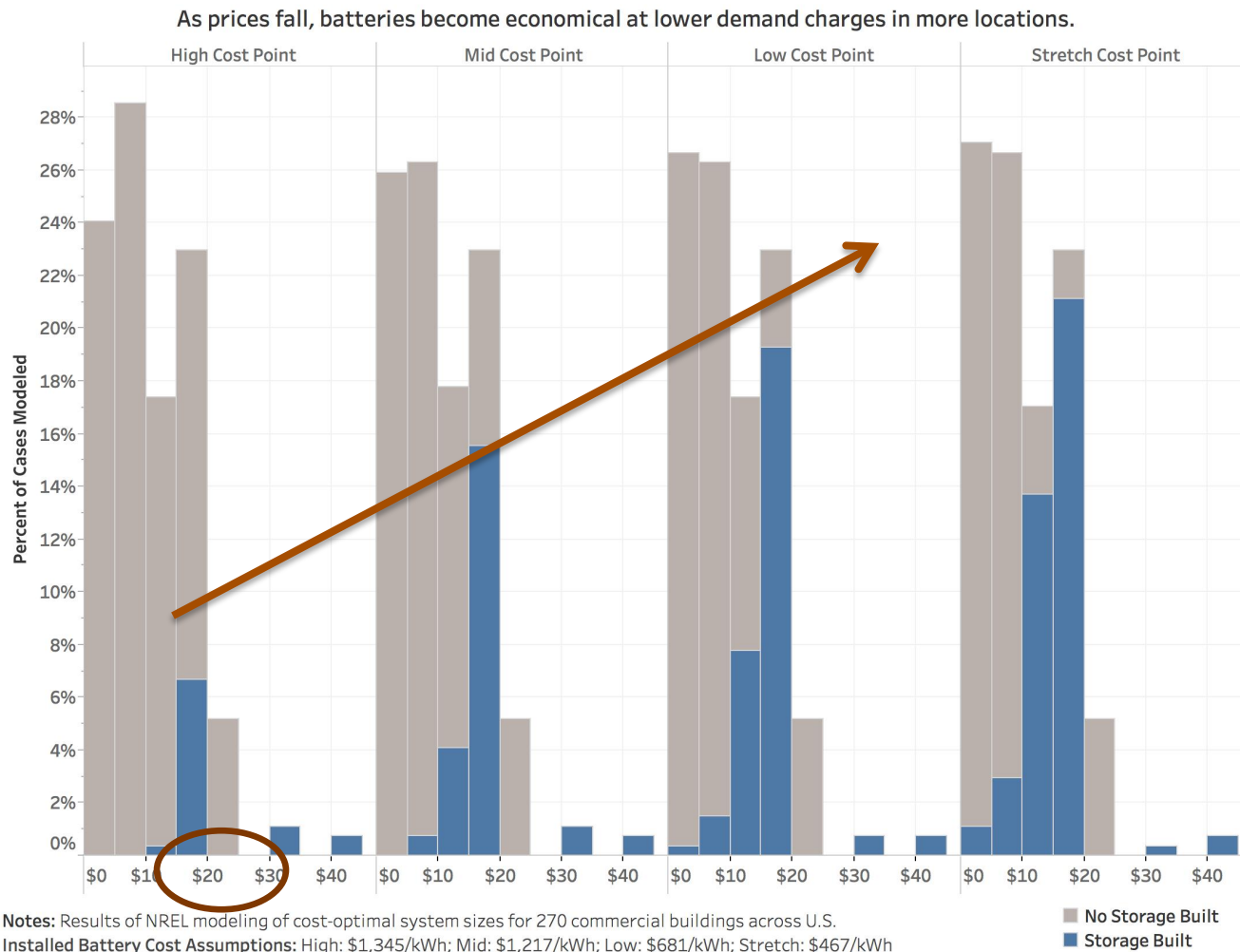
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Questions addressed by the analysis

- *How prevalent are commercial demand charges?*
- *How are demand charges dispersed across the country?*
- *How high are demand charges?*
- *How many customers are eligible for a rate with a maximum demand charge of >\$15?*
- *How about >\$20?*

Why a \$15 threshold?

As costs decline, more storage projects are economical at the \$15 demand charge range (based on NREL commercial storage cost-optimization modeling).



Demand Charge Variations

Type	Characteristics	Example	Assumption
Flat	Independent of the time, season or usage	\$15	Sum of all demand charge elements, if separated.
Time of Use	Based on time of day	\$15 between 2pm – 6pm \$5 all other times of day	The highest time of day is used.
Seasonal	Based on season	June – August \$15/kW September – May \$5/kW	The highest seasonal rate is used.
Tiered (less common)	Based on usage	\$5/kW first "X" kW, \$10/kW for next "Y" kW \$15/kW for all kW above Y.	The highest rate in the tier is used.

Each of these demand charge variations has a maximum demand charge of \$15/kW, according to our methodology.

Methodology & Data Sources

Which utility rates have demand charges >\$15?

Utility Rate Database

10,000+ commercial tariffs

Filtered to 8,000+ common tariffs

2,400+ unique utilities

70% of commercial load represented

How many buildings are there of each type in each location?

EIA CBECS Building Stock Data

Education	Lodging
Food Sales	Retail
Food Service	Mall
In-patient health care	Office
Outpatient health care	Warehouse/Storage

Is a certain building eligible for a demand charge rate?

DOE Commercial Reference Buildings

DOE Commercial Reference Building Load Profiles

16 ASHRAE Climate Zones

8 building floor sizes from CBECS data

80 representative load profiles

How many commercial customers could have a demand charge?

EIA Utility Customer Counts

EIA Form 861

Customer count * fraction of buildings eligible for demand charge rate = Number of customers eligible

Fraction of utility's customers in each state → utility state assignment for the top 10 tables

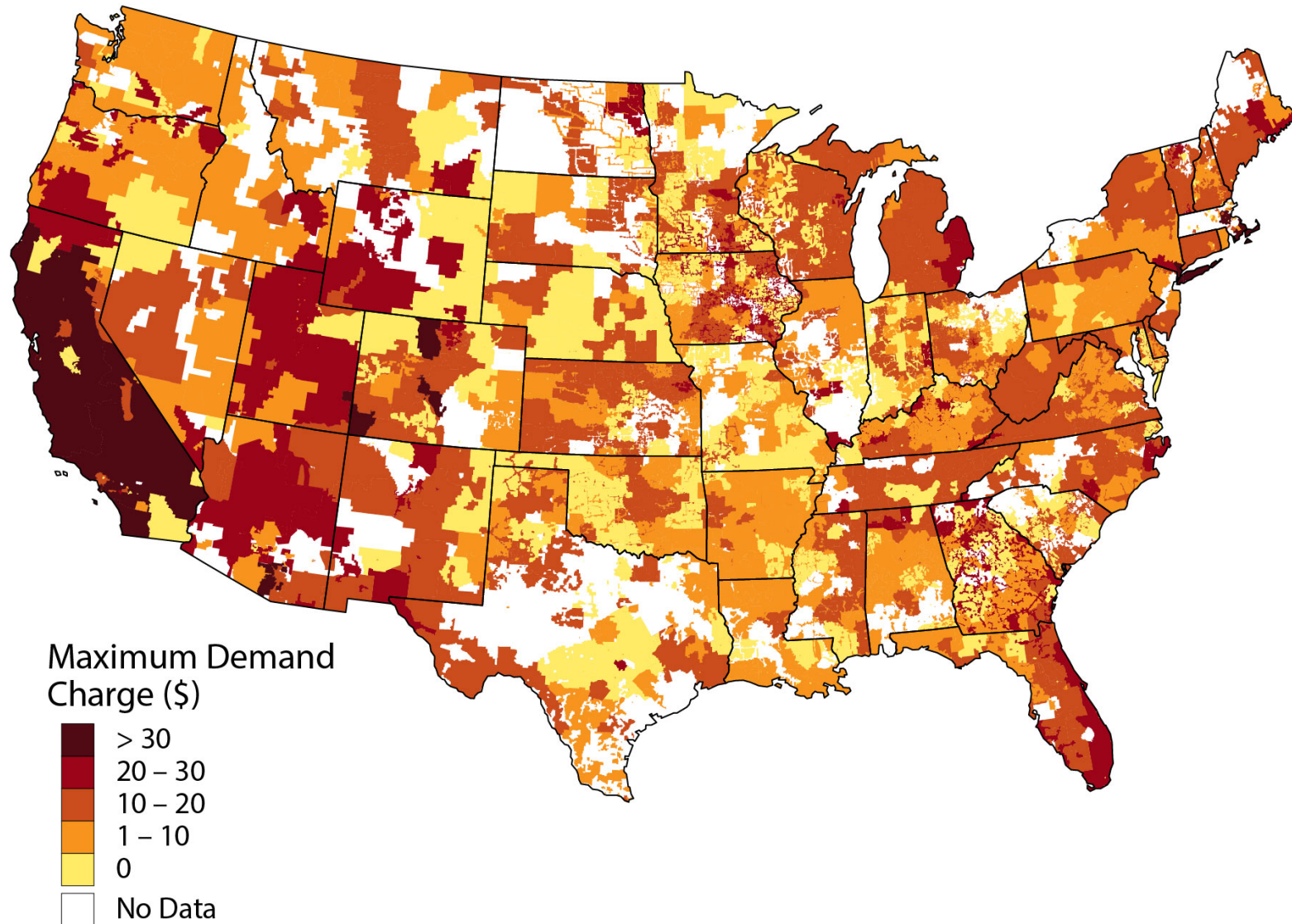
Assumptions & Limitations of the Data

- This study is intended to provide a high level overview current demand charges. Stakeholders interested in identifying potential markets for battery storage should **use these data only to guide to further investigation** into individual tariffs.
- These data were **interpreted and transcribed manually** from utility tariff sheets, which are often complex. They undoubtedly contain errors, and therefore should only be used as a reference.
- Since not all tariffs have a format that can be entered into the URDB, this **list is incomplete**.
- **Tariffs may have changed** since the maps were developed in 2017.
- Tariffs may have **additional restrictions** that are not represented here (e.g. only available to the agricultural sector or closed to new customers).
- The **maximum demand charge may be significantly different** from demand charges at other times in the year, day, or for lower tiers.

Questions NOT addressed in this analysis

- How many customers actually pay demand charges?
 - This study only estimates the number of customers that are eligible for at least one utility rate that has a demand charge above the \$15 or \$20 threshold. It doesn't determine if they actually subscribe to that rate.
- Is storage economical in a location/building type?
 - This study does not determine whether a battery will actually **save a customer money by reducing their demand charges**.
- How many customers in an area could benefit from storage in the future?
 - This study uses existing rates. Rates change frequently. Therefore, the study should not be used to forecast future markets for batteries.

Maximum demand charges by utility territory

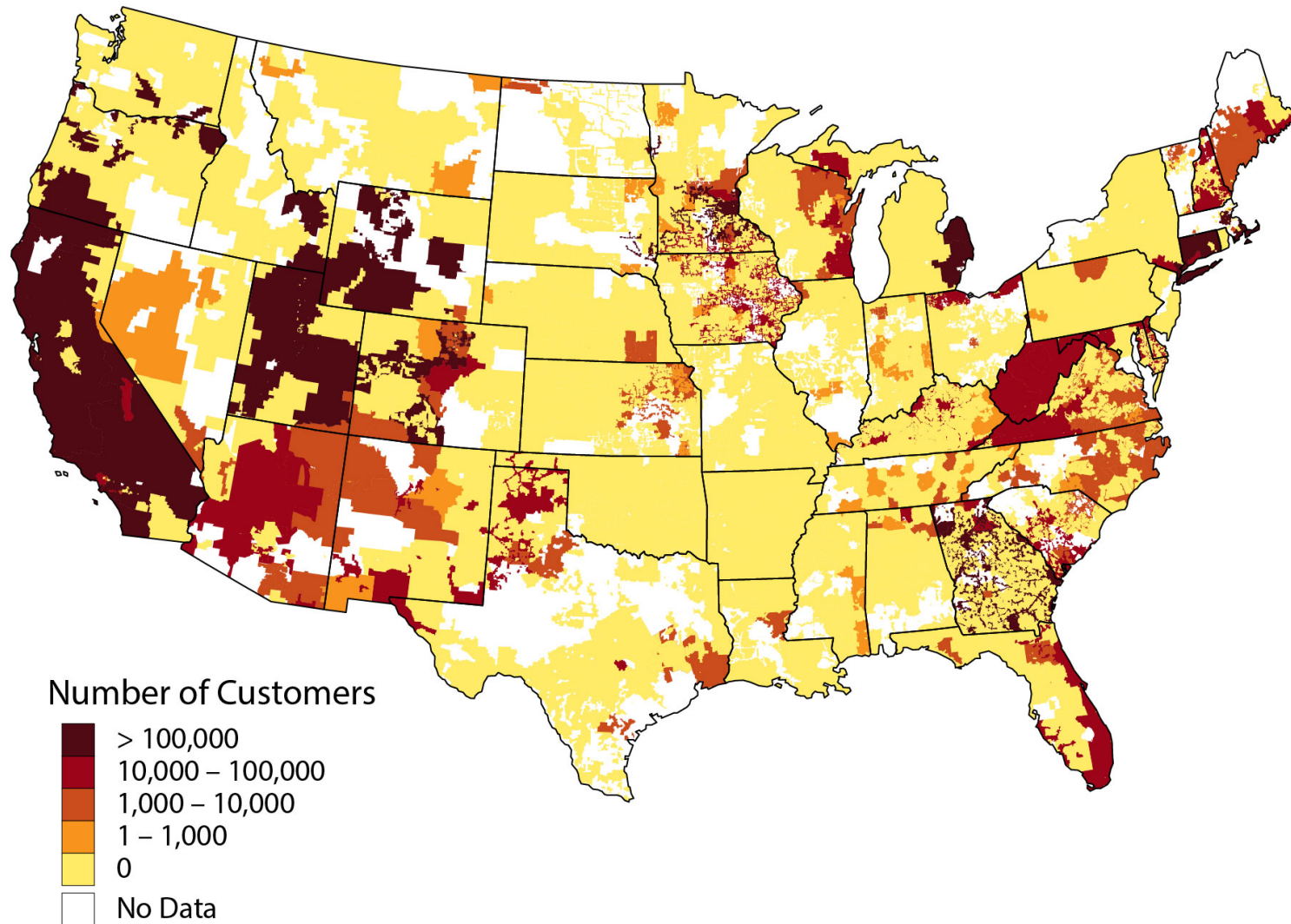


States with the Highest Demand Charges

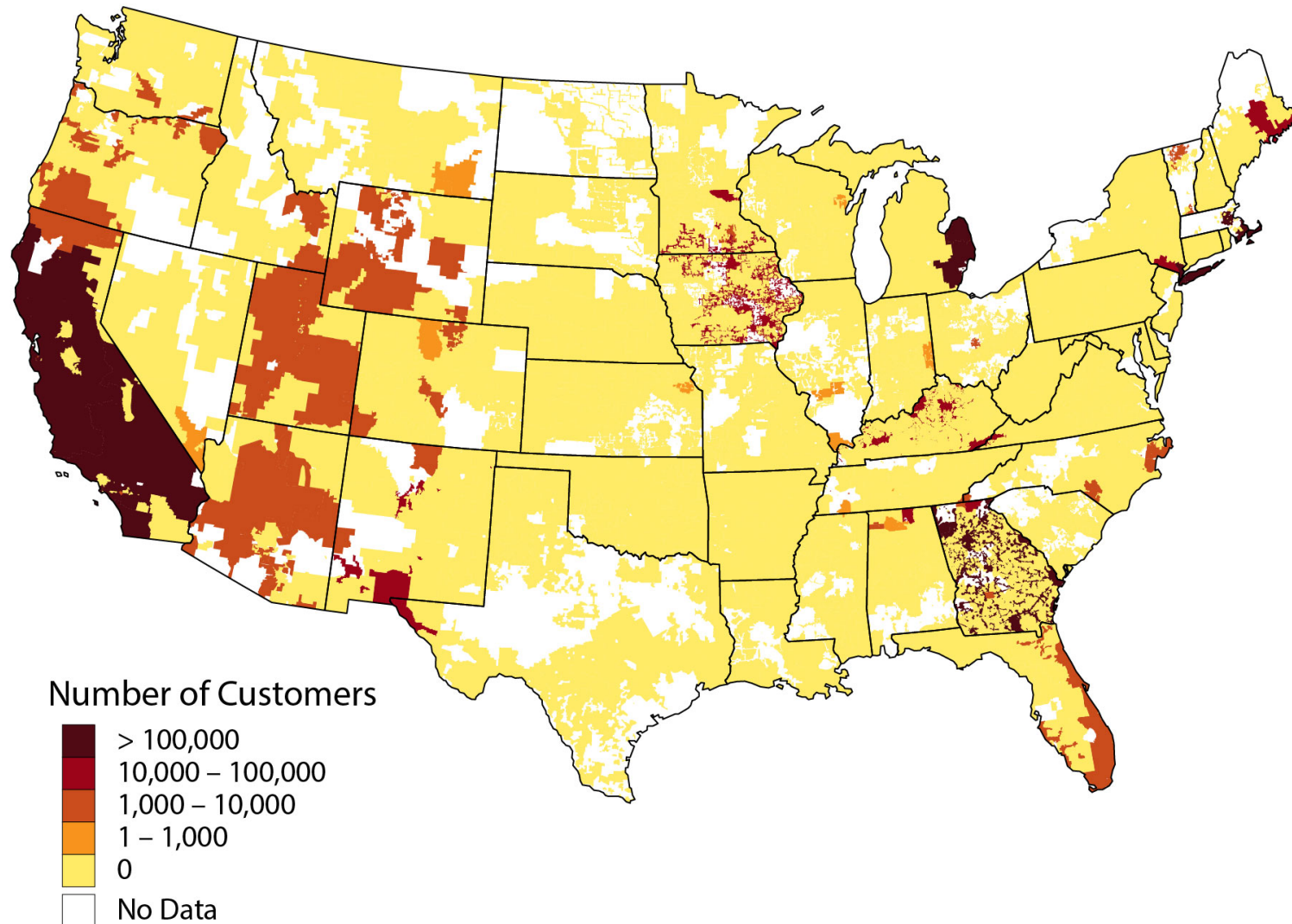
Demand Charges Across All Utilities Operating in the State

	Maximum charge across all utilities	Average of all utility maximum charges	Median of all utility maximum charges
New York	\$51.25	\$9.30	\$4.30
California	\$47.08	\$11.45	\$10.60
Colorado	\$46.43	\$21.68	\$16.65
Massachusetts	\$41.25	\$19.14	\$15.50
Arizona	\$35.45	\$18.82	\$18.50
Nebraska	\$30.00	\$14.82	\$15.70
Illinois	\$30.00	\$16.58	\$16.63
Georgia	\$28.70	\$5.83	\$3.60
North Carolina	\$25.65	\$15.61	\$15.63
Vermont	\$25.39	\$17.43	\$16.05

Number of Customers eligible for Demand Charge > \$15



Number of Customers eligible for Demand Charge > \$20



Top States by Number of Customers Eligible for Demand Charge

Number of Customers Eligible for
Demand Charge >\$15/kW

California	1,420,000
New York	648,000
Georgia	237,000
Colorado	221,000
Michigan	209,000
Massachusetts	189,000
Texas	155,000
Connecticut	135,000
Minnesota	134,000
Ohio	124,000

Number of Customers Eligible for
Demand Charge >\$20/kW

California	1,081,000
New York	648,000
Georgia	216,000
Michigan	205,000
Massachusetts	180,000
Kentucky	41,000
New Mexico	24,000
Alabama	23,000
Texas	23,000
Iowa	23,000

Relevancy to Distributed Storage Market

- Demand charges are dispersed and varied.
- Small number of customers with high demand charge \neq small storage market.
 - Largest commercial customers often have the highest demand charges.
 - Small fraction of customers may represent a relatively large quantity of cost-effective behind-the-meter storage.
- As storage costs decline, additional markets for storage may open.
- Utilities are considering residential demand charges.
- Utility tariffs can & will change.

Where can I get the raw data?

NREL Data Catalog <https://data.nrel.gov>

“Maximum demand charge rates for commercial and industrial electricity tariffs in the United States” ID: #74

Direct link to the data: <https://doi.org/10.7799/1392982>

Note: The list uploaded to the NREL Data Catalog is unfiltered (it includes all demand charge rates, including special/agricultural rates). It was extracted from the URDB on September 13, 2017.

NREL (National Renewable Energy Laboratory). 2017. Maximum Demand Charge Rates for Commercial and Industrial Electricity Tariffs in the United States. Golden, CO: National Renewable Energy Laboratory.

- Utility Rate Database https://openei.org/wiki/Utility_Rate_Database
- EIA Commercial Buildings Energy Consumption Survey
<https://www.eia.gov/consumption/commercial/data/2012/>
- DOE Commercial Reference Buildings
<https://energy.gov/eere/buildings/commercial-reference-buildings>

Questions?

Identifying Potential Markets for Behind-the-Meter
Battery Energy Storage: A Survey of U.S.
Demand Charges

<https://www.nrel.gov/docs/fy17osti/68963.pdf>

Joyce.McLaren@NREL.gov