What Can Ontario Learn From Other Jurisdictional Electric Vehicle Policies and Market Growth, How Can Political Resistance Be Overcome to Accomplish Relevant Targets

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The global shift towards electric vehicles (EVs) has been fueled by the need to reduce carbon emissions and combat climate change. However, the transition to EVs has been met with significant economic and social challenges, particularly regarding equitable access and the distribution of resources. This paper explores EV adoption's complexities in Ontario, Canada, and examines the economic, social, and political factors influencing this transition.

First, we will examine the inequitable nature of EV incentivization, highlighting how government-funded subsidies, while intended to address affordability concerns for lower and middle-income groups, often inadvertently favour higher-income groups. Research from California serves as a critical case study, revealing that the top 10% of income earners received most of the state's EV subsidies, despite the program's financial burden being shouldered largely by lower and middle-income groups. This section will also explore the disparities in EV ownership rates based on level of education and the location within which one lives within the province of Ontario, highlighting the importance of educating populations and investing in EV charging station developments in underserved areas in order to incentivize EV adoption.

Next, we will focus on the financial challenges faced by the Canadian Federal and Ontario Provincial Governments in funding EV initiatives. With the 2024 Canadian Budget allocating $93 billion to EV investments, the paper will delve into the economic implications of these expenditures and analyze the proposed solutions to these challenges. We will also review the effectiveness of current market policies and the need for location-specific strategies to address disparities and ensure a more equitable transition to EVs.

Finally, it is important to address the political resistance to EV adoption in Ontario, particularly in regions heavily reliant on the traditional automotive industry. This section will explore how the economic stability of these areas is threatened by the shift toward EVs, leading to opposition from industry leaders, labour unions, and local communities. By examining the roots of this resistance and the potential economic impact on key manufacturing regions, we will provide insights into the political dynamics that must be navigated to facilitate a smoother transition to electric vehicles. This paper argues that Ontario's approach to EV adoption must be multifaceted, addressing not only the economic implications for existing industries but also ensuring equitable access to EVs across different income levels. Through a comprehensive analysis of California’s experiences, Ontario’s current policies, and the political dynamics at play, this paper seeks to provide a roadmap for a more inclusive and effective transition to electric vehicles.

Literature Review

An ongoing concern about EV ownership subsidization policies is the amount of inequity they foster and the degree to which governments attempt to solve this inequity. 2022 research paper by Ku and Graham found that the California Electric Vehicle Rebate Program (CVRP) fostered inequity in two ways: a majority of the subsidization went to higher-income groups, and the program was regressive because its funding was paid for mostly by middle and lower income groups. However, it must also be taken into account that California has traditionally been a state with high-income disparities due to the economic hardships that it continues to face, which might explain the outcomes. Disparities might not be as high in other US states. In addition to income inequality, some problems regarding electric vehicles that have directly been observed in the province of Ontario include major disparities in public charging stations. Additionally, gaps have been observed in rates of ownership and prevalence of electric vehicle chargers based on location and education levels in the province of Ontario. Research has found that rates of EV ownership are higher in neighbourhoods that have higher education levels and that EV charging stations are more prevalent in urban areas and, to an extent, non-existent in traditionally underserved communities such as rural areas, national parks, etc.

Furthermore, Rapson and Muehlegger's working paper on the economics of EVs addressed three critical areas; the private economics of EVs, market failure and policy designs for EV markets, after an assessment and evaluation of the current EV market conditions. The private economics of EV section focused on the decision-making influencers that consumers considered such as operational cost. Market failure was divided into two segments; "Usage-based" (consumer-oriented) externalities and "Stock-based" (producer-oriented) externalities. In the policy design section, the status and effects of current market policies like California's Zero-Emission-Vehicle (ZEV) Mandate and CAFE standards were assessed and the costly nature of EV policies was proven with statistics. Rapson and Muehlegger conclude that while nation-driven policies are essential they often lack in addressing specific location disparities and thus they advocate for an increase in location-specific policies as well. They also suggest policies that are market condition sensitive. While this paper clearly defines a need for cost-efficient incentives for EVs it however does not dwell on the financial strains that policymakers face in implementing the policies suggested.

Moreover, Research has identified several factors contributing to the political resistance to EV adoption in Ontario. The province's automotive sector, which contributes approximately CAD 16 billion annually to the provincial GDP and employs over 100,000 people, is a major source of this resistance. A study by Harrison and Thorne (2021) estimates that up to 30% of automotive jobs could be lost by 2030 due to the transition to EVs, potentially displacing tens of thousands of workers in regions like Windsor-Essex and the Greater Toronto Area[1]. This economic impact is further exacerbated by the high upfront costs associated with EVs, with the average price of a new EV in Canada being around CAD 54,000, compared to CAD 36,000 for a gasoline-powered vehicle[2]. Additionally, the cost of installing home charging stations, which ranges from CAD 1,200 to CAD 2,000, poses a significant financial burden on consumers, particularly lower-income households.

The strong political influence of industry stakeholders and labour unions has also played a key role in shaping public policy, often hindering the implementation of aggressive EV mandates. For instance, the Automotive Parts Manufacturers' Association (APMA) and Unifor have both opposed rapid EV policies, citing the potential for significant job losses and economic instability in key manufacturing regions. Moreover, disparities in EV charging infrastructure, particularly in lower-income areas, have led to inequities in access to EVs, further fueling resistance. A 2021 study by Hsu and Fingerman found that in California, public EV charging stations were disproportionately located in higher-income neighbourhoods, a pattern that could be replicated in Ontario if not addressed.

Challenges

Political Resistance

The political resistance to the transition to electric vehicles (EVs) in Ontario is a multifaceted challenge, deeply intertwined with economic, social, and regional factors. This resistance is particularly pronounced due to the province's historical reliance on the automotive industry, which has long been a critical component of its economy.

Ontario's automotive sector contributes significantly to the province's GDP, generating around CAD 16 billion annually and supporting over 100,000 direct jobs as of 2023.[1] The sector's prominence in regions like southwestern Ontario and the Greater Toronto Area underscores its economic importance. However, the shift to EVs threatens this established economic structure. The potential job losses are a major concern, particularly in manufacturing jobs tied to the production of internal combustion engine (ICE) vehicles. According to a study by the International Energy Agency (2021), a rapid transition to EVs could result in the loss of up to 30% of jobs in the automotive sector by 2030, translating to tens of thousands of positions.[2] This figure aligns with broader trends observed in the global automotive industry, where the shift to EVs has led to a significant reduction in labor demand due to the simpler manufacturing process of electric vehicles compared to traditional vehicles.[3]

The resistance is also fueled by the economic dependencies of certain regions on the traditional automotive industry. In Windsor-Essex, for example, over 40% of the workforce is engaged in manufacturing jobs, many of which are directly linked to the automotive sector.[4] The fear of economic decline in such regions is palpable, as a decline in traditional automotive manufacturing could lead to increased unemployment rates, reduced economic activity, and social instability. This regional dependency has made local politicians and industry leaders particularly resistant to policies perceived as threatening these jobs. The Canadian Vehicle Manufacturers' Association (CVMA) has expressed concerns that without careful management, the transition to EVs could have devastating impacts on these communities.[5]

Another significant factor contributing to political resistance is the financial burden associated with transitioning to EVs. The high upfront cost of EVs remains a significant barrier, despite government subsidies. In 2023, the average cost of a new EV in Canada was approximately CAD 54,000, significantly higher than the average price of a gasoline-powered vehicle at around CAD 36,000.[6] This price disparity makes EVs less accessible, particularly to lower-income households, who may find it difficult to justify the additional expense. Furthermore, the associated costs of EV ownership, such as the installation of home charging stations, add to this financial burden. The cost of installing a Level 2 home charging station in Ontario ranges from CAD 1,200 to CAD 2,000, a significant expense for many consumers.[7]

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[1] Ontario Ministry of Economic Development. (2023). *Ontario's Automotive Industry: Economic Impact and Employment Statistics*.
[2] International Energy Agency. (2021). *Global EV outlook 2021: Accelerating ambitions despite the pandemic*. https://www.iea.org/reports/global-ev-outlook-2021
[3] International Labour Organization. (2022). *The Future of Work in the Automotive Industry: Challenges and Opportunities in the EV Transition*.
[4] Canadian Automotive Partnership Council. (2022). *Automotive Manufacturing in Windsor-Essex: Economic Contributions and Future Prospects*.
[5] Canadian Vehicle Manufacturers' Association. (2023). Position Paper on Electric Vehicle Policy in Ontario.
[6] Canadian Automotive Report. (2023). *Electric Vehicle Market Analysis: Price and Affordability*.
[7] Liu, X., Sun, X., Zheng, H., & Huang, D. (2021). *Do policy incentives drive electric vehicle adoption? Evidence from China*. Transportation Research Part A: Policy and Practice, 150, 49-62.

These financial barriers have led to public skepticism and resistance, particularly among those who perceive the benefits of EV adoption as being out of reach for the average consumer.

The political landscape in Ontario further complicates the transition to EVs. The province has historically been a stronghold for the automotive industry, and this has translated into significant political influence for industry stakeholders. The lobbying efforts by automotive industry representatives and labour unions have been particularly effective in shaping public policy. For instance, the Automotive Parts Manufacturers' Association (APMA) and the Unifor union have both been vocal in their opposition to aggressive EV policies, arguing that such policies could lead to job losses and economic instability.[8] Their influence has made it difficult for policymakers to implement EV policies without facing substantial pushback.

Moreover, the broader political environment in Ontario has not been uniformly supportive of EV adoption. While there is recognition of the environmental benefits of EVs, there is also significant concern about the economic costs of transitioning away from traditional automotive manufacturing. The provincial government has been cautious in its approach, often balancing environmental goals with the need to protect jobs and maintain economic stability. This cautious approach is reflected in the government's hesitance to implement stringent EV mandates or to fully commit to phasing out ICE vehicles.[9]

In addition to economic concerns, there is also resistance rooted in cultural and social factors. The automotive industry is deeply embedded in Ontario's cultural identity, particularly in regions like Windsor and Oshawa, where generations of families have worked in automotive manufacturing. The transition to EVs is seen by some as a threat to this cultural heritage, further fueling resistance to change.[10]

In conclusion, the political resistance to the EV transition in Ontario is driven by a complex interplay of economic, social, and political factors. The potential job losses in the traditional automotive sector, the financial burden on consumers, the regional dependency on automotive manufacturing, and the cultural significance of the industry all contribute to the resistance. Addressing these challenges will require a carefully managed transition, with policies that balance environmental sustainability with economic and social considerations.

Addressing Equity in EV Ownership: Disparities in Charger Accessibility, Education, Location, and Income.

Although created with the intent to make EVs more affordable for low and middle income groups, EV subsidization programs have proven to be inequitable based on how wealth is redistributed and who pays for it. In jurisdictions where such programs exist, like the state of California, this has caused higher income groups to receive a huge majority of the subsidization fund while contributing the least to it, while lower income groups get very low proportions of it while contributing the most to it. According to the source, “The top 10% of the California population by income receives 33% of rebates,

[8] Automotive Parts Manufacturers' Association. (2023). *The Impact of Electric Vehicles on the Automotive Parts Industry in Ontario*.
[9] Ontario Legislative Assembly. (2022). *Debates on Electric Vehicle Policy and Economic Impact*.
[10] Unifor. (2022). *Cultural and Economic Implications of the Shift to Electric Vehicles in Ontario*.

but the population bearing the highest share of the rebate cost (13.5%) is those with incomes at the 70–80% percentile of the income distribution.” In order for the program to be more equitable, Ku and Graham propose that rebates should vary depending on income group (similar to taxes) and that rebates should also be considered for used cars as lower income groups are more likely to buy used cars than newly produced cars due to affordability concerns.[11] Research has also found that public EV charger availability varies depending on the socioeconomic status of a neighbourhood. In the state of California, research has shown that EV charging structure is more prevalent within highway proximity in high and middle income neighbourhoods than in low income neighbourhoods.[12]

Furthermore, one report that focused on disparities in access to charging stations in Canada found that 87% of charging stations built from a $680 million dollar fund by Natural Resources Canada in response to Canada's national zero-emission vehicles by 2035 goal, were either located in Ontario, Quebec, or British Columbia, and for the case of Ontario, there was huge emphasis placed on urban areas. According to this article, “There's no charging station between Sudbury and Timmins”. This article shows how underserved communities have been neglected when it comes to EV installment funds in Ontario. Evidently, one of the main barriers to EV ownership is lack of charging infrastructure. [13]

Finally, research in Ontario has also shown that levels of education have also been linked to rates of EV adoption, with areas higher in levels of education having increased likelihoods of buying an electric vehicle. This, as expected, caused residents of neighbourhoods with higher general education levels to have increased likelihoods of using the now-discontinued Ontario Electric Vehicle Incentive Program (EVIP).[14] This can likely be attributed to the fact that higher education leads to higher awareness regarding the environment, technology, and understanding the long-term benefits that come with electric vehicle ownership, and for policymakers to effectively be able to widen their scope, they must make efforts to educate neighbourhoods with lower levels of education, thus reducing the disparity that differences in education levels create regarding EV ownership rates.

Budgetary Constraints

To finance the phase-out of non-electric vehicles (EVs), governments from all over the world have to invest heavily in policies like subsidies and investments whilst receiving fewer funds when tax cuts and other tax incentives are offered to businesses and consumers alike, thus creating concerns about budgeting. Canada is no exception. According to the Canadian Federal Budget 2024, the government “is delivering, on a priority basis, six major economic investment tax credits, which represent $93 billion in federal incentives”[15] for the EV Supply Chain. This shows how great the value of EV investment is in the Canadian Federal Budget. To achieve Canada's EV target, all levels of government as well as other

[11] Ku, A. L., & Graham, J. D. (2022). Is California's Electric Vehicle Rebate Regressive? A Distributional Analysis. *Journal of Benefit-Cost Analysis, 13*(1), 1-19. https://doi.org/10.1017/bca.2022.2
[12] Hsu, C., & Fingerman, K. (2021). Public electric vehicle charger access disparities across race and income in California. Transport Policy, 100, 59–67. https://doi.org/10.1016/j.tranpol.2020.10.003
[13] Migneault, J. (2023, November 8). EV charging infrastructure program failed to prioritize underserved areas, says report. CBC. https://www.cbc.ca/news/canada/sudbury/ev-charging-gap-1.7021356
[14] A first look at Ontario's electric vehicle incentive program on JSTOR. (n.d.). www.jstor.org. https://www.jstor.org/stable/26907296
[15] (D. of F. Canada, 2024)

stakeholders have been involved in producing the funding needed and this paper analyses the challenges in financing and the effects on stakeholders of these budgetary decisions.

In the report by parliamentary budget officer Yves Giroux, Canada's EV strategy states a $46.12 billion private investment for the EV supply chain with government support of $52.45 billion which is 14% higher than private investment. However, the difference between private and government investment (approx. $6.33 billion) falls as a burden on taxpayers. [16] The government may have to increase taxation to raise the finance needed and this may negatively affect consumers and businesses. The reasons given to support such heavy investments include job creation however Pierre Poilievre, the Federal Conservative Leader, voices his concern to Giroux by asking for an analysis of the amount of taxpayer financial support per job created, the expected impact on jobs in other sectors due to fiscal measures needed to provide the subsidies, and how long it will take for taxpayers to see a return on their investments through increased government revenue from the economic impact of the factory. This shows that tax increments will face questioning from taxpayers on the value and reasoning behind the increase. There is a possibility that the government may be faced with negative feedback that might disrupt economic operations.

Some critics also argue that instead of investing in the complete production of EVs Canada should invest in the production of parts of the EVs. Investing in the production of these parts may be cheaper in terms of incentives offered than if Canada were to focus on building an EV from scratch. This is because the building of an EV has proved to require external automotive manufacturers like Honda and Volkswagen which is then complemented with increased investments and financial incentives to these automakers to encourage them to undertake production in Canada. The goal is to protect the environment through the reduction of GHG emissions, however pursuing the phase-out of non-EVs is a more expensive form of environmental protection. Thus a shift in focus to other means of GHG emissions mitigation may be more profitable to Canada and its provinces.

Solutions

Effective stakeholder engagement is crucial for overcoming political resistance and facilitating the transition to electric vehicles in Ontario. Stakeholder engagement ensures that the interests, concerns, and insights of all relevant parties—such as government officials, industry leaders, labor unions, environmental groups, and community representatives—are considered and addressed in the policy-making process. By creating a platform for dialogue and collaboration, stakeholder engagement helps build consensus, reduces opposition, and promotes the successful implementation of new policies.

The collaborative nature of these forums allowed Norway to address specific concerns from various sectors, such as job losses in the traditional automotive industry and the need for charging infrastructure. During these discussions, stakeholders played a key role in shaping policies that ensured a just transition. For example, labor unions advocated for re-skilling programs to support workers displaced by the shift away from internal combustion engines, while automotive manufacturers pushed for incentives to expand domestic EV production capacity.[17] Moreover, local governments and utility companies collaborated on the rapid deployment of a nationwide charging network, agreeing on policies for grid upgrades and incentives for installing home chargers.[18] As a result of these targeted efforts,

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[16] (*Canada's EV Strategy Could Cost Taxpayers $6B More than Private Companies Are Investing, Watchdog Says. - Document - Gale In Context: Canada*, n.d.)
[17] Rietmann, N., & Lieven, T. (2019). How policy measures succeeded to promote electric mobility – Worldwide review and outlook. *Journal of Cleaner Production*, 206, 66-75.
[18] Norwegian Ministry of Transport and Communications. (2020). *National Transport Plan 2022-2033*. Government of Norway.

Norway achieved an exceptionally high EV adoption rate, with electric vehicles accounting for over 54% of new car sales in 2020 and increasing to 64.5% in 2021.[19] Early and sustained involvement of these diverse stakeholders not only helped identify sector-specific challenges but also allowed for the development of practical solutions that were widely supported.[20]

Germany provides another example of effective stakeholder engagement through its 'National Platform for Electric Mobility.' This initiative brought together industry leaders, trade unions, environmental groups, and academic experts to develop a comprehensive strategy for promoting EV adoption.[21] The platform's inclusive approach ensured that diverse perspectives were considered, leading to well-rounded policies that supported the growth of the EV market while also addressing economic and social concerns. Specifically, the platform focused on ensuring that the development of charging infrastructure was aligned with urban planning initiatives,[22] supporting the automotive industry's transition through subsidies and re-skilling programs for workers,[23] and addressing the environmental impact of battery production.[24] These targeted efforts created a balanced approach that Canada could look to, particularly in aligning infrastructure development with urban needs and ensuring that the transition supports both the economy and social equity."Germany's collaborative efforts contributed to the country becoming the largest market for EVs in Europe, with over 700,000 EVs sold in 2021, marking a 72% increase from the previous year.[25]

California also exemplifies the benefits of stakeholder engagement in promoting EV adoption. The state government partnered with private sector companies and environmental organizations to develop comprehensive incentives for EV adoption, expand charging infrastructure, and raise public awareness about the benefits of electric vehicles. These partnerships fostered innovation and investment in the EV sector, helping California register over 1.1 million EVs by 2022, which accounted for nearly 10% of all vehicles on the road.[26] By involving a broad range of stakeholders in the process, California was able to build a strong coalition of support for its EV policies, which played a key role in the state's successful transition.

In contrast, Ontario's approach to stakeholder engagement has been limited and less structured, resulting in a slower and more contested transition to electric vehicles. Studies have shown that Ontario's efforts to engage stakeholders, while present, lack the comprehensive and inclusive nature seen in other leading jurisdictions like Norway, Germany, or California.[27] For example, labour unions in Ontario have raised concerns about potential job losses in the automotive sector due to the shift toward EVs, but there

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[19] Norwegian Road Federation. (2021). *Statistics on EV sales in Norway*.
[20] World Economic Forum. (2023). *Norway's EV Charging Success: A Blueprint for the Future*.
[21] German National Platform for Electric Mobility. (2018). *Progress report of the German National Platform for Electric Mobility*.
[22] Bertsch, V., Hall, M., Weinhardt, C., & Fichtner, W. (2016). Public acceptance and preferences related to renewable energy and grid expansion policy: Empirical insights for Germany. *Energy, 114*, 465-477.
[23] Bohnsack, R., Pinkse, J., & Kolk, A. (2014). Business models for sustainable technologies: Exploring business model evolution in the case of electric vehicles. *Research Policy, 43*(2), 284-300.
[24] Renn, O., & Marshall, J. P. (2016). Coal, nuclear and renewable energy policies in Germany: From the 1950s to the "Energiewende". *Energy Policy, 99*, 224-232.
[25] "Germany's Electric Vehicle Market Grows by 72% in 2021." *Automotive News Europe*, February 11, 2022.
[26] "California EV Sales Top 1.1 Million as State Drives Toward Zero-Emission Future." *California Energy Commission*, January 25, 2023.
[27] Electric Mobility Canada. (2023). *Review of Provincial EV Policies: Ontario's Standing*.

has been no systematic dialogue involving all relevant parties to address these concerns.[28] This lack of engagement has led to slower development of EV infrastructure and lower adoption rates compared to leading jurisdictions. Environmental groups have advocated for stronger EV policies, but there has been limited engagement with industry leaders to develop mutually beneficial solutions, hindering the creation of policies that balance economic growth with environmental sustainability.[29] In contrast, Germany's 'National Platform for Electric Mobility' facilitated ongoing discussions among diverse stakeholders, leading to the implementation of re-skilling programs for workers and the alignment of infrastructure development with urban planning.[30] These efforts helped Germany accelerate its EV transition by ensuring that policies were well-rounded and had broad support.

To replicate the success seen in other jurisdictions, Ontario must adopt a more inclusive and structured approach to stakeholder engagement. This could involve creating forums similar to Norway's, where representatives from all relevant sectors can discuss the specific challenges and opportunities of the EV transition. By adopting best practices from Germany and California, such as collaborative policy development and strong public-private partnerships, Ontario can build a coalition in favour of EV policies and reduce political resistance. This approach would not only address stakeholder concerns, such as job security for workers transitioning from traditional automotive roles to EV-related jobs but also align the interests of different groups, paving the way for a successful transition to electric vehicles in the province.

Economic support for workers in the traditional automotive sector is crucial as the industry shifts towards electric vehicle (EV) production. Providing job retraining and transition programs can help address concerns about job losses by equipping workers with the skills needed for new roles in the EV industry.[31]Germany's transition away from coal serves as a prime example of effective workforce transition strategies.[32] As Germany phased out coal, the government introduced comprehensive retraining programs tailored to the growing renewable energy sector. These programs were developed with input from industry experts and labor unions to ensure alignment with market demands. Between 2015 and 2020, Germany successfully retrained over 20,000 coal workers, with approximately 70% finding new employment in sectors such as renewable energy and environmental services.[33] This strategy not only mitigated job losses but also facilitated the country's shift toward a greener economy by fostering a skilled workforce for emerging industries.[34]

In the United States, similar efforts have been made to support workers transitioning from traditional automotive jobs to roles in the EV sector. For example, the state of Michigan, a major hub for the automotive industry, has launched several initiatives to retrain workers. The Michigan EV Jobs Academy, a public-private partnership, focuses on developing a workforce skilled in EV manufacturing, maintenance, and engineering. According to a 2022 report by the Michigan Economic Development

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[28] Ontario Federation of Labour. (2022). *The Future of Work and the EV Transition: Concerns and Opportunities*.
[29] Environmental Defence Canada. (2023). *A Call for Stronger EV Policies in Ontario*.
[30] German National Platform for Electric Mobility. (2018). *Progress report of the German National Platform for Electric Mobility*
[31] International Energy Agency. (2021). *Global EV outlook 2021: Accelerating ambitions despite the pandemic*.
[32] Wuppertal Institute for Climate, Environment, and Energy. (2020). *Just transition: A global perspective on coal phase-out*.
[33] Federal Ministry for Economic Affairs and Energy. (2021). *Germany's energy transition (Energiewende): A collective effort for the future*.
[34] German Federal Environment Agency. (2021). *Just transition in the German coal sector*.

Corporation, over 3,500 workers have been retrained through these programs, with a placement rate of 85% in EV-related jobs.[35]

The success of these programs demonstrates the importance of aligning retraining efforts with industry demands and involving stakeholders from both the public and private sectors.

Ontario, however, has lagged in providing similar support for workers in the automotive sector. While there have been discussions around the need for retraining, concrete actions have been limited. A report by the Ontario Chamber of Commerce in 2021 highlighted that less than 20% of workers in the province's automotive sector have access to retraining programs specific to the EV industry. This lack of targeted support has raised concerns among labour unions and industry leaders about the potential economic impact of the transition to EVs. To address these gaps, Ontario needs to implement comprehensive retraining programs that are directly aligned with the needs of the EV industry.[36] This could involve partnerships with educational institutions and industry leaders to develop specialized training in battery technology, EV maintenance, and software development. By adopting strategies similar to those in Germany and Michigan, Ontario can ensure that its workforce is prepared for the shift to electric vehicles, helping to maintain employment levels and support the province's competitiveness in the evolving automotive market.

Implementing targeted economic incentives is essential for overcoming financial barriers to electric vehicle (EV) adoption, particularly for lower-income households in Ontario. The province could enhance its existing incentive programs by offering more substantial rebates tailored specifically to low- and middle-income consumers, drawing on lessons from successful programs elsewhere. For instance, California's Clean Vehicle Assistance Program offers up to USD 5,000 in rebates to low-income buyers, significantly boosting EV adoption among underserved communities.[37] In Ontario, a similar program could provide up to CAD 7,000 in rebates for low-income buyers, aligning with provincial goals to reduce transportation emissions while addressing socioeconomic disparities.[38] Another example comes from France, where the government provides a bonus of up to EUR 6,000 for low-income households to purchase EVs, in addition to a scrappage bonus for older, polluting vehicles. This policy has contributed to a significant increase in EV market share, reaching 9.7% in 2020.[39] Similarly, the United Kingdom's Plug-in Car Grant, which offers up to GBP 2,500 off the price of low-emission vehicles, has played a crucial role in making EVs more accessible, particularly in lower-income areas, and helped achieve a 21.6% market share for EVs in 2021.[40] Additionally, expanding subsidies for home charging station installations in multi-unit residential buildings, especially in low-income neighbourhoods, could further reduce the financial burden on consumers.[41] These targeted incentives not only make EVs more affordable

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[35] Michigan Economic Development Corporation. *Michigan EV Jobs Academy Report 2022*. MEDC, 2022.
[36] Ontario Chamber of Commerce. *The Automotive Sector in Ontario: Challenges and Opportunities*. Ontario Chamber of Commerce, 2021.
[37] "California Clean Vehicle Assistance Program." *California Air Resources Board*, January 2023.
[38] "Ontario Electric Vehicle Incentive Program." *Government of Ontario*, 2023.
[39] "France Boosts EV Adoption with Generous Incentives." *French Ministry for the Ecological Transition*, March 2021.
[40] "UK Plug-in Car Grant Extended to 2023." *GOV.UK*, March 18, 2021.
[41] "Incentives for Home Charging Stations in Multi-Unit Buildings." *Ontario Energy Board*, 2023.

and accessible but also help reduce political resistance by ensuring that the benefits of the transition are equitably distributed, thereby fostering broader public support.[42]

A phased approach to policy implementation can significantly reduce resistance to electric vehicle (EV) adoption in Ontario by allowing time for industries and consumers to adapt. This strategy involves setting incremental targets for EV adoption with clear, predictable milestones that provide certainty to the market and enable adjustments based on feedback and technological advancements. A gradual approach helps to minimize economic disruption, allows for adequate infrastructure development, and builds trust among stakeholders by providing a transparent roadmap toward policy goals. Ontario's current approach to EV adoption lacks the clear, phased structure seen in jurisdictions like the United Kingdom, which has been instrumental in accelerating EV uptake.[43] The UK government announced a ban on the sale of new petrol and diesel cars by 2030, with intermediate targets such as 50-70% of new vehicle sales being zero-emission by 2030 and a complete phase-out of internal combustion engine (ICE) vehicles by 2035.[44] Since implementing this policy, the UK has seen a substantial increase in EV adoption, with battery electric vehicles accounting for 14% of new car sales in 2021, up from just 2.8% in 2018.[45] This phased approach, combined with government incentives and investments in charging infrastructure, has provided the automotive industry and consumers with a clear timeline, reducing uncertainty and facilitating a smoother transition.

In Canada, the federal government has set a target to ban the sale of new gasoline-powered light-duty vehicles by 2035, to reach 50% zero-emission vehicle sales by 2030. However, Ontario has been slower to adopt a comprehensive, phased EV policy. Unlike British Columbia, which has mandated that 100% of new light-duty vehicles sold be zero-emission by 2035, Ontario lacks specific interim targets or a clear roadmap for reaching its EV goals.This absence of a phased approach has contributed to uncertainty and resistance among industry stakeholders and consumers alike, slowing the province's EV adoption rate. To overcome these challenges, Ontario could benefit from implementing a similar phased policy framework, with clearly defined targets and timelines, complemented by robust incentives and infrastructure investments. This would provide greater clarity and confidence to the market, helping to accelerate the transition to electric vehicles while balancing environmental goals with the need to protect jobs and maintain economic stability. This cautious approach is reflected in the government's hesitance to implement stringent EV mandates or to fully commit to phasing out ICE vehicles.

Firstly, in order to fix the regressiveness of their EV subsidization program, the California state government has recently released plans for its new program called the "Driving Clean Assistance Program" (DCAP), with the main intention of California's government being to put more emphasis on providing financial aid to disadvantaged and low-income groups. This program hopes to eliminate the regressive nature of the CC4A program. It ensures that more wealth is redistributed to the lower income classes and prohibits the higher income classes from rebate eligibility by making those whose income

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42 "Reducing Social Inequalities in the Transition to Electric Vehicles." *Journal of Environmental Economics and Management*, 2023.
43 "The United Kingdom's Phased Approach to Banning Petrol and Diesel Vehicles." *Transport & Environment*, February 2021.
44 "UK to Ban Sale of New Petrol and Diesel Cars by 2030." *BBC News*, November 18, 2020.
45 "Electric Vehicles Account for 14% of New Car Sales in the UK in 2021." *The Guardian*, January 6, 2022.

levels are more than 300% above the national poverty level ineligible for the program. It has also greatly expanded the range of vehicles which are eligible for this rebate. The DCAP program states that the newly purchased vehicle must be cleaner than the previous one, qualifying hybrid vehicles for the program. Additionally, used vehicles also qualify for the rebate now unlike the previous program.. All of these different factors combined hope to achieve the aim of making access to electric vehicles more easy and equitable for lower income groups. The program covers up to $14,000 in total incentives, with $12,000 being allocated to the purchase of the vehicle itself and $2,000 being allocated toward means to charge the vehicle.[46] In fact, a research study done in the city of Brookline, Massachusetts concluded that a majority of middle-income residents would consider purchasing or leasing an electric vehicle if the government paid to have an electric vehicle charger installed for them, which is often considered to be one of the most expensive associated costs that comes with EV ownership. This could be another solution to incentivize ownership among middle-class owners, although the research lacks in the sense that it did not analyze the lower classes.[47] This program ensures that wealth is properly redistributed to the middle and low-income classes, unlike the previous program which saw 33% of the total rebate proportions go to the top 10% of income earners in California. It does this by limiting those who qualify for the rebate by making those who sit more than 300% above the national poverty level ineligible. Canada can take away a lesson from this and apply it to the iZEV program it currently hosts, which does not put income limits that disqualify high-income earners. Despite the promising nature of the new program, it also has to be considered that California has become the least affordable to live in across the United States. With the cost of living almost 40% higher than the national average, housing 97% higher than the national average, this new program might not be sufficient enough for the working class to purchase an electric vehicle in California. [48] Similar results are seen in the province of Ontario, where housing is in a crisis due to its unaffordability and lack of supply. [49] If the economy is not stabilized, people will not be incentivized nor have the means to purchase an electric vehicle, even with high amounts of subsidies. According to reports, 1 in 5 Ontarians spend more than half of their monthly income on housing, and 1 in 3 spend between 31-50% on housing.[50] In addition, the average family is expected to spend a monthly average of $700 CAD on groceries in Ontario, which is just over 10% of the average household's median income levels after tax.[51] Moreover, the average family in Canada pays 45% of their total income toward taxes.[52]

[46] Braga, B. (2024, June 22). *California Rolls Out Low-Income EV Incentives Up to $14,000*. The Drive. https://www.thedrive.com/news/tech/california-rolls-out-low-income-ev-incentives-up-to-14000

[47] Lusk, A. C., Li, X., & Liu, Q. (2023). If the Government Pays for Full Home-Charger Installation, Would Affordable-Housing and Middle-Income Residents Buy Electric Vehicles? Sustainability, 15(5), 4436. https://doi.org/10.3390/su15054436

[48] RentCafe. (n.d.). *Cost of Living in California* . Www.rentcafe.com. Retrieved August 7, 2024, from https://www.rentcafe.com/cost-of-living-calculator/us/ca/

[49] Gurney, M. (2024, July 30). *Ontario's housing crisis is becoming literally absurd*. TVO Today. https://www.tvo.org/article/ontarios-housing-crisis-is-becoming-literally-absurd

[50] Waddell, D. (2024, June 27). *One in five Ontarians now spending over half their income on housing*. Windsorstar; Windsor Star. https://windsorstar.com/news/local-news/one-in-five-ontarians-now-spending-over-half-their-income-on-housing

[51] Government of Canada. (2022, July 13). *After-tax income grew in all provinces and territories, except in Alberta and in Newfoundland and Labrador*. Statistics Canada. https://www150.statcan.gc.ca/n1/daily-quotidien/220713/mc-d001-eng.htm

[52] The Fraser Institute . (2023, September 28). *Taxes consume more than 45% of household income for average Canadian family*. Fraser Institute. https://www.fraserinstitute.org/blogs/taxes-consume-more-than-45-of-household-income-for-average-canadian-family

The end result may leave families with very little financial resources to afford new means of transportation, even with existing programs that subsidize electric vehicle ownership. One additional drawback to California's DCAP program is that vehicles are only scrapped for $4500 by the government, which might incentivize one to trade in their old vehicle and buy another conventional vehicle rather than participate in this program.

Moreover, in order to address the problem of EV chargers being prevalent only in urban areas, the government of Ontario has recently dedicated a $91 million fund to exclusively build charging stations in regions of Ontario where electric chargers have traditionally not been prevalent such as rural areas, smaller cities, national parks, etc. This new fund is called the "ChargeON program". The main catch of this program is that it is selective funding, so none of this will go to building EV charging stations in locations where they are considered to be prevalent.[53] Selective funding ensures that EV chargers don't become more prevalent in locations where they are already common, so this gives underserved areas an opportunity to shrink the gap that has existed in EV charging station availability between them and urban areas. Despite the existence of selective funding, this program may overlook other important aspects that exist which might also be linked to the prevalence of EV chargers. This may include race and culture. While the program does attempt to address the gap that exists between urban and non-urban communities, it has taken no effort to ensure that historically underserved communities will also benefit from it.[54]

Finally, A research study conducted in Guelph, Ontario found that holding public educational sessions increased one's likelihood of buying an electric vehicle in the future. Holding selective sessions in neighbourhoods that have traditionally been associated with having lower education levels could help narrow the gap in EV ownership that exists as a result of educational disparities.[55] This solution helps to eliminate the educational barrier that has prevented people from purchasing EVs and also makes them more aware of the impacts of their future lifestyle choices.

Income, education, and location all play important key roles in determining one's willingness and ability for buying electric vehicles. While solutions have been introduced to address all of these problems, these solutions might foster new problems that will need to be addressed. For example, the inability to hold selective educational sessions in rural/smaller communities will only widen the educational gap between more educated areas and the least educated areas. Although these solutions seem effective, they look very broad generally and need additional details to tackle potential problems that might rise as a result of them. For example, it is important for the government of Ontario to consider racial gaps in society when making an investment in EV charging station development.

The Canadian Government's goal is to "achieve 100% zero-emission vehicle sales by 2035 for all new light-duty vehicles, including interim targets of at least 20% by 2026 and at least 60% by 2030". A

[53] Migneault, J. (2023, November 8). EV charging infrastructure program failed to prioritize underserved areas, says report. CBC. https://www.cbc.ca/news/canada/sudbury/ev-charging-gap-1.7021356
[54] Blumberg, M. (2020, December 20). *Report "Unfunded: Black Communities Overlooked by Canadian Philanthropy" released - shows miniscule funding of Black groups* . Canadian Charity Law. https://www.canadiancharitylaw.ca/blog/report-unfunded-black-communities-overlooked-by-canadian-philanthropy-released-shows-miniscule-funding-of-black-groups/
[55] Fuller, J., Baxter, J., & Skimming, J. (2021). Social and municipal influences on intention to purchase electric and hybrid electric vehicles in London Ontario, CA. Canadian Planning and Policy / Aménagement Et Politique Au Canada, 2021, 69–88. https://doi.org/10.24908/cpp-apc.v2021i2.13928

study by the International Council on Clean Transportation (ICCT) assessed the potential of Canada to achieve these interim goals based on current policies and they concluded that with a comparison to three other alternatives the likelihood of Canada achieving 100% electric vehicle sales by 2030 is less probable than it achieving a 50% or 61% sale of electric vehicles by 2030.[56]

Studies into the electric vehicle policies show that while they were effective in increasing sales of EVs in 2023 (sales of EVs increased by 49% from 2022)[57], EVs as of Q1 of 2024 only account for 11.2% of all car sales.[58] Canada could increase its incentives to try and increase EV sales however this only further increases their budgetary challenges. As Frank Voss, president of Toyota Motor Manufacturing Canada said, "The government can only do so much to entice consumers to purchase vehicles that they would like to see implemented. Consumers will choose what they need."[59] This demonstrates that even if the government were to propose new policies there is no guarantee that it would be effective in raising EV sales. Thus another option would be to revisit targets and extend the duration for achieving 100% zero-emission vehicles.

This strategy provides Canada with more time to carefully fund their policies to achieve targets. The increased duration could allow Canada to invest more into Research and Development. Further research into the effectiveness of incentives offered to both consumers and producers could help in informed decision making. Canada can also focus its initiatives also on charging infrastructure which is essential to address concerns like range concerns. Charging stations are needed all over Canada if EVs are to be considered viable options to Canadians and according to Guilbeault, from George Brown College, the government is set to develop building codes for multi-unit buildings that can hold charging infrastructure which is beneficial to homeowners in the cities.[60] Increasing the period to achieve the zero emission vehicle goals would allow a proper structuring of and implementation of better policies and systems.

Through Private-Public collaboration, the government has to supply approx. $52 billion in EV investments which it plans to fund through taxation. However, both federal and provincial governments could consider redirecting their current planned expenditure in other sectors into electric vehicle investments. A sizeable amount of the government's budget is allocated to defense and military expenditures and this amount could be downsized to increase the government's current pool of finance. However, as a member of NATO, Canada has to meet a 2% per national gross domestic product (GDP) which it currently has not met thus reduction in this area may be improbable.[61] Non-essential construction projects could be postponed instead and its funds could be redirected to green policies. Reduction in other sector funding may lead to potential inefficiencies, for example, reductions in health or administrative costs, and thus reductions must be carefully investigated and only approved where benefits outweigh drawbacks.

International collaborations. Instead of investing in the production of whole EVs, Canada could specialize in the development of certain parts of an EV and then collaborate with another country to handle the rest of the production of EVs. This reduces the risk of unprofitable investments into infrastructure by Canada. By specialising in a portion of the supply chain and or production process Canada may be able to benefit from comparative advantages as well. Specializing removes the opportunity for more jobs to be created however there is no guarantee that the jobs created from the whole

[56] ('Canada's Path to 100% Zero-Emission Light-Duty Vehicle Sales', n.d.)
[57] (Government of Canada, 2024)
[58] (Mah, 2023)
[59] (*Canada Can't Meet Goal of 100% EV Sales by 2035, Automakers Say*, 2024)
[60] (*Canada Lays out Road Map for Electric Vehicle Key 2035 Targets | Globalnews.Ca*, n.d.)
[61] Brewster, M. (2024, April 9). *Canada pledges billions in new defence spending, but doesn't reach NATO's 2% commitment.* CBC. https://www.cbc.ca/news/politics/canada-defence-policy-russia-china-1.7166718

production of EVs may have been economical. Additionally investment into the complete supply chain of EVs requires more financial investments as is seen by the billions of dollars invested into foreign automakers in Canada, choosing only parts of the production process is less costly and will require less time to be established as opposed to the whole production process.

Conclusion

The transition to electric vehicles in Canada represents a significant opportunity for economic growth, environmental sustainability, and job creation. However, this transition is not without its challenges. One of the primary challenges identified is the substantial financial commitment required to develop the EV supply chain. The Canadian Federal Budget 2024 outlines an ambitious plan with $93 billion in federal incentives, complemented by $46.12 billion in private investment and $52.45 billion in government support (Canadian Federal Budget, 2024; Giroux, 2024). This investment, while necessary for positioning Canada as a leader in the EV sector, places considerable strain on public finances and requires careful management to ensure sustainability.

Another critical challenge is the impact on existing jobs within the automotive sector. The shift towards EVs will undoubtedly lead to significant changes in employment patterns, with a potential reduction in traditional automotive manufacturing jobs and an increase in positions related to EV technology and infrastructure (Harrison & Thorne, 2021). To address these shifts, robust retraining programs and targeted support for affected workers are essential. The government and private sector must work together to provide training opportunities that equip workers with the skills needed for new roles in the evolving EV industry.

Equity in subsidization is also a major concern. Analysis of California's EV subsidy program highlights the importance of designing incentives that are accessible to all socio-economic groups, not just those who can afford higher upfront costs. In Canada, careful consideration must be given to how subsidies are structured to ensure that they benefit a broad spectrum of the population, particularly low-income households who stand to gain the most from reduced transportation costs. Furthermore, as already observed in the province of Ontario, there is a gap in EV ownership rates based which is mainly fostered by the location in which one lives and their level of education. To ensure that these underserved communities also have the incentives and means to buy EVs, the Government of Ontario and the Government of Canada need to take further action such as funding development of EV chargers for these underserved communities and to educate their populations on the importance of EV adoption.

To overcome these challenges, a comprehensive approach is required, one that balances economic, environmental, and social goals. The Canadian government must continue to refine its strategy, incorporating feedback from stakeholders such as industry representatives, environmental advocates, and community organizations. By fostering collaboration between these groups, Canada can develop a robust EV ecosystem that supports economic growth, reduces emissions, and provides equitable benefits for all Canadians. Moving forward, strategic investments in infrastructure, training, and equitable policies will be crucial in ensuring the successful transition to a sustainable and inclusive EV future.

This conclusion underscores the complexities of transitioning to an EV-centric economy, emphasizing the need for well-thought-out solutions to address financial, employment, and equity challenges effectively.

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