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An Analysis Of How Electric Vehicles Have Influenced The Economic Landscape Of Oil-Dependent States And Cities In The U.S. Since 2020

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Abstract
Recently, electric vehicles have started to take over the market, with brands such as Tesla in the USA, by far the most successful brand in the country, holding 43.5% of the EV market share and BYD in China, holding 28.5% within the country. But, they have been just that:recent. Previously, the energy sector used to be dominated by fossil fuels such as gas, oil or coal and as a matter of fact, there are cities that significantly benefited from them in states such as Louisiana, Oklahoma and especially, Texas. This study investigates the projected economic impact of EV uptake from 2020 to 2025 of EV adoption in cities that have a history of being dependent on oil such as Lake Charles, Louisiana, Lafayette,Louisiana or Port Fourchon, Louisiana or Houston, Texas. We will employ an input-output model and multiple regression lines in order to quantify how EV market rising share, combined with logistic growth parameters influenced key economic indexes, vital for determining the state of the economy such as GDP Per capita, GDP, Tax revenue and local oil sector employment. Our research underscores the importance of economic diversification and targeted infrastructure policies to bolster resilience in oil-centric cities facing inevitable energy transitions.
Keywords: *electric vehicles, oil-dependent cities, economic impact, GDP Decline, energy transition, public service, municipal finance*

1.1: INTRODUCTION

In the context of oil dependent cities, the introduction of EV's is important as it represents a shift in the dynamics of the global and local energy economy. It challenges the financial stability of regions whose livelihoods depend on the extraction, refining and transportation of oil. In 2020, 3.1 million units of electric vehicles were sold (Businesswire, 2025). Jump to 5 years later. As of 2025, 4.1 million cars have been sold in the first quarter of 2025 (Rhomotion, 2025), which extrapolated for trends, are expected to surpass more than 20 million units (Lea,2025), which is a 480.65% increase within the last 5 years. Therefore, it is safe to say that these electric vehicles are becoming a force to be reckoned with.

However, in places like Louisiana and Texas, which have significant offshore reserves of crude oil and natural gas, there exists cities such as Lake Charles and Midland, where a majority of its economy is dependent on oil. Lake Charles itself can process roughly 463,000 barrels of oil, which itself is the 7th largest refinery in the US (1012industryreport, 2023) and makes 22.4 billion dollars on oil refinement plus an additional 11.1 billion dollars on extraction. Midland County, which only contains the city of Midland, ranked 3rd in oil production according to a report released in April of 2025 and is economically dependant on fossil fuels, producing 74.5 million MCF of natural gas in 2025 alone (RRC, 2025) .As electric vehicle adoption threatens to reduce oil demand, the heavy dependence of these cities on this single industry poses critical challenges for its economic future.

1.2: Study Methodology and Scope

This study will review the statistics for GDP, GDP Per capita and tax revenues from sources like BEA, Bureau of Labor Statistics, city/county government databases. It will then estimate the impact of the oil and gas industry of that specific city using the following steps:

- Collecting previously mentioned baseline data
- Tracking growth trends of EV's
- Use iO tables to track effects of reduced oil production on economies
- Regression analysis; determine the strength and significance of EV adoption impact
- Estimate potential future economic impacts under such scenario
- Compare model outcomes with real world case studies or reports

This paper will present information on:

- The economic structure of oil dependance and structure within these cities such as oil production volumes, employment in oil sectors and contributions to local GDP and tax revenues
- The extent of EV adoption (i.e the number of EVs introduced or registered) in oil dependant American cities such as the aforementioned Midland and Lake Charles
- The relationship between EV Adoption and economic indicators such as changes in GDP, Employment and tax revenues using statistical analysis such as regression and correlation
- The projected economic impacts of EV Adoption on oil-dependant cities modeled through input-output analysis and scenario forecasting
- Policy implications and recommendations for local governments and stakeholders to manage the transition toward cleaner energy while preventing any economic disruptions in oil-reliant regions.

1.3: Literature Review

Electric Vehicles

Electric vehicles refer to vehicles that use electricity to perform its motor functions rather than fossil fuels or gas, as most cars use. They differ from regular, fossil-fuel powered vehicles in the sense that they use power charging stations to create electricity which is what they are fuelled by. Some of the more common and wide known benefits of electric vehicles include its quieter noise, it's low long-term cost and finally, zero emissions of any pollutant gasses or greenhouse gases

Oil Industry

Petroleum in the United States goes as far back as 1859, when oil was found in Titusville, Pennsylvania. Within the oil industry, its main responsibility is to be able to extract oil from the regions where one is able to do so through a process of refining. In the United States, the main production locations of oil involve the Permian Basin in Texas, the offshore petroleum in the Gulf of Mexico as well as the state of North Dakota. In cities that are economically dependent on oil, the industry contributes substantially to the local GDP, the employment, the business investment and infrastructure and the tax revenues.

Economic Impact Metrics

The shift from combustion engine vehicles to economic ones, not just represents a technological evolution but also an economic one - particularly for regions that are heavily dependent on the oil and gas sector. EVs reduce the need for gasoline and diesel. As more consumers adopt EVs, national fuel consumption decreases which can reduce oil demand. For cities that are heavily dependent on oil this can lead to reduced prices, reduced workforce, decreased production volumes and declines in tax revenues and local business activity. To understand the impact we are going to be looking at three aforementioned factors:

GDP: The total monetary value of all the goods and services produced within a region over a period of time

Employment rate: The proportion of the working-age population that is currently employed

Tax revenue: The money a government collects from individuals, businesses, and other entities through various types of taxes. It is used to fund services such as schools, roads, healthcare or police.

Energy Transition

The global shift toward cleaner energy sources, known as the energy transition involves moving away from fossil fuels like oil and gas toward renewable energy, electric vehicles (EVs), and energy efficiency improvements. While the energy transition presents significant environmental benefits, it also has economic challenges, especially for oil-dependent cities such as Midland and Lake Charles. These regions face potential job losses and reduced tax revenues as demand for oil declines, highlighting the urgent need for economic diversification and workforce retraining to adapt to a changing energy landscape.

1.4: Hypothesis

It has been predicted that cities with oil-dependent economies will have a significant decline in their GDP (defined by a drop of at least 10%) which could have a similar effect in the quality of their school, the quality of their infrastructure and may cause the town or city to go bankrupt or would increase the possibility of financial distress unless effective economic implementation is implemented.Electric vehicle adoption have already started to outgrow oil demand, with a research paper suggesting that EV Adoption could displace over 5 million barrels of oil per day by 2030 (IAE, 2023). At the same time, the US Energy Information

Administration data shows that states such as Texas and Louisiana - home to cities such as Midland or Lake Charles - are deeply dependent on oil production. Economic theory and empirical studies such as Moretti (2010), emphasize that any disturbances in a region's primary industry can have continuing and serious effects through multiple factors such as employment, public services and infrastructure. I predict that Electric vehicles will have a significant economic effect on the following factors:

1.4i) It has been predicted that cities with oil-dependant economies would experience a considerable decline in GDP per capita as EV adoption reduces demand for fossil fuels

1.4ii) It has been predicted that cities with oil-dependant economies would experience a considerable decline in oil and gas extraction jobs EV adoption reduces demand for fossil fuels

1.4iii) It has been predicted that cities with oil-dependant economies would experience a considerable decline in GDP per capita as EV adoption reduces demand for fossil fuels

In order to be able to predict the real-world perception of electric vehicles on economic shifts in oil dependent cities, respondents from an online science community were asked whether they had observed changes in employment within the oil and gas sector. Out of 34 total responses, a significant 72.7% reported noticing changes which although it does not indicate a causation, it does support our hypothesis that the economic foundations of oil-reliant cities are beginning to shift in response to clean energy trends.

In addition to employment trends, the survey explored public perception of the causes and consequences of economic changes in oil-dependent cities. When asked whether the rise in EV's had contributed to employment shifts in the oil and gas sector, 72.7% of respondents agreed, stating that there may indeed be a strong perceived link between job displacement in traditional energy industries. Interestingly, 45.5% of participants viewed the impact of EVs on their city's overall economy as positive, while 36.4% felt it was negative and 18.2% were not sure. This reflects the polarizing opinion of EVs within the general community. Whilst some people feel as if EV's could stimulate progress, others are against it, stating that it may cause economic disruption

To further emphasize these concerns, 63.6% of these respondents reported changes in quality of public services and an overwhelming 90.9% agreed that reduced revenue could be impacting local government finances. These responses reinforce the hypothesis that the shift toward EVs may be contributing not only to sector-specific job losses but also to broader fiscal challenges in cities heavily reliant on oil and gas revenue.

1.5: Outline of the paper structure

The methodology section outlines the research design, data sources, and analytical models used to assess economic effects. Following this, the data analysis and results section presents findings on EV adoption trends and their relationship with economic indicators. The discussion interprets these results in the context of existing research and explores policy implications. Finally, the paper concludes with a summary of key insights, limitations, and recommendations for future research.

2.1: Data Analysis

2.1.1: Introduction

This section presents an analysis of the economic indicators and electric vehicle adoption trend in oil-dependent cities across the United States from 2020 to 2025. By examining these factors, we hope to gain a sense of the economic impact of the increasing EV adoption in cities heavily reliant on these crude oils. Initially, descriptive statistics will outline the extent of oil dependence and EV Market saturation, followed by correlation analysis to analyse any potential relationships between rising EV Usage and changes in local economic performance.

2.1.2: Economic Dependance: Employment in Oil Related Sectors

To begin with, it is important to quantify just how much these cities are dependent on oil. For this research paper we will be focusing on the city of: Houston, Texas.

Here is data showing the percentage employment of oil in the city of Houston from 2020 till 2025:

Year	Oil and Gas Extraction Jobs (thousands)
2018	36.8
2019	37.2
2020	34.1
2021	29.5
2022	30.7

The below table showcases the data for the number of EV Registrations from 2011 to 2025.

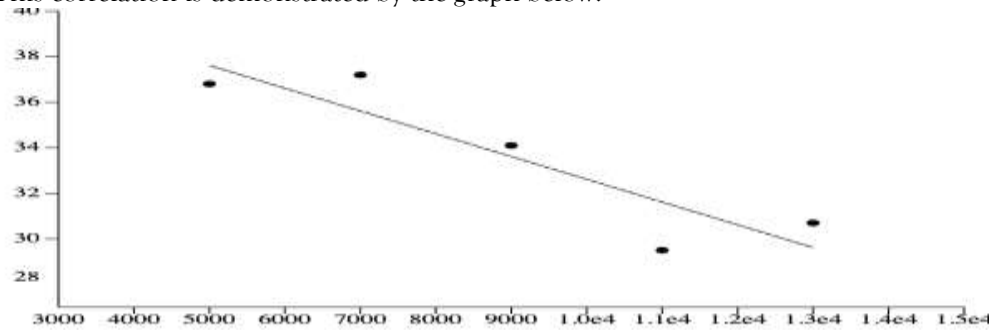
Year	Total EV Registrations
2018	5000
2019	7000
2020	9000
2021	11000
2022	13000

When we plot this data, on a graph, using the total EV Registrations on the x axis and the oil and gas extraction jobs on the y axis using the desmos tool, our line of regression came up with the following equation:

$$y = -0.000995x + 42.615$$

On the line of regression, we are able to come up with a negative slope. This negative slope indicates that, for every additional EV that is registered, the oil sector decreases by 1 job per 1,000 EV's. While this may seem gradual on an individual level, it is important to note that the scale at which this is being implemented, that being, tens of thousands, makes the loss of employment seem very significant. The strong correlation of -0.90220 reinforces the reliability of this trend, thereby underscoring the importance of economic adaptation and diversification.

This correlation is demonstrated by the graph below:



In order to be able to analyse this graph, I will be using the Input-Output model, which is a tool for understanding systems, processes and projects. It is used in a variety of industries and fields. IPO consists of three factors: Inputs, Outputs and Processes.

Inputs are the resources, data fed into a system/process, processes are merely the actions/steps done to transform the inputs into outputs and the outputs are merely the results of the systems/processes. In this study, the oil and gas sector is treated as both a consumer (of labor, machinery, and services) and a producer (of energy, jobs, and economic output).

Using input-output analysis, the inputs include labor and industrial equipment, while the outputs include energy products, employment, and regional tax revenue. The processes link these elements through direct, indirect, and induced effects — illustrating how employment declines in oil and gas due to EV adoption can propagate economic losses across multiple sectors in Houston's economy.

2.1.3 Economic Dependance: Oil Tax Revenue

Another way of trying to come up with a conclusion on the effect of EV's on economic indicators would be to discuss the oil tax revenue. Oil Tax Revenue, are additional costs that states levy on oil and gas extraction methods as a way of producing significant amounts of revenue. This can include the volume of the oil/gas being produced, the property tax on which the oil and gas is being extracted from or the revenue that comes from leasing the land. However, with the introduction of EV's, the amount of tax revenue that the city/state/county/federal government receives, could be significantly or noticeably declining due to the obvious neglect of such fossil fuels.

This part of the research paper will take a look at the state of Colorado. The oil and gas economy within the state of Colorado is quite significant, ranking 7th nationally according to a research paper conducted by Barrels of Oil Equivalent, published in May of 2025. Colorado, in addition, reported having 178 million MCF of natural gas in that month, reflecting a significant presence of oil and natural gas.

Colorado, however, has had a long and surprisingly significant history with electrical vehicles, with the Fritchie Automotive Electric Automobile, being manufactured in Denver and electric charging stations were built and the state maintained many of the charging stations in Denver during this period, making it one of the few places where recharging was common.

After a prolonged hiatus spanning several decades where gasoline cars dominated, the modern re-introduction of electric vehicles in Colorado gained significant momentum in the 21st century.

While early models like the Nissan Leaf and Chevrolet Volt started appearing in the early 2010s, it was a pivotal 2017 Executive Order by then-Governor John Hickenlooper that truly jumpstarted the state's comprehensive push. This order led to Colorado's first Electric Vehicle Plan in 2018, establishing ambitious goals for EV adoption, outlining strategies for building crucial charging infrastructure across major corridors, and setting the stage for substantial state-level incentives.

This policy groundwork, combined with the continuous improvement in battery technology and increasing model availability from manufacturers, has transformed Colorado into a national leader in EV adoption, with the state consistently ranking among the top for EV sales and per-capita registrations, actively working towards its net-zero emission targets.

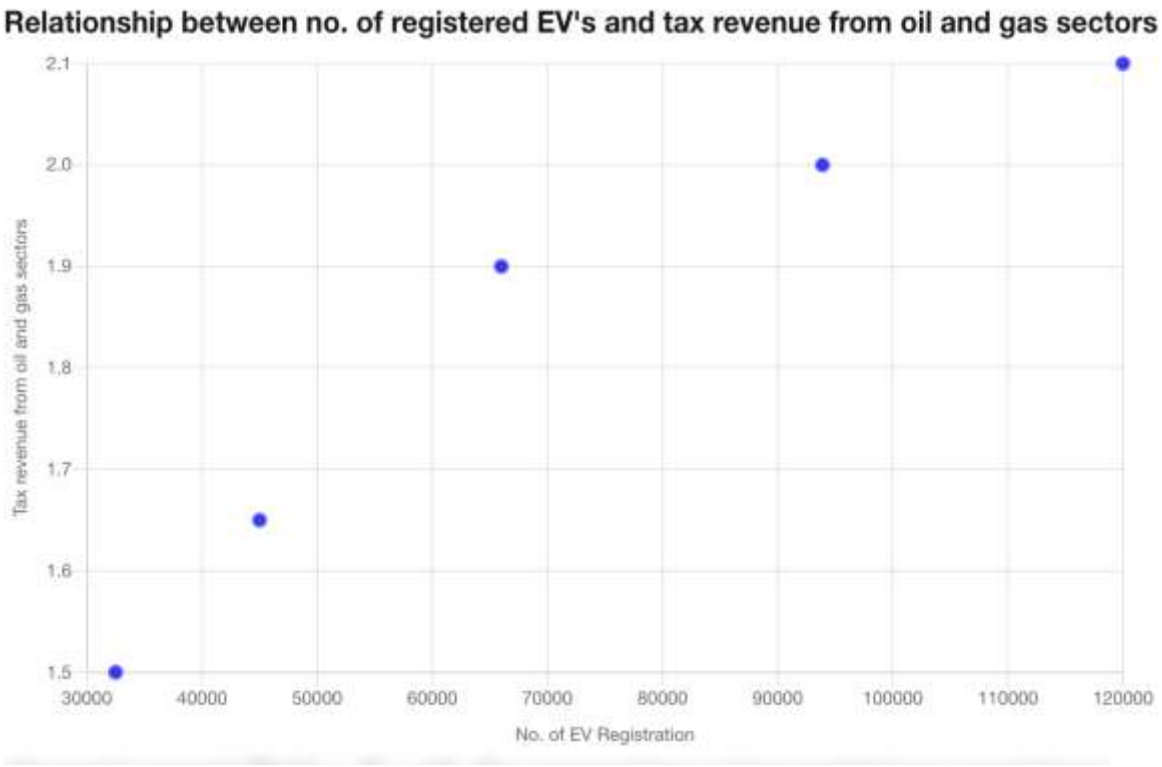
However, with the re-introduction of the EV's comes the consideration of how the oil revenue would be affected. That is what this section hopes to achieve.

Using the AI system perplexity, and asking it to thoroughly search multiple tables to generate a table of both oil and gas tax revenue as well as the no. of EV registrations, the following table consists of both of those data from 2020-2024:

Year	**Oil/Gas Tax Revenue(billion of $)**	**No. of registered EV vehicles**
2020	1.5	32,500
2021	1.65	45,000

2022	1.9	66,000
2023	2	93,900
2024	2.1	120,000

Putting all of the data onto a graph, we get the following result:



The graph displays a positive correlation between the number of registered EV's and the tax revenue from oil and gas related sectors. While one might reasonably assume that an increase in EV registration might lead to a decrease in the tax revenue, here the graph suggests the opposite;it shows both are increasing.

This could have happened because of the following:

1) Firstly, according to a research paper produced by the Colorado Fiscal Institute in 2025, the majority of the oil and gas tax produced only comes from severance tax, which is a tax imposed upon nonrenewable natural resources that are removed from the earth, which are separate from the tax that you pay at the gas station when you pump gas, thereby allowing the taxes to increase independently of gasoline consumption trends.

2) Oil and gas tax revenue growth depends mainly on production levels, severance tax rates, and market prices, not directly on how many EVs are on the road. If oil and gas production rises or prices increase, severance and extraction taxes can grow even as gasoline consumption declines

Using input-output analysis (in this case, the inputs are the increase in EV Registrations, the outputs are the decreased demand for oil as well as the possible simulation of other sectors such as charging stations, battery supply chains and renewable energy. These sectors create jobs and taxable income, increasing total sales tax, income tax, and corporate tax revenues. These also have the positive effect of offsetting any stagnating or declining oil revenue

2.1.3: Economic Dependance: GDP Per Capita

The final way that we are going to look at whether GDP Per Capita really affects the economic situation of a city/state/country is to look at the GDP Per capita, which refers to the average economic output per person in any specific place.

As the global shift towards sustainability accelerates, EVs have emerged as a key indicator of technological advancement. In this section, the relationship between the number of electric vehicles registrations and the GDP Per Capita is examined to explore whether the adoption of EVs corresponds with higher or lower economic growth. The rationale behind this, is that with the introduction of EV's, the dynamic becomes a lot more complex. As EV registrations rise, they may disrupt the traditional sources of revenue that was rooted in oil and gas. By exploring this relationship, the analysis seeks to uncover whether EV adoption serves as a harbinger of economic transition or a challenge to local economic stability.

This part of the research paper will take a look at the city of Bakersfield, within the state of California. The city is the most significant for oil and gas production, serving as the industrial hub for Kern County - the state's top oil producing region. The county produces about 66-70% of the state's oil production according to sjvgeology and about 10% of the country's supply, according to a video published by C-Span.

Although California, a quintessential liberal state deeply committed to ambitious climate goals and environmental regulations, remains a major oil and gas producer and has only recently begun accelerating efforts to phase out fossil fuel extraction. The state is the seventh-largest oil producer in the United States, with the industry generating billions in state and local revenue and supporting extensive economic activity—particularly in regions like Kern County, where Bakersfield is located.

Using the AI system perplexity again, which thoroughly searches the internet to find data from 2020-2024 on the GDP Per capita as well as the no. of EV Registrations from those years, I was able to come up with the following table:

Year	**EV Registrations***	**GDP Per Capita**
2020	3850	50878
2021	5425	58417
2022	6450	63535
2023	10850	63668
2024	15250	64210

*These are total plug-in vehicles, including BEVs and PHEVs, estimated from incremental growth patterns in California's EV market and Kern County's efforts to expand infrastructure and adoption.These values were averaged.

Upon plotting the results in a graph, the results were completely different than what was expected. The graph had an equation of:

$y = 0.894484x + 52659.2418$.

This equation indicates a positive correlation graph, which is opposite to the theory that no. of EV Registrations and GDP Per capita have a negative correlation. Furthermore, the correlation coefficient that this graph produced was r = 0.7307, which is weaker than the graphs of the previous two economic indicators. The observed positive correlation between EV registrations and GDP per capita in Houston can be explained through input-output analysis, which reveals how economic activity in one sector influences others. While increasing EV adoption may reduce reliance on the oil and gas industry, it simultaneously stimulates growth in adjacent sectors such as clean energy, battery manufacturing, charging infrastructure, and high-tech

services. These emerging industries tend to generate higher-paying jobs and attract skilled workers, thereby raising the average income and overall productivity in the region. Furthermore, the more that public and private investment invest into EV-related infrastructure and innovation the more likely that it is to enhance economic output per person.

This could be for the following reasons:
First GDP Per Capita is a broad economic measure that measures overall economic output relative to population size and is less sensitive to declining sectors. An increase in EV adoption may coincide with technological innovations, infrastructure investment and new industries that can create revenue that can offset losses or even boost the GDP Per Capita.
Secondly, the early stages of EV adoption may not yet be large enough to significantly affect the dominant oil and gas sectors in many of these cities. Although California leads the nation in EV ownership, adoption rates are higher in urban coastal regions like Los Angeles and San Francisco. In Bakersfield, the uptake may still be growing but not yet substantial enough to cause a noticeable decline in oil-sector-driven GDP.

2.2: CONCLUSION

This study set out to investigate the economic impact of EV adoption and the economic indicators of oil dependent cities, focusing on GDP Per Capita, Oil and Gas Employment as well as the tax revenues received by the local government. This data revealed a negative correlation between EV registration and oil and gas employment, thereby supporting our previously stated notion that clean energy transitions are associated with declining job opportunities in fossil fuel sectors. However, contrary to the original hypothesis, the analysis showed a positive correlation between EV registrations and tax revenue from oil and gas, as well as between EV registrations and GDP per capita. These findings suggest that while EV growth may reduce employment in specific sectors, it does not necessarily trigger an immediate decline in broader economic indicators. Instead, cities like Bakersfield may be demonstrating resilience or diversification amidst energy transitions.
While the research provided insightful insights into the relationship between the EVs and the economic factors, it is important to acknowledge the potential limitations. To begin with, the study relied heavily on secondary data and publicly available economic indicators which may not fully capture the true impact of EV adoption — particularly in regions where data on oil-specific GDP share or municipal tax breakdowns is limited or generalized. Furthermore, while a negative correlation was observed between the EV Registrations and the oil employment, this does not prove causation; other variables such as oil prices and automation in the energy sector may have influenced employment levels during the study period.
Ultimately, by combining public perception, statistical correlations, and input-output modeling, this study reveals that the economic impact of electric vehicle adoption in oil-dependent cities is not solely disruptive, but complex — signaling not just decline, but the beginning of structural transformation.