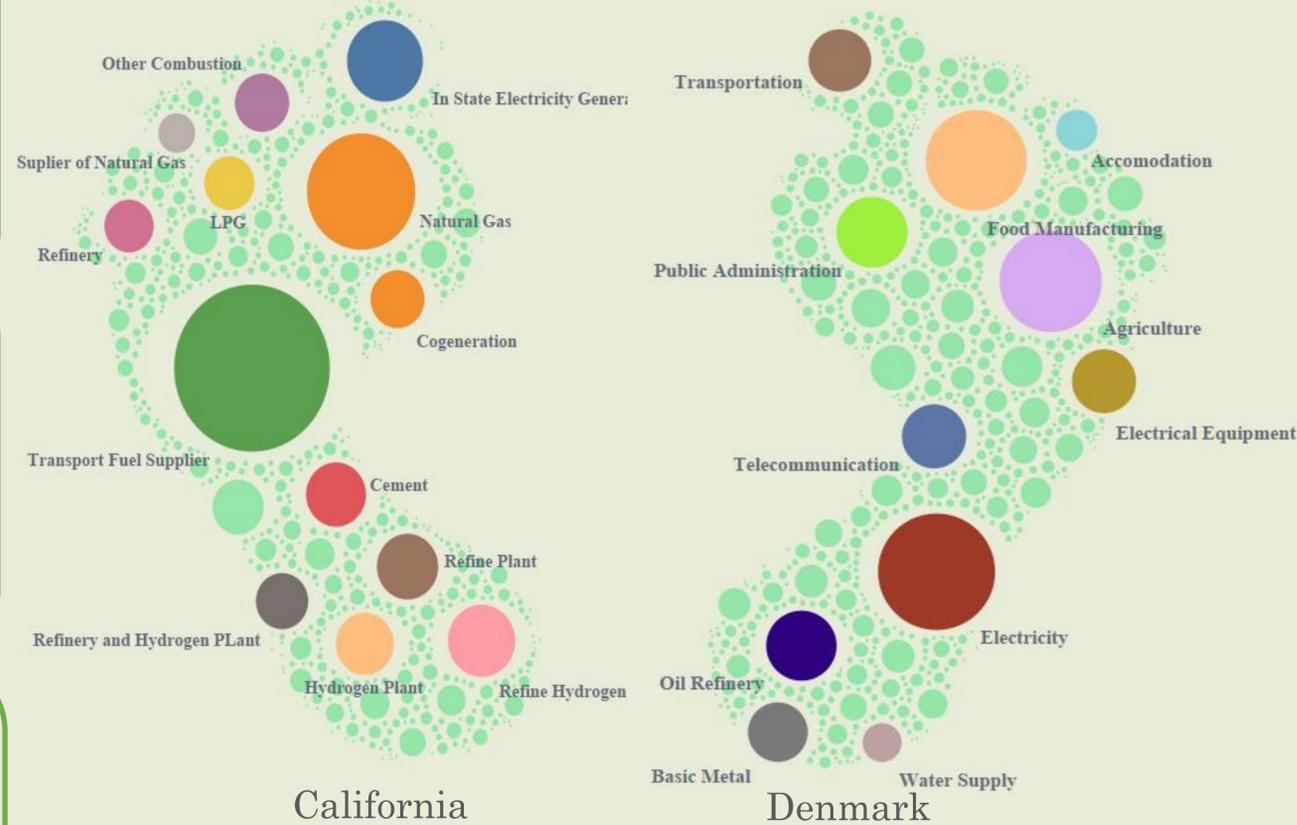


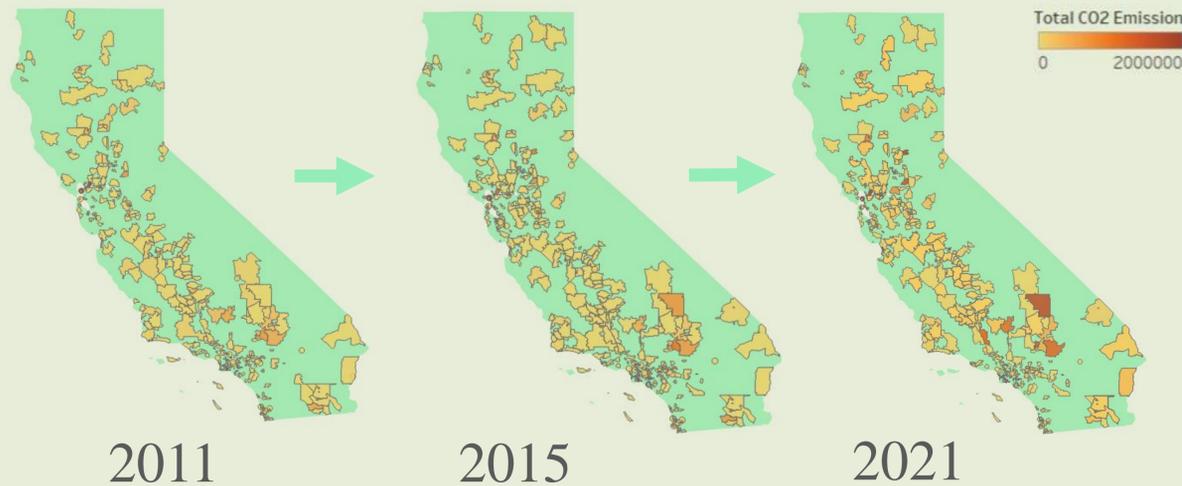
## Can Nuvve's V2G Technology Mitigate Global CO2 Emissions?

### Carbon Footprint Distribution



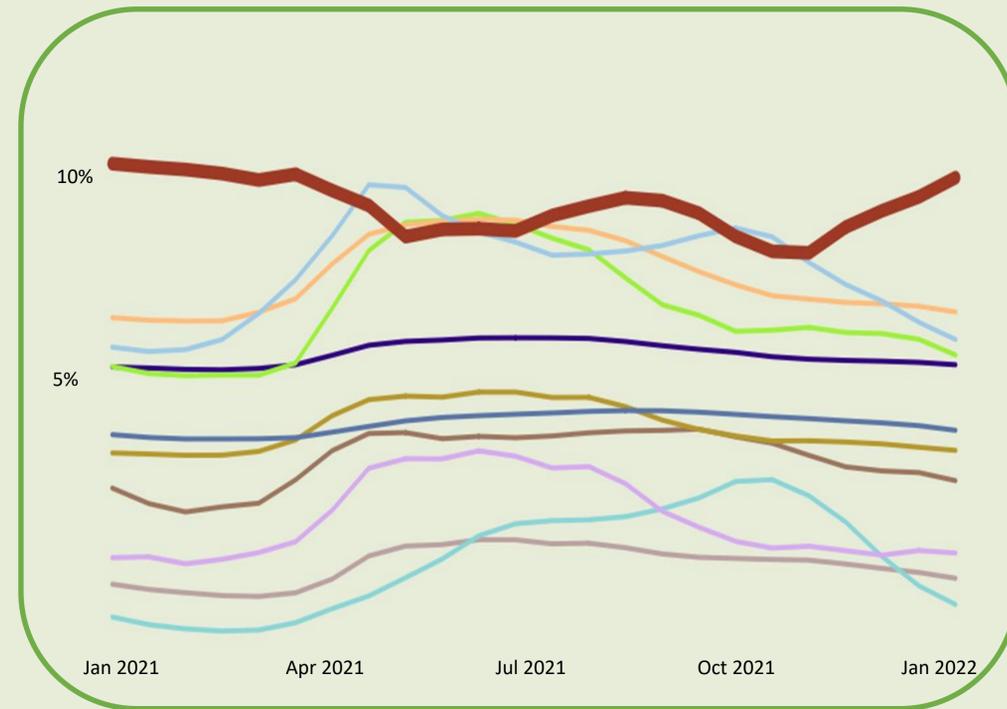
We analyzed the CARB and ENTSO datasets and calculated the total carbon emission of each industrial sector relative to their power consumed. We then represented these findings, compared them with the total CO2 emission of these sector and generated a bubble map whereby the area of each component is directly proportional to its shared CO2 contribution. As we can see, in California, the biggest contributor is Transport Fuel Supplier vs Electricity generation in Denmark.

### Regional Total CO2 Emission Over Time



This is a choropleth map we generated using the California Air Resource Board data. By cross mapping, the total CO2 Emission of each region with their zip codes we were able to create this map whereby by the color of each district is indicative of their CO2 contribution, with the hue to of the color being proportional to its contribution. We noticed that the trend was CO2 increasing throughout the years with the districts producing power being the highest.

### Denmark CO2 by Sector Over Time



- #### Our Team
- Alexander Kuzior
  - Harold Adu-Twum
  - McKenna Lago
  - Nathaniel Willison
  - Nick Royal
  - Shiv Mauree

Each industry on the bubble map is representative of the industries on Denmark from the footprint. We culled the dataset quite a bit given that the private sector included power consumed through general housing needs—such as appliances and heat—was the biggest contributor. We infer that this had to do with the quarantine because the private sector's carbon emissions started to spike in 2020 and began to decline in late 2021. We also filtered out sectors that were insignificant in terms of carbon emissions.

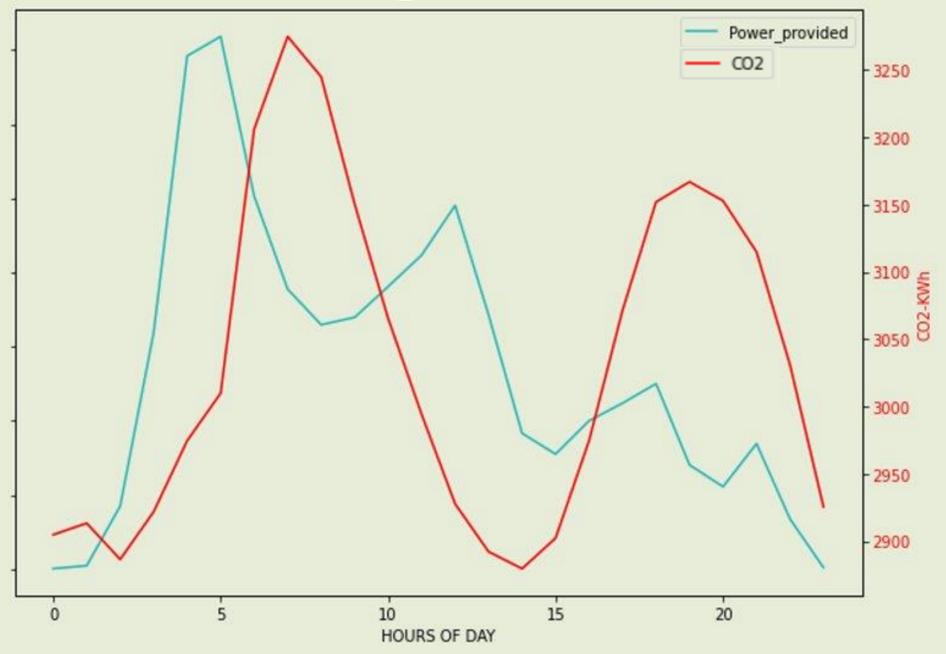
- #### About Nuvve
- Nuvve is a pioneer in V2G technology
  - Stabilizes power grids during times of high-volume electricity usage
  - Alleviates the need for power sustenance procedures

- #### Our Work
- Analyzed CO2 emissions in different regions where Nuvve operates
  - Generated visualizations and models to quantify CO2 emissions
  - Assessed Nuvve's impact on emissions.

- #### Why?
- In a global transition towards cleaner energy, bidirectional charging reduces the need for energy production from high carbon emitting sources
  - Our collective aim is to incentivize the use of this technology by showing how V2G can mitigate CO2 emissions and reduce consumer's cost in energy markets.

- #### Future Work
- Plan to address the optimization of when vehicles are plugged into a V2G station by creating a predictive model that can estimate when carbon emissions will be the highest on a given day
  - Determine Nuvve's impact on houses served from V2G, further expand our regional scope,
  - Look into energy markets to further incentivize policy and customer interest.

### How V2G Can Impact Carbon Emissions



This visualization uses historical data from two merged datasets:

- Nuvve Fleet Data
- CO2 Emissions Data from Denmark

The red line follows the daily carbon emissions trend throughout the day (in g/kWh) and the blue line is representative of when vehicles are providing energy to the grid. Our future goal is to create a predictive model that could better optimize the charging times of vehicles so that the power provided more closely follows when CO2 emissions are high, as that is when V2G can have the greatest impact.

#### Special Thanks

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