

# [BRD] US Climate Change Dashboard

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Project Overview			
Project Name	US Climate Change Dashboard	Date	10/08/25
Stakeholders	US Policymakers; Concerned US Citizens	Prepared By	Chris Wang

Purpose
<p>The US Climate Change Progress Tracker is an interactive analytics dashboard designed to help policymakers and informed citizens quantify the US' progress towards achieving the following environmental goals. The dashboard contains overviews quantifying progress to date and future projections, with interactive tools enabling users to explore the data.</p> <ol style="list-style-type: none"><li>1. Reduce net US greenhouse gas (GHG) emissions to a maximum of 66% of 2005 levels by 2035 (4946.46 MMT CO<sub>2</sub>e)</li><li>2. Transition all new passenger vehicle sales in the US to zero-emission vehicles by 2035</li><li>3. Build a nationwide public EV charging network consisting of 500,000 EV chargers by 2030</li></ol>

Background
<p><b>Greenhouse Gas Emissions</b></p> <p>Greenhouse gas (GHG) emission caused by human activity is widely recognized as the primary driver of climate change, with global emissions increasing over sixfold since the start of the 20th century.</p> <p>In response, since 1922 the international community has coordinated its response through the United Nations Framework Convention on Climate Change (UNFCCC), a governing entity established to prevent dangerous human interference with the climate system. Every five years, each participating country submits its Nationally Determined Contribution (NDC) – a set of climate change commitments and action plans to achieve them. In 2024, President Biden updated the US 2035 NDC with a goal of reducing net greenhouse gas (GHG) emissions to 66% of 2005 levels by 2035.</p>
<p><b>Zero-Emission Vehicles</b></p> <p>The need for cleaner transportation has risen to the forefront of national conversation in recent years, influencing discussion at the highest level of US policymaking. The Zero-Emissions Act of 2024 was a proposed federal bill that would have established a national standard for zero-emission vehicles (ZEVs) and required all new passenger vehicles sold in the US to be ZEVs by 2035. Although it did not pass, the proposal reflects growing public demand for clean-air transportation and continues to shape state policy and corporate planning.</p>

## Public EV Charging Infrastructure

As more American auto owners transition toward ZEVs, the pressure to expand public charging infrastructure has never been greater. Federal investment accelerated in 2021 with the passage of the Bipartisan Infrastructure Law (BIL), which allocated over \$7.5B toward the Biden administration's goal of building a nationwide network of 500,000 publicly accessible EV chargers by 2030. Public EV chargers are defined as available to and accessible by the public without requiring a subscription fee or membership at any organization to use.

## Scope

In Scope	Out of Scope
<ul style="list-style-type: none"><li>- US passenger vehicle sales (ZEV &amp; non-ZEV) between 2011 and 2024</li><li>- GHG emission metrics</li><li>- Public charging infrastructure deployment</li><li>- State and manufacturer-level insights</li></ul>	<ul style="list-style-type: none"><li>- US passenger vehicle sales pre-2011 and post-2024</li><li>- Non-US vehicle sales, emissions, and charging infrastructure metrics</li><li>- Federal &amp; state incentive efficacy analysis</li><li>- Individual consumer behavior insights</li></ul>

## Data Sources

Problem Space	Data	Source	File Type / Ingestion	Update Frequency
GHG emissions	GHG emission data by year, state, and economic sector	Historic: <a href="#">US EPA Data Explorer</a> Projected: <a href="#">US EPA</a>	Flat file / Tableau Upload	Never
ZEV sales	ZEV & passenger vehicle sales data	Historic: <a href="#">US DOE AFDC, Manufacturer Sales Reports by Year</a> Projected: <a href="#">Energy Innovation EPS</a>	Flat file / Tableau Upload	Never
	Market share by manufacturer		Flat file / Tableau Upload	Never
	Market share by model		Flat file / Tableau Upload	Never
	Vehicle registration data by state	Historic: <a href="#">US DOE AFDC</a>	Flat file / Tableau Upload	Never
EV charging infrastructure	EV charging ports & charger types	Historic: <a href="#">US DOE AFDC</a> Projected: <a href="#">National Renewable Energy Laboratory</a>	Flat file / Tableau Upload	Never

## KPIs

KPI Name	Definition	Informational Hierarchy	Query	Calculation	Visualization
<b><i>ZEV Share of New Passenger Vehicle Sales, 2024</i></b>	Percent of new passenger vehicles sold in 2024 that are	Primary	mkt_share_by_mfr_yr.sql	sum(zs.sales) / pvs.total_sales	KPI widget + % change YoY + Scorecard

KPIs					
KPI Name	Definition	Informational Hierarchy	Query	Calculation	Visualization
	ZEVs				
<i>ZEV Unit Sales, 2024</i>	Absolute volume of ZEVs sold in 2024	Secondary	mkt_share_by_mfr_at.sql	sum(zs.sales)	KPI widget + % change YoY
<i>Cumulative ZEV Unit Sales</i>	Absolute volume of ZEVs sold all-time	Secondary	mkt_share_by_mfr_at.sql	sum(zs.sales)	KPI widget
<i>Top 5 ZEV Manufacturers by 2024 Sales</i>	Top 5 manufacturers by absolute volume of ZEV sales in 2024	Secondary	mkt_share_by_mfr_yr.sql	sum(zs.sales) limit 5	Table + % change YoY
<i>Top 10 ZEV Models by 2024 Sales</i>	Top 10 models by absolute volume of ZEV sales in 2024	Secondary	mkt_share_by_model_yr.sql	sum(zs.sales) limit 10	Table + % change YoY
<i>ZEV Share of New Passenger Vehicle Sales, per Year (%)</i>	Percent of new passenger vehicles sold that are ZEVs per year	Secondary	mkt_share_by_mfr_yr.sql	sum(zs.sales) / pvs.total_sales	Combination chart
<i>ZEV Unit Sales, per Year</i>	Absolute volume of ZEVs sold per year	Secondary	mkt_share_by_mfr_yr.sql	sum(zs.sales)	Combination chart
<i>ZEV Unit Sales, per Year (by manufacturer)</i>	Absolute volume of ZEV sales per year by manufacturer	Tertiary	mkt_share_by_mfr_yr.sql	sum(zs.sales)	Bar chart
<i>ZEV Unit Sales, per Year (by Model)</i>	Absolute volume of ZEV sales per year by model	Tertiary	mkt_share_by_model_yr.sql	sum(zs.sales)	Bar chart
<i>ZEV Share of Total Vehicle Registrations (%)</i>	Percent of registrations each year that are ZEVs, by state	Tertiary	zev_registrations_by_state.sql	zev_registrations / (zev_registrations + non_zev_registrations)	Map
<b>GHG Emissions, 2024 (MMT CO<sub>2</sub>e)</b>	Absolute volume of GHG emissions in 2024 (in MMT CO <sub>2</sub> e)	Primary	ghg_emissions_top_sources_reduction_2024.sql	sum(emissions_mmt_co2e)	KPI widget + % change + Scorecard
<b>GHG Emissions Relative to 2005 (%)</b>	Percent of GHG emissions in 2024 over those in 2005	Primary	ghg_emissions_top_sources_reduction_2024.sql	(a.emissions_mmt_co2e - b.emissions_mmt_co2e) /	KPI widget + pp change + Scorecard

KPIs					
KPI Name	Definition	Informational Hierarchy	Query	Calculation	Visualization
				b.emissions_mmt_co2e	
<i>Top ranked GHG emission sources (2024)</i>	Top 5 state/economic sectors with the most GHG emissions (by absolute volume) in 2024 by state and economic sector	Secondary	ghg_emissions_top_sources_reduction_2024.sql	sum(emissions_mmt_co2e) limit 10	Table + % change YoY
<i>Top ranked GHG reduction contributors (2024)</i>	Top 5 state/economic sectors with the largest declines (by absolute volume) in 2024 by state and economic sector	Secondary	ghg_emissions_top_sources_reduction_2024.sql	rank() over(  order by (a.emissions_mmt_co2e - b.emissions_mmt_co2e) / b.emissions_mmt_co2e) as emissions_yoy_reduction_rank_by_percentage from base_2024 as a limit 10	Table + % change all-time
<i>Top ranked GHG emission contributors since (aggregated since 2005)</i>	Top state/economic sectors with the largest emissions (by absolute volume) all-time by state and economic sector	Secondary	ghg_emissions_rank_all_time.sql	rank() over(  order by sum(emissions_mmt_co2e) desc ) as emissions_rank_all_time	Table + % change all-time
<i>Top ranked GHG reduction contributors (aggregated since 2005)</i>	Top 5 state/economic sectors with the largest declines (by absolute volume) all-time by state and economic sector	Secondary	ghg_emissions_rank_all_time.sql	rank() over(  order by sum(emissions_mmt_co2e) desc ) as emissions_rank_all_time	Table + % change all-time
<i>GHG reduction by economic sector (aggregated since 2005)</i>	Absolute volume of GHG emission reduction by economic sector	Secondary	ghg_emissions_by_state_sector.sql	sum(emissions_mmt_co2e)	Table + % change all-time
<i>Total GHG</i>	Absolute volume of	Tertiary	ghg_emissions_by_	sum(emissions_mmt	Map

KPIs					
KPI Name	Definition	Informational Hierarchy	Query	Calculation	Visualization
<i>emissions by state</i>	GHG emissions by state per year		state_sector.sql	_co2e)	
<i>Total GHG emissions by economic sector</i>	Absolute volume of state GHG emissions by economic sector per year	Tertiary	ghg_emissions_by_state_sector.sql	sum(emissions_mmt_co2e)	Map tooltip
<b>EV Charging Port Count (2024)</b>	Total number of public EV charging ports in 2024	Primary	ev_charging_port.sql	ev_charging_port_count	KPI widget + % change YoY
<i>EV Charging Port Count (aggregated by year)</i>	Total number of public EV charging ports by year	Secondary	ev_charging_port.sql	ev_charging_port_count	Line chart
<i>Top ranked states by EV Charging Port Count (2024)</i>	Top 5 states with the largest number of public EV ports in 2024	Tertiary	ev_charging_port.sql	rank() over( partition by year  order by ev_charging_port_count desc ) as ev_charging_port_count_rank	Table + % change YoY
<i>EV Charging Port Count (by state)</i>	Percent of each state's total number of public EV charging ports over the total number of public EV charging ports by year	Tertiary	ev_charging_port.sql	ev_charging_port_count / total_ev_charging_port_count_year	Line chart

\* "All-time" refers to the full data availability period (January 2011 – December 2024).

User Stories & Technical Requirements		
#	User Story	Acceptance Criteria
1	As a user, I want to know at a glance the current ZEV share of the passenger vehicle market, so that I can gauge the nation's progress towards its ZEV sales goal.	<ul style="list-style-type: none"> <li>A KPI widget that displays <i>Market share of passenger sales</i> in 2024.</li> <li>Widget should display percent change between 2023 and 2024.</li> <li>A KPI widget that displays <i>Cumulative ZEV sales</i> all-time.</li> <li>Widget should display percentage point change between 2023 and 2024.</li> </ul>
2	As a user, I want to know at a glance which vehicle manufacturers and models are currently the most popular amongst consumers, so that I can identify market leaders driving ZEV adoption progress.	<ul style="list-style-type: none"> <li>A table that displays <i>Top selling EV manufacturers</i> in 2024.</li> <li>A table that displays <i>Top selling ZEV models</i> in 2024.</li> <li>Tables should display percent change for each item between 2023 and 2024.</li> </ul>

3	As a user, I want to see how the ZEV portion of the passenger vehicle market is changing over time, so that I can identify risk areas that require additional investment to achieve the ZEV sales goal by 2035.	<ul style="list-style-type: none"> <li>A combination chart, in which <i>Total ZEV sales</i> is plotted as a bar chart and <i>Market share of passenger vehicle sales</i> is plotted as a line chart, since 2011.</li> </ul>
4	As a user, I want to see how ZEV sales trends have changed over time by manufacturer and model, so that I can identify factors driving ZEV adoption progress.	<ul style="list-style-type: none"> <li>A line chart that displays <i>Total ZEV sales</i> by manufacturer since 2011.</li> <li>A line chart that displays <i>Total ZEV sales</i> by model since 2011.</li> </ul>
5	As a user, I want to know how ZEVs are distributed geographically across the US, so that I can identify regional factors suppressing ZEV adoption.	<ul style="list-style-type: none"> <li>A map chart of the US, where states are shaded by <i>ZEV registration percentage</i>.</li> <li>Map should allow users to change the visualization by year.</li> </ul>
6	As a user, I want to know at a glance the current GHG emission levels and reduction relative to 2005 levels, so that I can identify risk areas that require additional investment to achieve the GHG emission reduction goal by 2035.	<ul style="list-style-type: none"> <li>A KPI widget that displays <i>Total GHG emissions</i>, aggregated from all states, in 2024.</li> <li>Widget should display percentage change between 2023 and 2024.</li> <li>A KPI widget that displays <i>GHG emissions reduction percentage</i> relative to 2005 levels.</li> <li>Widget should display percentage point change between 2023 and 2024.</li> </ul>
7	As a user, I want to know which state and economic sectors are currently emitting the most GHGs, so that I can identify high-risk areas to prioritize emission reduction efforts.	<ul style="list-style-type: none"> <li>A table that displays <i>Top ranked GHG emission sources</i> in 2024.</li> <li>Table should display percent change for each item between 2023 and 2024.</li> </ul>
8	As a user, I want to know which state and economic sectors have the largest reduction of GHG emissions to date, so that I can highlight and apply effective solutions in other areas.	<ul style="list-style-type: none"> <li>A table that displays <i>Top ranked GHG reduction contributors</i> in 2024.</li> <li>Table should display percent change for each item between 2023 and 2024.</li> </ul>
9	As a user, I want to break down each state's GHG emissions by economic sector, so that I can tailor public policy based on each state's unique needs.	<ul style="list-style-type: none"> <li>A map chart of the US, where states are shaded by <i>Total GHG emissions</i>.</li> <li>Map should allow users to change the visualization by year.</li> <li>When the user hovers over a state, a tooltip should appear breaking down that state's emissions by economic sector.</li> </ul>
10	As a user, I want to know at a glance the current number of public electric charging ports, so that I can gauge the nation's progress towards its EV charging infrastructure goal.	<ul style="list-style-type: none"> <li>A KPI widget that displays <i>Count of public EV charging ports</i> in 2024.</li> <li>Widget should display percentage change between 2023 and 2024.</li> </ul>
11	As a user, I want to know how the number of public electric charging ports has changed over time, so that I can identify risk areas that require additional investment to achieve the EV charging infrastructure goal by 2030.	<ul style="list-style-type: none"> <li>A line chart that displays <i>Count of public EV charging ports</i> since 2011.</li> </ul>
12	As a user, I want to know which states contain the most public EV charging ports, so that I can identify which states are contributing most to the nation's EV charging infrastructure goal.	<ul style="list-style-type: none"> <li>A table that displays <i>Top ranked states by public EV charging port count</i> in 2024.</li> <li>Table should display percent change for each item between 2023 and 2024.</li> </ul>
13	As a user, I want to understand where the nation's public EV charging ports are distributed, so that I can identify potential areas that require additional investment.	<ul style="list-style-type: none"> <li>A map chart of the US, where states are shaded by <i>Percentage of EV charging port count</i>.</li> <li>Map should allow users to change the visualization by year.</li> </ul>

14	As a user, I want to understand whether the charging infrastructure in each state sufficiently supports the state's charging needs.	<ul style="list-style-type: none"> <li>• A map of the US where states are shaded by <i>EV charging port density (Count of charging ports / 100 registered EVs)</i>.</li> <li>• Map should allow users to change the visualization by year.</li> </ul>
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Appendix	
-	<a href="#">[Supplement] US Climate Change Dashboard</a>
-	Github link