

# Impact of Transportation-Related Environmental Initiatives

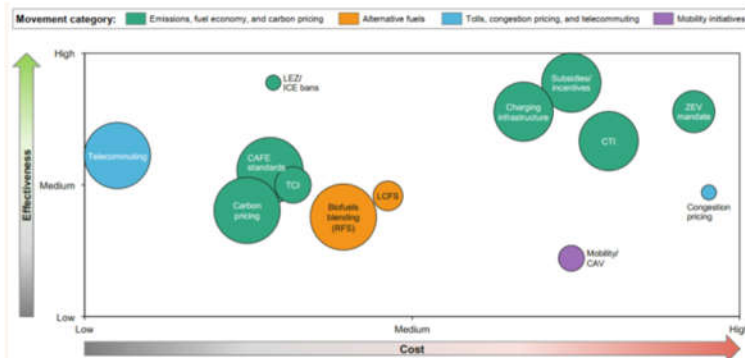
The global community is developing and implementing a wide variety of environmental initiatives to reduce emissions from the transportation sector. This report provides an overview of 37 such initiatives (or movements) and an in-depth analysis of 14 of those movements to better understand their effectiveness in reducing emissions and their overall cost to society, including governments, industry and consumers. This report does not make any recommendations regarding which policies should be pursued in the future, nor does it provide judgment regarding which initiatives could be considered worse or better than others. It simply provides an objective assessment of each initiative to enable stakeholders and policymakers to better understand the options that exist in their quest to reduce transportation-related emissions. This brief provides an overview of the report and presents three initiatives representing different levels of effectiveness and cost as examples of the analyses conducted.

## METHODOLOGY

Ricardo Strategic Consulting analyzed the effectiveness, impact, and cost of compliance of various movements that represent legislation, mandates, proposals, initiatives, and trends under discussion in the U.S. Ricardo also considered global themes that may shape the U.S. landscape for the next 20 years. Ricardo conducted preliminary studies on a total of 37 U.S. and global movements and shortlisted 14 U.S.-specific movements for long-term impact assessment.

The 14 selected movements were measured on three key factors: effectiveness, cost and impact. The **effectiveness** of a movement is comprised of three key elements, each weighed equally: emissions reduction, fuel economy improvement, and vehicle demand (in terms of shift to alternate powertrains). **Cost** is defined as how much it costs to comply with a movement in terms of singular cost of compliance per person, such as purchase price, or of operational costs, such as incremental costs for operating a vehicle. **Impact** is determined by how widespread a given program is – whether it operates at a national, state, or local level.

Each of the 14 movements assessed are plotted in the chart below based upon their effectiveness and cost. The size of the circle corresponds with the impact an initiative might have – a larger circle indicates a larger geographical impact. Following this chart is a summary of the analysis for three of the movements evaluated – vehicle electrification, biofuels policies and telecommuting.



## VEHICLE ELECTRIFICATION

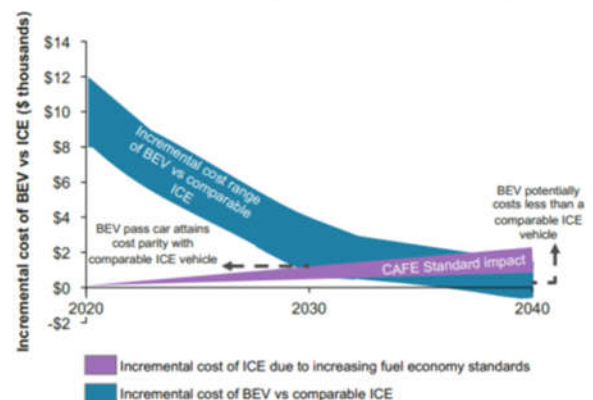
The movements analyzed relative to electrification include subsidies and incentives, charging infrastructure and zero-emission vehicle mandates. These movements are clustered in the top right corner of the overview chart, indicating their high effectiveness in reducing emissions and their associated high cost.

EVs and a low-carbon grid (electricity power generation) are primary drivers for reducing emissions compared to other alternative fuels. Currently, EVs offer slightly lower lifecycle emissions compared to internal combustion engines even when considering conventional energy sources for power generation.

The industry is moving towards attaining cost parity for EVs versus ICE vehicles, but until that is achieved, direct cash-in-hand for consumers through subsidies and incentives is one way to promote PEV sales. Another way is through the ZEV mandate. Technological advancements and economies of scale are rapidly reducing battery costs. The result could be price parity with ICE vehicles by the end of the decade.

Until that time, however, based upon Ricardo’s analysis, subsidies required to offset the higher cost of EVs and encourage sufficient adoption to comply with ZEV mandates could cost \$8,000 - \$12,000 per vehicle purchased.

Incremental cost w.r.t. a comparable ICE vehicle in 2020, \$000's



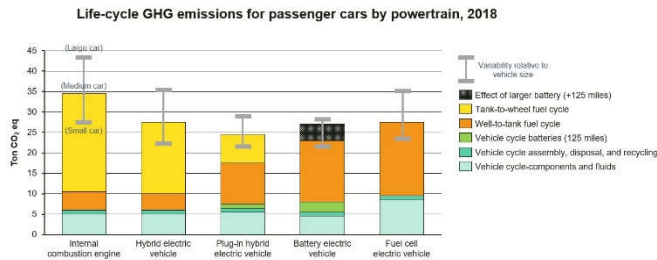
## BIOFUELS POLICIES

The Low Carbon Fuel Standard (LCFS) and the Renewable Fuel Standard (RFS) have both had varying success. The LCFS pursues a CI-based approach to meet emission reduction targets, whereas the RFS considers a volume-based approach for certain targeted renewable fuels for emissions reduction. As can be seen from the chart on the prior page, these programs occupy a middle ground in terms of effectiveness and cost.

Over the years, the EPA has consistently waived some of the renewable fuel volumes required by the RFS, which has brought the effectiveness of this program under scrutiny. With the statutory requirements of the RFS set to expire at the end of 2022, how biofuels policies will be developed remains to be seen.

Both programs rely on similar fuel products to achieve their objectives and are successful in reducing transportation carbon emissions. Due to the structure of the programs and the waivers issued for the RFS, it seems the LCFS has been more successful in reaching its targets.

From a total cost of ownership perspective, the alternative fuels that comprise both programs range from slightly cost positive to slightly cost negative for consumers depending on the blending ratio, with an upper cost of about \$200 per year for passenger vehicles and up to \$700 for commercial vehicles.



Source: IEA The Global EV Outlook 2019 - life cycle analysis

## About the Fuels Institute

Founded by NACS in 2013, the Fuels Institute is a nonprofit tax-exempt social welfare organization under section 501(c)(4) of the Internal Revenue Code. We are dedicated to evaluating issues affecting the vehicles and fuels markets. We commission comprehensive, fact-based research projects that are designed to answer questions, not advocate a specific outcome. Our reports address the interests of industry stakeholders—from business owners making long-term investment decisions to policymakers considering legislation and regulations that affect these markets.

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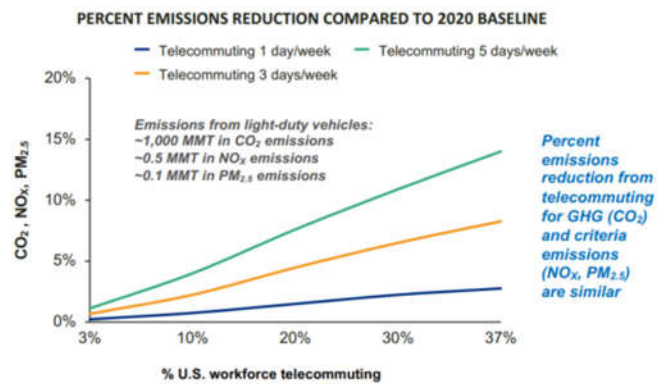
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## TELECOMMUTING

The experience of the COVID-19 pandemic has directed significant attention towards the potential impact of telecommuting. During the pandemic shutdown, vehicle miles traveled dropped more than 40% and gasoline demand dropped nearly 50%; meanwhile, air quality in most metropolitan areas improved dramatically. The effectiveness-cost chart on the prior page presents telecommuting as very low cost with medium degree of effectiveness.

Based on a study from the National Bureau of Economic Research, 37% of the U.S. workforce can feasibly work from home. If the population who could work from home were to do so at least one day per week, emissions would decline by nearly 3% at virtually no cost. Increase the frequency of telecommuting to five days per week, and emissions could decline by as much as 14%.

Also, telecommuting has a marginal cost benefit to consumers due to fuel savings. On average, per person fuel savings from telecommuting one to five days per week is \$150–800 annually (assuming \$3 per gallon of gasoline). The negligible cost impact of telecommuting is a key component compared to other movements, that require significant investments to achieve a similar percentage of emissions reduction.



## SUMMARY AND OUTLOOK

From this analysis, it seems evident that the effectiveness of an individual movement is directly proportional to the cost to comply with assigned targets, except for telecommuting which offers the advantage of non-trivial emissions reduction but at a negligible cost. Meanwhile, technological advancements in electrification coupled with a push for renewable energy sources and reduced costs will positively contribute toward emissions reduction. And, with the ICE continuing to be driven for decades to come, alternative fuels movements like the LCFS and RFS will continue to play a significant role to reduce emissions.

As urbanization increases, congestion pricing, carbon pricing, and low emissions zones may take shape, although divergent political views on these topics could hinder their implementation. Similarly, the effect of autonomous and shared mobility on emissions remains to be seen.

The full report and summary of all 37 movements evaluated can be downloaded free of charge at [fuelsinstitute.org/research](https://fuelsinstitute.org/research)

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