

# The Environmental Effects of EV Investments

Ian Spellane, Economic Analyst  
Zach Schofield, Economic Analyst

Regional Economic Models, Inc.

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EV Investment Background

Discussion of E3+ Model Simulation

Model Results

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Q&A

# About Us

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We are the nation's leader in dynamic local, state and national policy modeling.

From the start, REMI has sought to improve public policy through economic modeling software that informs policies impacting our day-to-day lives.

We were founded in 1980 on a transformative idea: government decision-makers should test the economic effects of their policies before they're implemented.

At REMI, we're inspired by a single goal: *improving public policies.*



what does **REMI** say?<sup>sm</sup>

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Our models are built for any state, county, or combination of counties in the United States.

## Our Representative Clients

Our model users and consulting clients use REMI software solutions to perform rigorous economic analysis that critically influences policy.



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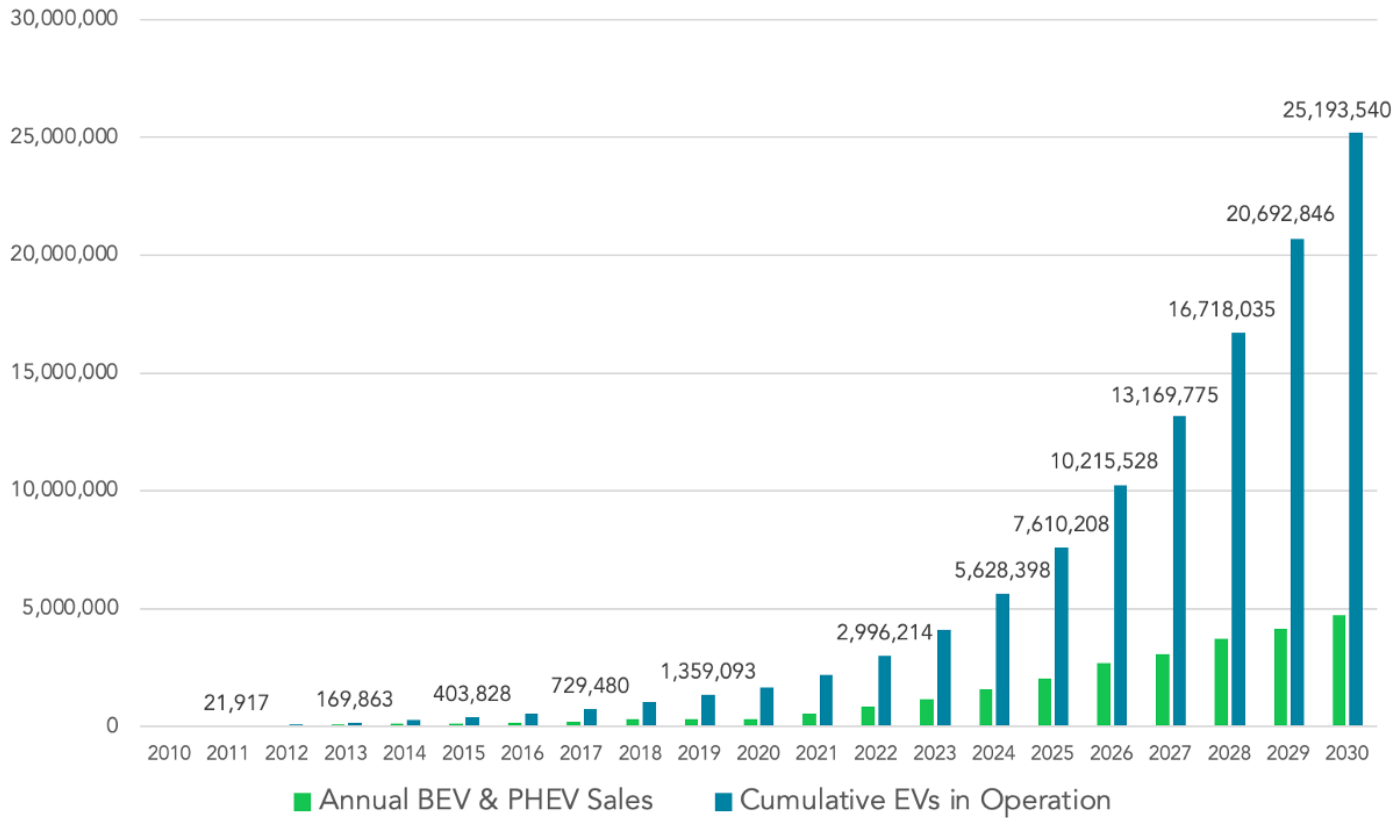
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# EV Sale Projections

## Cumulative US Electric Vehicles In Operation: 2010-2030



- 25 million total EVs by 2030
  - Appx 10% Market share

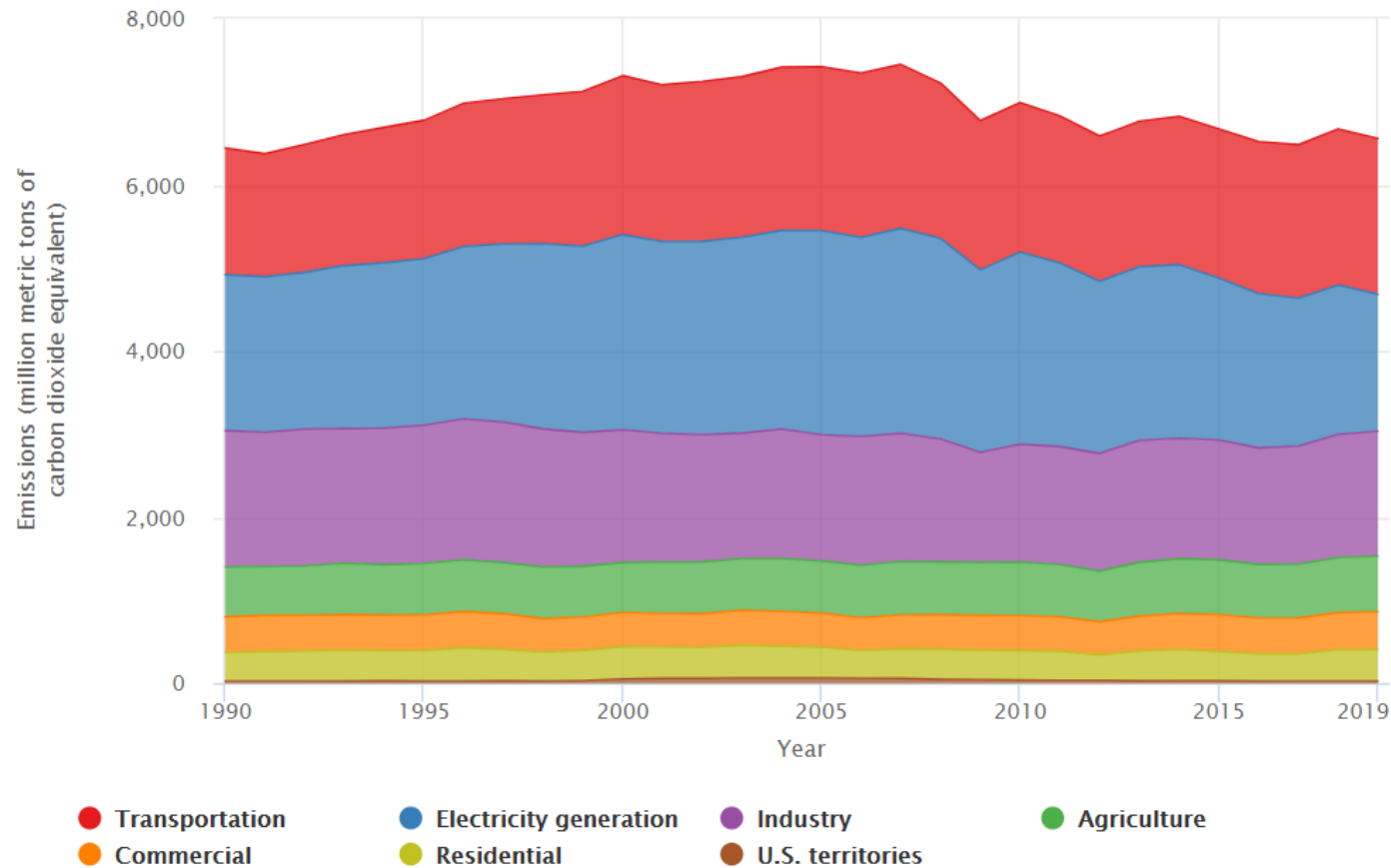
Historical Data: GoodCarBadCar.net, InsideEVs, IHS Markit | Auto Manufacturers Alliance, Advanced Technology Sales Dashboard | Research, Forecast & Chart: Loren McDonald / EVAdoption

Source: evadoption

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# US Carbon Emissions

U.S. Greenhouse Gas Emissions by Economic Sector, 1990–2019



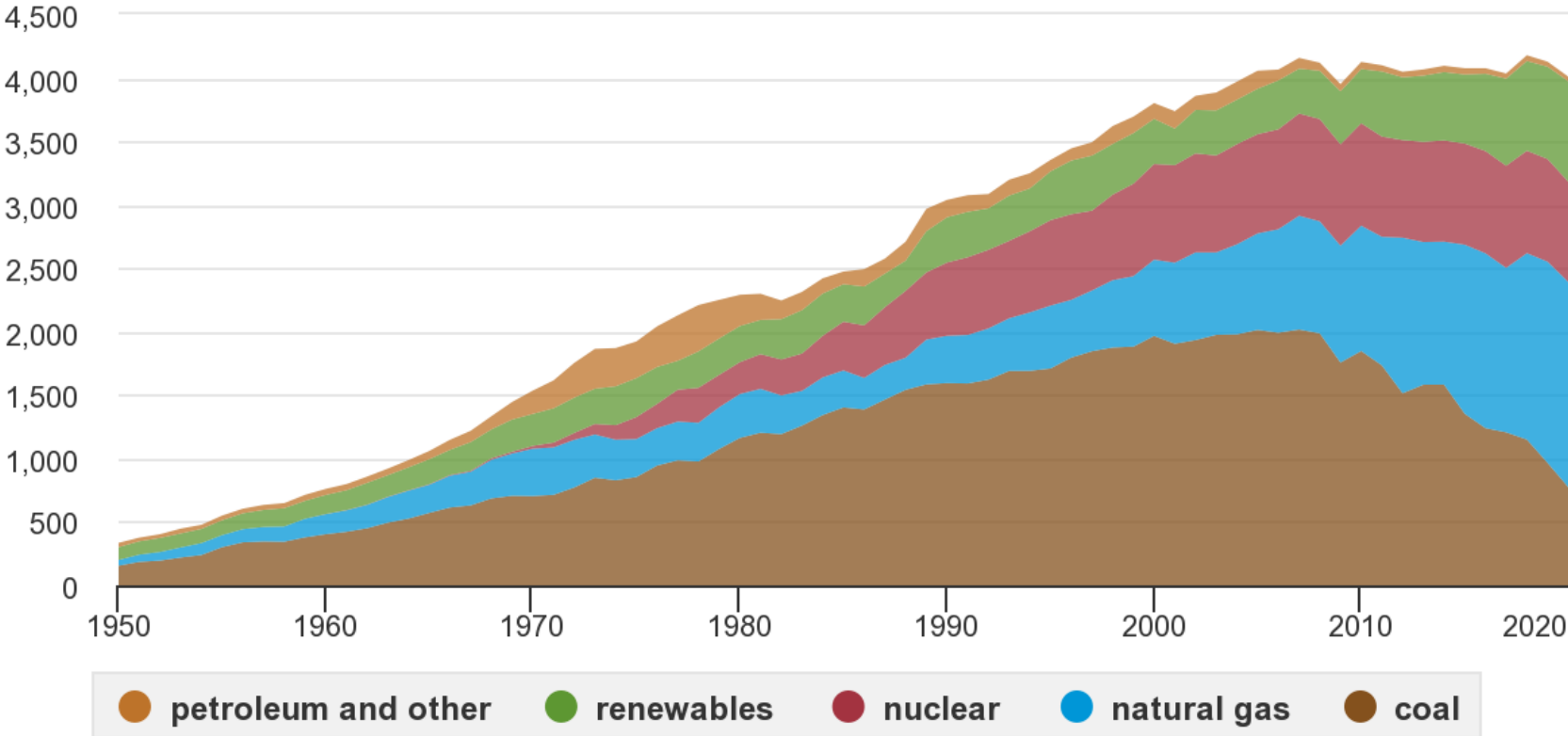
Source: U.S. EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2019.  
<https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>

- Transportation: 1500-2000 MMT
- Electricity: Historically 2000-2500 MMT
  - Falling close to 1500 MMT in recent years

# Environmental Effects of EV Expansion

## U.S. electricity generation by major energy source, 1950-2020

billion kilowatthours



- 21% of electricity was produced by renewables in 2020
- The US EIA predicts this will double to 42% by 2050

Note: Electricity generation from utility-scale facilities.

Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 7.2a, January 2021 and *Electric Power Monthly*, February 2021, preliminary data for 2020



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# Background on EV Expansion



## EV Advances

- Total cost of ownership of EVs has been steadily declining
- Range and usability has been steadily increasing

## Government Support

- Biden administration aiming for new car sales to be 50% electric by 2030
- American Jobs Plan includes \$15 billion to advance EV use, including 500,000 charging stations

## Economic Effects

- Effects of shifting energy sources
- US share of auto market
- Construction of new infrastructure

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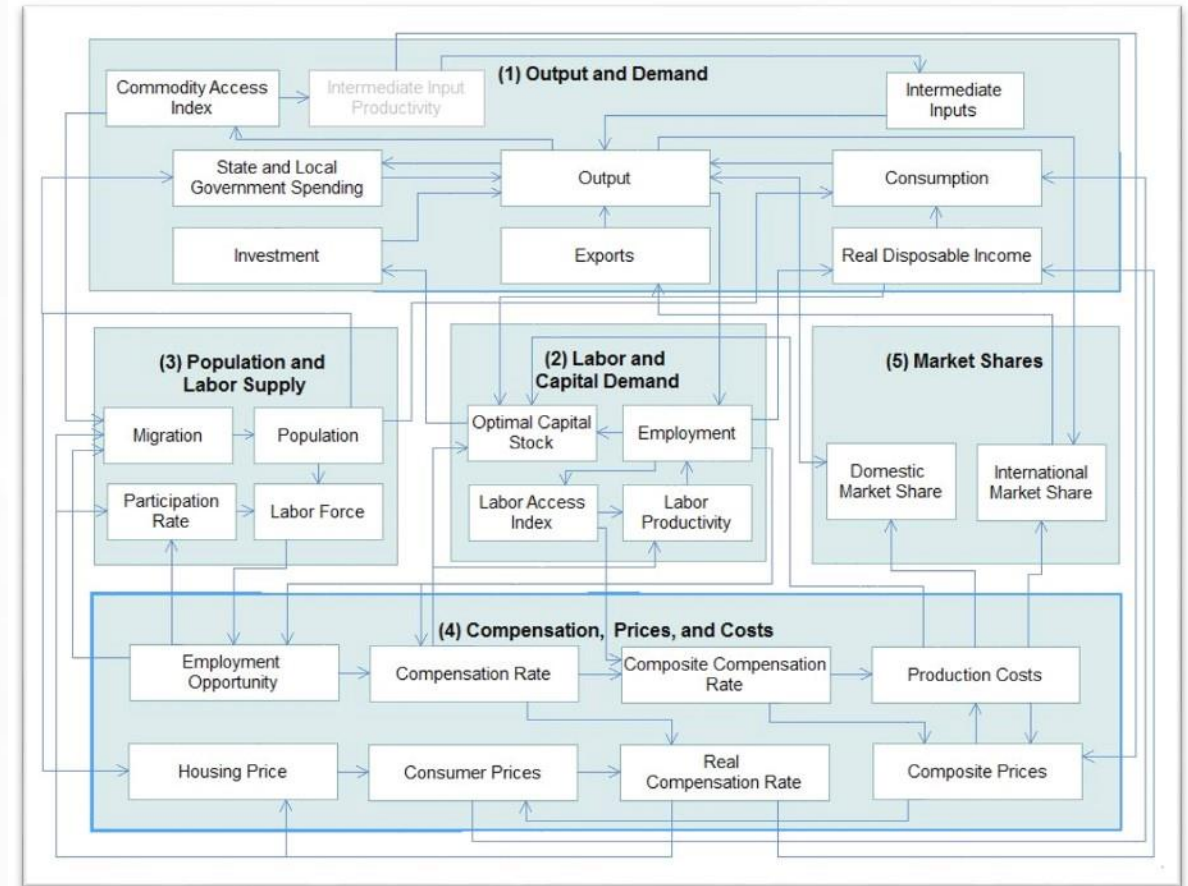
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# Model Simulation: REMI E3+



E3+ is the premier software solution for analyzing the macroeconomic and demographic impacts of any initiatives related to the energy and environmental sectors.

Decision-makers depend on E3+ to provide comprehensive evaluations of the total economic impact of altering electric rates, introducing new power sources, investing in the production of energy, and other policy changes.



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## Consumer Spending: Motor Fuels

- \$3.5 Billion reduction in 2021 increasing with EV sale projections
- \$88 Billion reduction by 2040
- Spending Reallocated to other Spending Categories

## Consumer Spending: Electricity

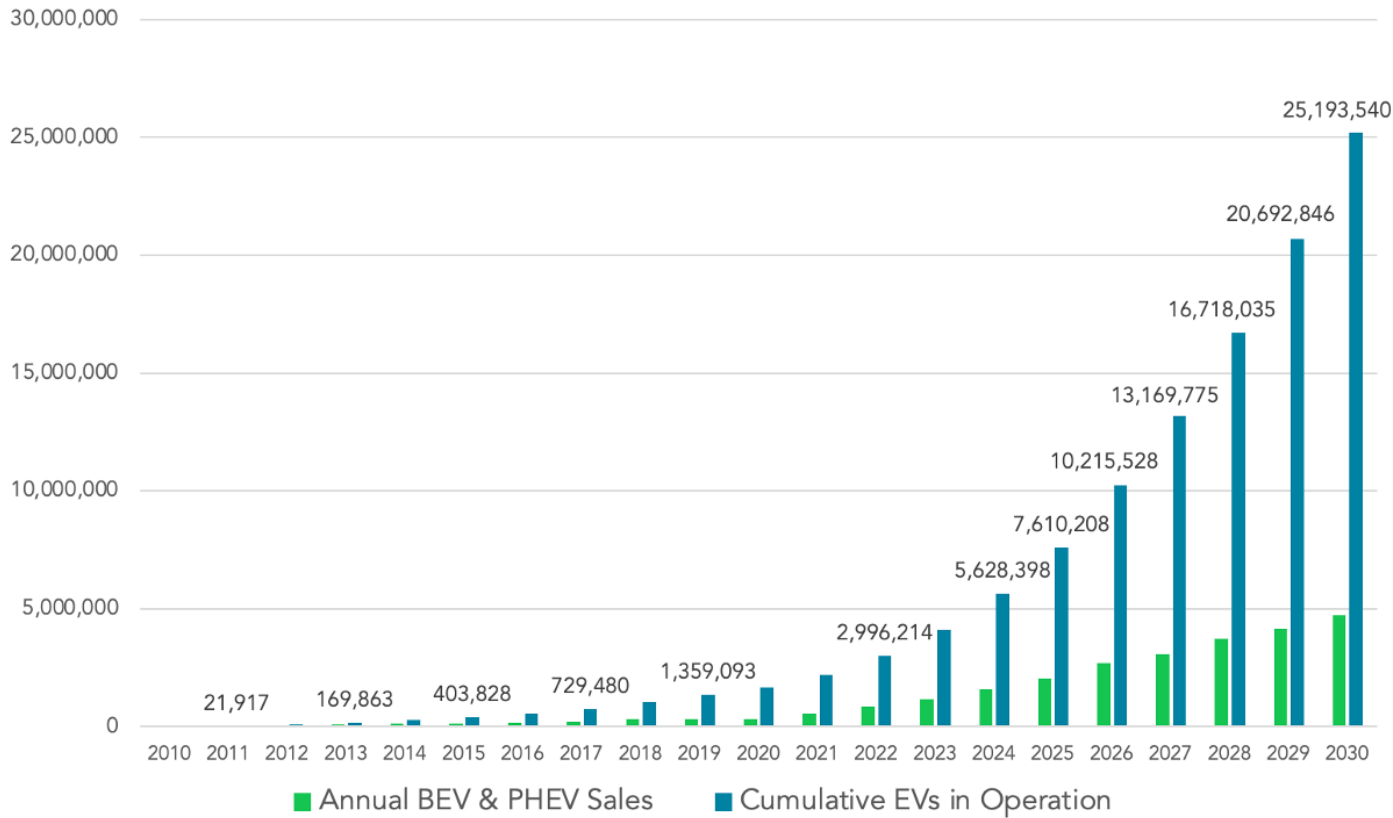
- \$1.2 Billion increase in 2021 increasing with EV sale projections
- \$31 Billion increase by 2040
- Spending Reallocated to other Spending Categories

## Renewable Energy Transition Variables

- Construction of Solar and Natural Gas Facilities
- Reduced CO2 per BTU coefficient in baseline

# EV Sale Projections

## Cumulative US Electric Vehicles In Operation: 2010-2030



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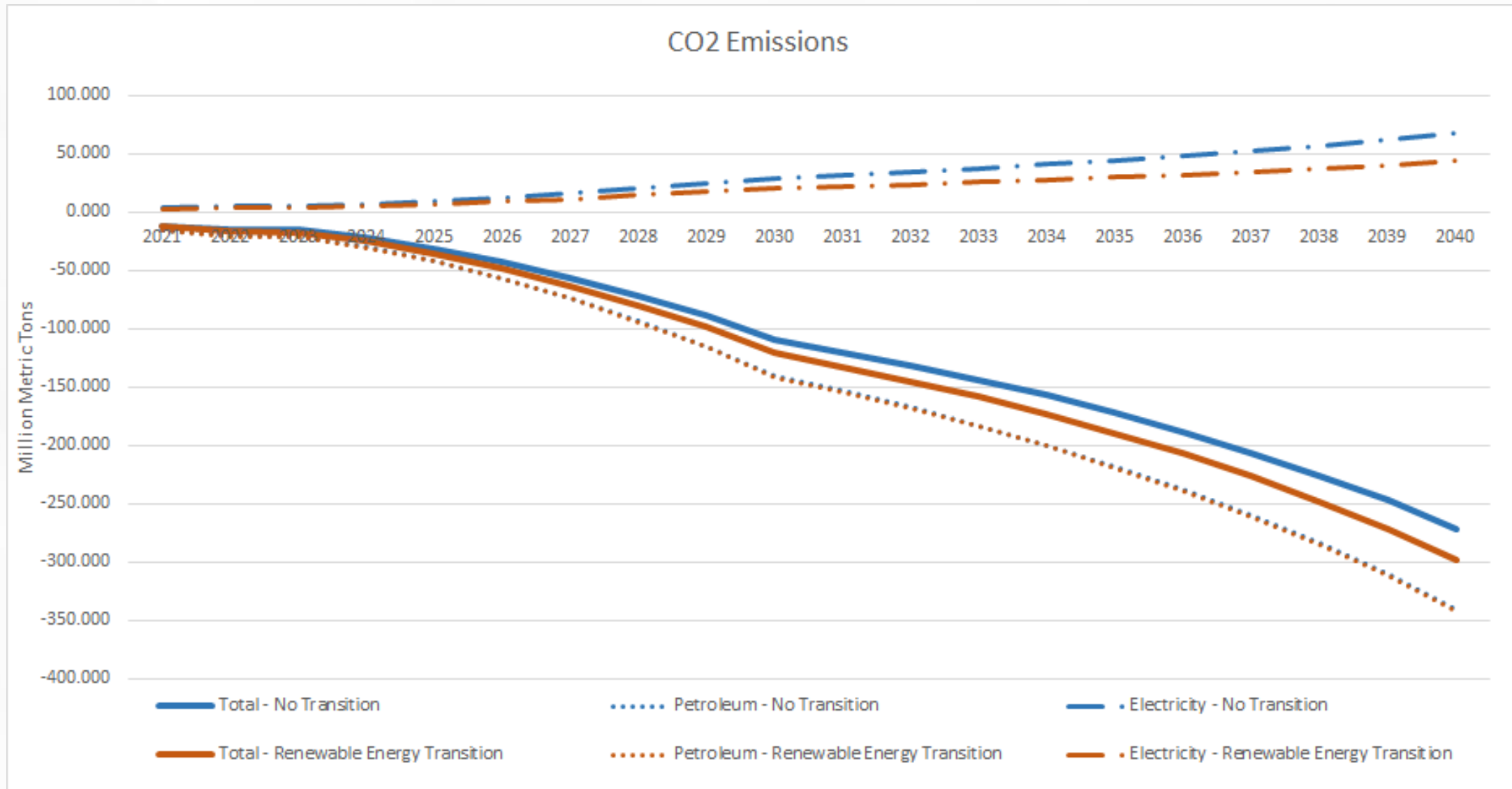
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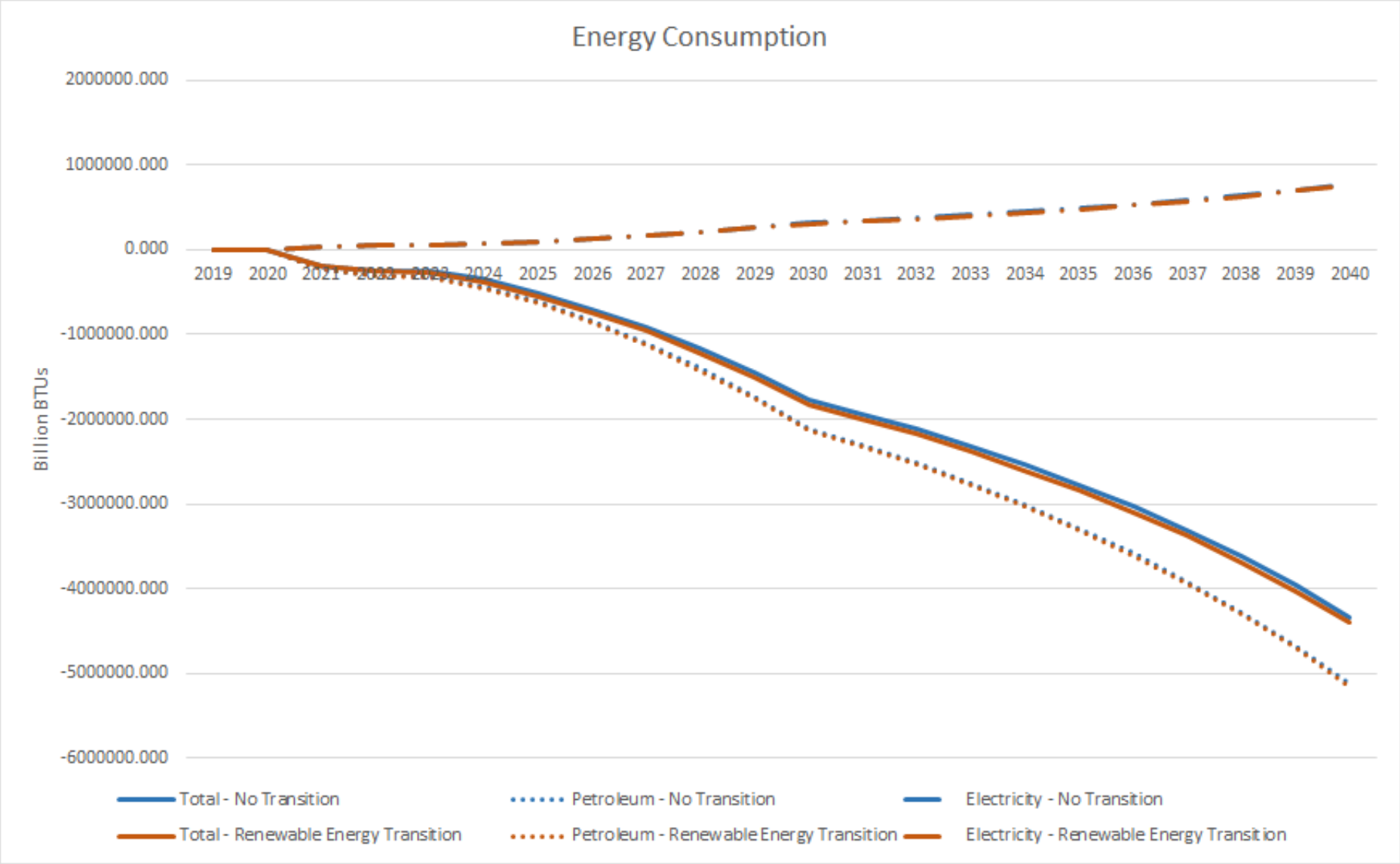
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# The Environmental Impact of Electric Vehicles



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# Energy Consumption

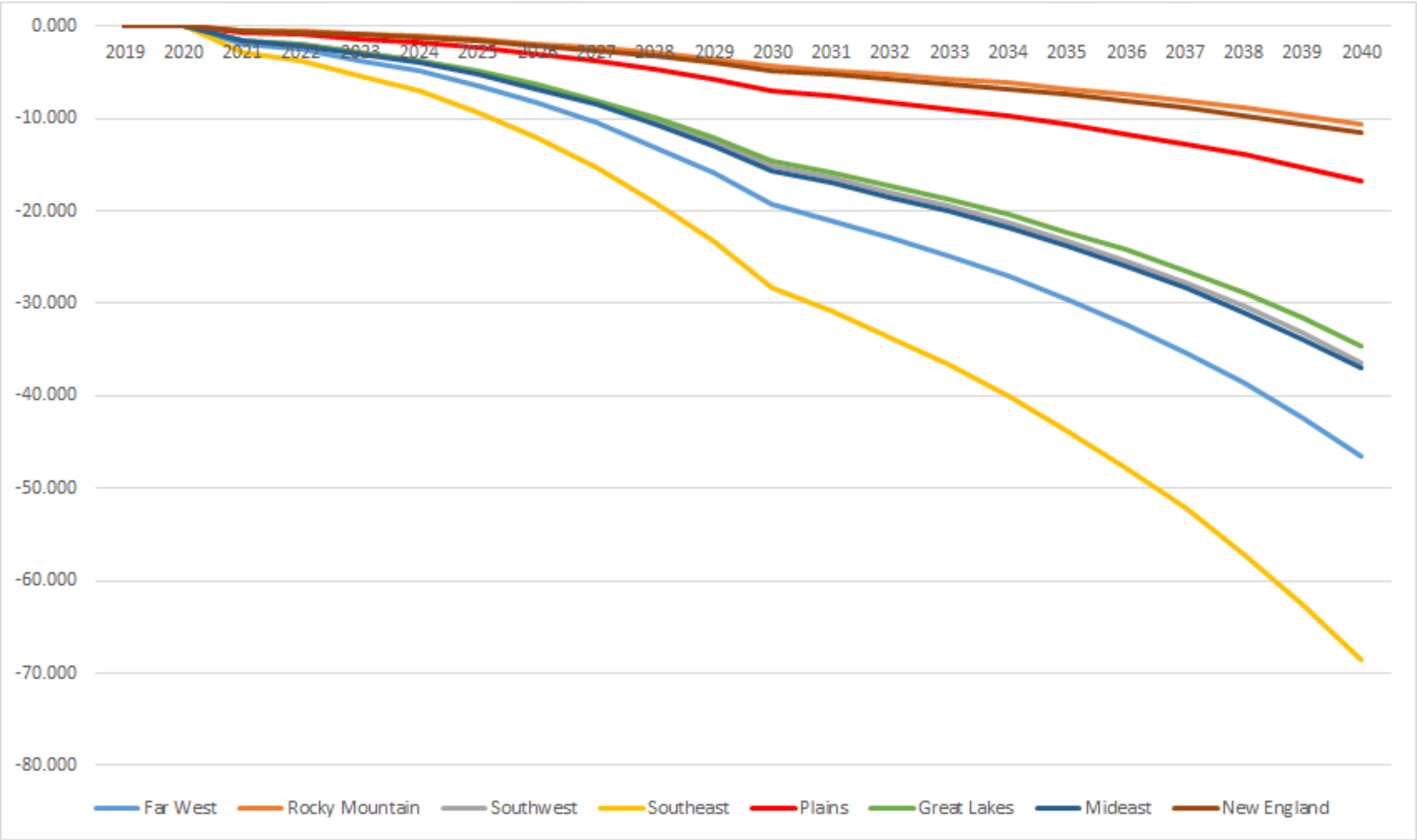


EV BTUs/100 Miles	Petrol BTUs/100 Miles
99,710.29	541,828.83

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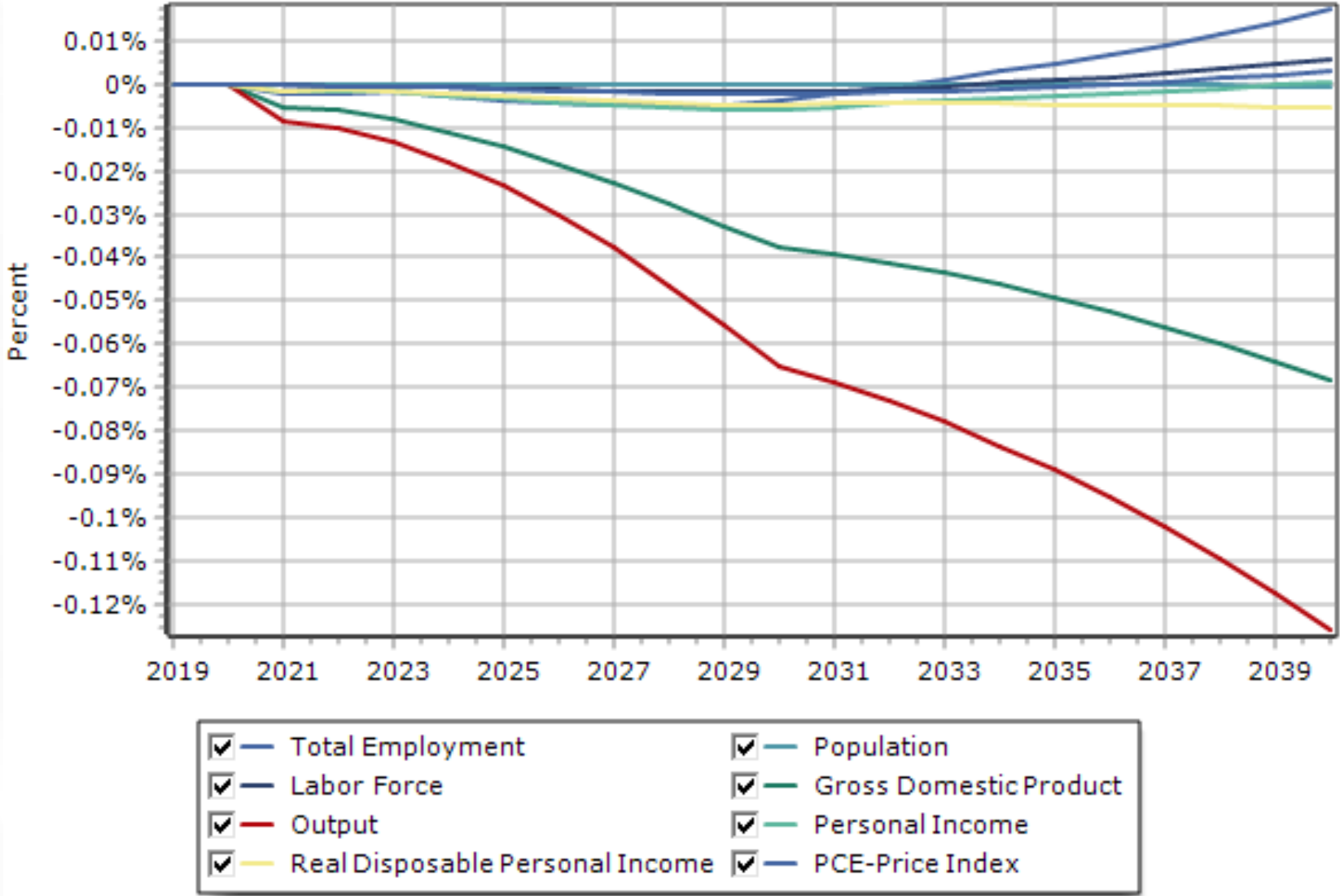


# Emissions by Region



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# Economic Outlook



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## Emissions Savings

- Transition to EVs is projected to reduce carbon emissions in the US dramatically
- Related to lower energy consumption overall

## Renewable Energy Transition

- A transition to non-carbon emitting energy sources speeds carbon savings
- But is not required to realize savings

## Effect on the Economy

- The cost savings associated with the transition to EVs gives consumers additional purchasing power
- Moderate reductions in GDP and Output

## Potential Forecast Errors

- Rate of EV deployment
- Efficiency of EVs
- Cost of charging infrastructure

# Economic Modeling: Why does it matter?



## Clarify

- Clarify the environmental and economic effect of EV investment
- Isolate the effect of different variables



## Predict

- Predict the magnitude of economic and environmental changes
- Quantify changes for each relevant year and make useful comparisons



## Inform

- Inform policy makers and constituents
- Communicate costs and benefits of EV investment

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## Sources

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- *Biden Administration Advances Electric Vehicle Charging Infrastructure.* The White House Statements and Releases, April 2021. Available at <https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-biden-administration-advances-electric-vehicle-charging-infrastructure/>.
- *Biden pushes for electric vehicles to make up half of U.S. auto sales by 2030.* CNBC, August 2021. Available at <https://www.cnbc.com/2021/08/05/biden-pushes-for-evs-to-make-up-40percent-or-more-of-us-auto-sales-by-2030.html>.
- *Electric vehicles get mixed reception from American consumers.* PEW Research Center, June 2021. Available at <https://www.pewresearch.org/fact-tank/2021/06/03/electric-vehicles-get-mixed-reception-from-american-consumers/>.
- *EIA projects renewables share of U.S. electricity generation mix will double by 2050.* US Energy Information Administration, February 2021. Available at <https://www.eia.gov/todayinenergy/detail.php?id=46676>.

# Input Methodology

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- Reduction in Oil Consumption
  - Calculate avoided fuel consumption by multiplying projected EV market share to average motor fuel consumption in the US since 2015
  - This is then multiplied by average fuel station prices in the US since 2015
- Increase in Electricity Demand
  - Average kWh demanded per year for current EV models
  - Multiplied by projected number of EVs projected to be on the road for each year
- Energy Transition Scenario: Assume 20% Less CO2 emissions per BTU of energy generated in the economy



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*Ian Spellane, Economic Analyst*  
[Ian.Spellane@remi.com](mailto:Ian.Spellane@remi.com)

*Zach Schofield, Economic Analyst*  
[Zachary.Schofield@remi.com](mailto:Zachary.Schofield@remi.com)