**To:** The Honorable Governor Carey Nupf, Governor

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**Subj:** Recommendations for reducing the automobile gasoline use in the state

**Abstract**

High automobile dependency, and prevalence of gasoline-based vehicles can be considered as primary factors leading to high gasoline usage in the state. Associated carbon emission and air pollution has residents of the state concerned. The memorandum outlines a causal model for the high automobile gasoline use in the state. It then considers three government programs that address different aspects of the issue.

State residents are concerned about global warming and air pollution. Since automobiles are source of more than 20% carbon emissions in the state, and have also been major contributor to smog in urban centers of the state, the policy memo considers policy alternatives to reduce automobile gasoline usage in the state.1

Problem Definition

The problem can be defined and measured as state’s high gasoline use in automobiles. The causal pathway outlined in Figure 1 below considers factors contributing to high gasoline use in the state. High automobile dependence, and prevalence of gasoline-based vehicles can be considered as proximate causes (boxes in bold in Figure 1) fueling the high automobile gasoline use in the state.

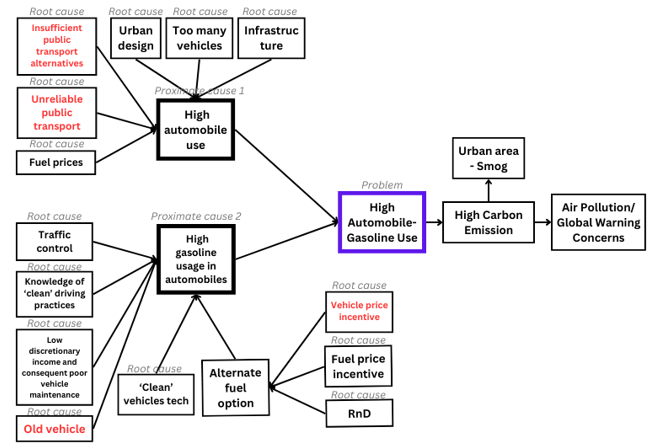


Figure 1 – Causal model for high automobile gasoline use - Proximate causes (boxes in bold) and Root causes (end nodes). Boxes in red are those through which the memorandum considers addressing the issue in the following sections.

Factors like insufficient public transport alternatives, lack of reliable public transit options, low fuel prices and automobile prices that don’t reflect the true social cost of using it and make owning multiple private vehicles affordable, and infrastructure and city design can be considered as root causes leading to high automobile use. Sufficient and reliable public transit options are necessary to switch consumption pattern away from private vehicles. Fuel and automobile prices are other related factors that can be used to incentivize public transit use. City and infrastructure design create and define commute needs. For example, if city design is such that homes are far away from school, hospitals, grocery outlets, and if public transit is unreliable or insufficiently available through the day, individuals would be incentivized to use private vehicles. Alternatively, even if public transit is a viable albeit not the most convenient option, fuel prices and car prices can make private transit just as cheap when matched with the actual, and time cost of waiting for public transit, and residents would be incentivized to choose private commute over public transit.

Prevalence of gasoline-based automobiles can be considered as the second proximate cause leading to high automobile gasoline consumption in the state. ‘Smarter’ traffic control design - optimized routes, intelligent transportation systems like smarter traffic light control and navigation systems, and awareness of ‘cleaner’ driving practices - maintaining steady speeds, smooth acceleration and breaking, avoiding idling, can optimize fuel consumption.3 Old and poorly maintained vehicles also contribute to inefficient fuel consumption, and lower discretionary incomes together with lack of knowledge about these considerations could be affecting purchase decisions.

Manufacturers can also contribute towards reduced consumption by designing ‘cleaner’ models. Affordable alternate fuel options can also help shift demand away from gasoline consumption. Both fuel price, and vehicle price are key determining factors that drive this shift, and research and development in this space can accelerate the shift to cleaner fuel and cleaner vehicles.

While the causal model holds for both rural and urban areas, transit need and demand in rural areas differs in scale and pattern from that of urban areas2. This memo will particularly consider policy programs to address the issue in urban centers.

Policy alternatives

1. Strengthening the public transit system

The urban area transportation can be revitalized by strengthening the public transit system.

For individuals in urban areas to shift away from using personal cars, public transit would have to be frequent, reliable, and have wide coverage. Under this program the public transit fleet would be expanded, and the routes reconsidered to provide frequent and complete coverage. Unreliable transit is a major deterrent in changing travel demand behavior. Accurate tracking with GPS installation on fleet, and using crowd sourcing methods for timely and reliable updates will be crucial to driving the demand change.

Better public transit alone cannot bring about this significant change in travel choice. Price could be an effective and easy tool to achieve this shift. While the upfront cost of purchasing a car and insurance is high, drivers don’t pay the real cost of driving which includes congestion cost, the cost of the maintaining and expanding supporting infrastructure, traffic control, and pollution.4 Increasing the cost of driving a car can be an effective deterrent. Increasing fuel prices to reflect the true social cost of driving can allow the free hand of market nudge household to reconsider travel choices, and shift to public transit to optimize their budget.

Despite pushback from manufacturers and dealers, and consumer inertia, reimagining American streets and its purpose can reduce fuel dependency, improve overall well-being of the residents, and help better use of city’s resources. Since changing travel behavior could take time, increasing the public transit fleet whilst people continue to drive their cars would stress the road infrastructure even more.

Hence it is essential that the price incentive be implemented alongside. Increasing fuel price has the undesired that the effective penalty is negatively related to income, whereby the richer find it easier to drive still compared to those with lower income. Additionally, the time cost of waiting for public transit and missed public transit could be higher for lower income households who have to work longer hours or work multiple jobs to make ends meet. Public transit subsidies linked to income can alleviate the disproportionate effect that waiting time has on lower income households.

1. Discouraging the use of old vehicles

Older vehicles contribute significantly to emissions. A program that aims to penalize owners of old vehicles can discriminate against lower income groups, for whom income could be limiting new vehicle purchase decision. The objective is not to penalize ownership of old vehicles, but rather to discourage their use.

Under this program, owners are required to get annual emission tests.

For private-use vehicles that don’t meet emission standards, the program introduces annual vehicle registration fees and links it to mileage; the fee increases exponentially with mileage - the more the vehicle has driven in the past year, exponentially higher would be the fees. The objective of the program is to discourage the use of old-polluting automobiles on the road, and where substitutable, nudge people to use public transit instead.

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| --- | --- | --- |
| Car Use Category | Annual Mileage - Range | Annual Registration Fees |
| Primary mode is public; private vehicle is used only on occasions | < 2k | $50 |
| A mix of public and private transit is used | 2k – 5k | $150 |
| Primary mode is private car | >= 5k | $500 |

Table 1 – Annual registration fees based on annual mileage to discourage use of old vehicles

The annual registration fees for those below 200% of Federal Poverty Line (FPL), would be lower. The mileage range and corresponding registration fees outlined in Table 1 is a placeholder. It is based on the fact that an average car runs 10-12k miles per year.5 Cars are often used for inter-city and inter-state travel, which if outside the purview of the everyday public transit options, mileage made on these trips shouldn’t be penalized under the same umbrella. Primary research would be needed - and would be city dependent - before defining these ranges and defining corresponding fees.

The underlying assumption here is that income is restricting the switch to newer cleaner vehicles since higher insurance and maintenance cost for old vehicles are financial incentives already in place that make driving older vehicles expensive. Hence the focus of the program is to limit the use of these vehicles, rather than penalizing ownership of these vehicles.

Commercial-use vehicles that don’t meet emission standards would have stricter requirements to get these automobiles off the road. The penalty would be linked to business size, with smaller businesses having lower effective rates. The penalty here won’t be linked to mileage, as unlike private transit, fleet used in business can’t be substituted with public transit. The objective of the program for this sub-group is to incentivize upgrade to cleaner fleet options.

Automobile are means to ends that fuel the economy. Penalty on old private-use cars would have unintended impact if it limits individual or household’s ability to engage in productive endeavors. Identifying effective penalty across income ranges is important to ensure that the policy isn’t unfair to those with lower incomes.

1. Incentivizing purchase of ‘green’ vehicles

In order to incentivize the shift away from gasoline and towards cleaner alternatives, the program offers tax benefits on purchase of EVs and alternate clean-fuel vehicles. The inclusion of EVs here would depend on source of electricity production in the state. If electricity is also fossil-fuel-based, then EVs would not be part of the program, unless stricter renewable-energy-based charging station requirements can be enforced. The program is intended to influence purchase decision towards cleaner vehicles. It is also intended to incentivize manufacturers to move away from gasoline-based automobiles.

The program offers tax incentives of up to $7,500 on purchase of new qualified vehicles and up to $4,000 on repurchase of qualified vehicles.8 The extent of the benefit is determined by how well the vehicle measures on the emission scale. Individuals and households with income under 700% of federal Poverty Line are eligible to participate in the program. In order to disincentivize car use, the program can only be used once in three years.8

To the extent that cleaner models use better technology and are more expensive; the benefit level would be higher for more expensive cars. And since higher income household can afford more expensive cars, they would receive higher level of absolute and proportional tax benefit. To illustrate, for example, a household at 700% FPL might be able to afford a car that makes them eligible for maximum benefit ($7,500), while a household at 300% FPL might be able to afford a car that makes them eligible for $1,500 benefit. As Table 2 below shows, for every household type, higher income household is able to afford a cleaner car and gets higher absolute and proportional benefit.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Family size** | **2024 FPL Income** | **700% FPL** | **$7500 benefit/Income** | **300% FPL** | **$1500 benefit/Income** |
| For individuals | $15,060 | $105,420 | 7% | $45,180 | 3% |
| For a family of 2 | $20,440 | $143,080 | 5% | $61,320 | 2% |
| For a family of 3 | $25,820 | $180,740 | 4% | $77,460 | 2% |
| For a family of 4 | $31,200 | $218,400 | 3% | $93,600 | 2% |
| For a family of 5 | $36,580 | $256,060 | 3% | $109,740 | 1% |
| For a family of 6 | $41,960 | $293,720 | 3% | $125,880 | 1% |
| For a family of 7 | $47,340 | $331,380 | 2% | $142,020 | 1% |
| For a family of 8 | $52,720 | $369,040 | 2% | $158,160 | 1% |

Table 2 – Tax benefit as proportion of income. Higher incomes (700% FPL) might be getting higher absolute benefits and higher proportional benefits (benefit/income) if ‘cleaner’ technology is more expensive.

This ‘unfairness’ built in the program would be avoided if ‘clean’ technology doesn’t come with a premium. Policies to incentivize research and development in this space can change this.

Conclusion

The memorandum considers three policies that address different factors contributing to high automobile gasoline use in the state. Strengthening the public transit system can reduce the number of vehicles on the roads. By discouraging the use of old vehicle, and encouraging the purchase of ‘greener’ alternatives, the programs aim to reduce the emissions and incentivize the shift to cleaner fuels for both users and manufacturers.

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