

ISSUE BRIEF

Reality EV: No Silver Bullet

2023 Edition

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The promise of Electric Vehicles has dominated politics, the media, and public consciousness at a level unparalleled in recent history. Perhaps the crypto craze was a comparable zenith, and like the EV hype, it has raised more questions than answers. The consumer/taxpayer, infrastructure and environmental constraints single fuel source electric vehicles face to live up to their often claimed but far from perfect solution fails to justify the drastic policy decisions being made. This Issue Brief updates our first edition three years ago—mandating what the public drives and outlawing competition was a bad idea then, and a worse idea now. A technology neutral strategy rather than government command and control is the right pathway for the United States.

Reality D.C.

If ever there was an example of being lured in by a bright shiny object, the promise of an all-EV and all happy consumer future is it. Driven by climate change concerns, many of which are coming from single focus environmental organizations rather than genuine public interest advocates, public policy has outraced reality. The nation has no silver-bullets, magic beans, or enough taxpayer money to produce a near-term scenario starring an all-electric, zero-emission, zero internal combustion engine fleet. Yet the Federal Government is leading a parade headed towards a consumer acceptance and political tolerance cliff. Federal and state governments are trying to outlaw internal combustion engines and will pay \$2.5 trillion for electric vehicles (EV) to replace them—sight unseen. Someone sold these policymakers a “bill of no-goods” without the car facts. Their roadmap to a city with 100% EVs takes them to a bridge too far, down a road paved with gasoline taxes riddled with environmental, economic, national security, and consumer acceptance potholes.

Led by California, other states are falling over one another to hang with the cool EV kids without

any thoughtful, calculated plan to integrate EVs in the market. As the headlines illustrate, that is being questioned.

While many questions have yet to be answered, some we know for sure. Is there a role for EVs? Yes. Can EVs make a meaningful contribution to the goals of climate change and reduced petroleum use? Of course. Is it justifiable to provide start up subsidies and assistance? Sure.

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Do reasonably minded people really think consumers driving a fleet of 284 million passenger vehicles can or will transform the entire buying and refueling game in little more than a decade? (Statistica 2022). The answer is no, we can't. Will this single interest EV silver-bullet shot in the dark effectively force industry to produce what the government wants them to produce? Of course NOT. Is it sound public policy to forgo all other options and ignore the hundreds of billions of gallons of gasoline that will be needed for decades? No.

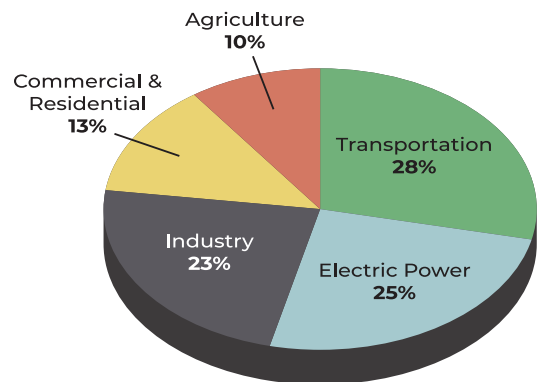
How Did We Get Here?

Many alternative fuels have auditioned for the world's largest gasoline market and failed. More than 40 years of researching and advocating for alternative transportation fuels make it clear that no single solution solves the United States' myriad of problems due to its reliance on crude oil. But climate change, the bright shiny object of the past two decades, did what wars, price hikes, supply disruptions, and pollution could not do which was to truly threaten the status quo. And that's a good thing, if done right.

The stated objective of EV mandates and banning internal combustion engines (ICEs) is to reduce greenhouse gases (GHGs) and carbon emissions while lessening petroleum consumption. The transportation sector is responsible for roughly 30% of total GHG emissions and light duty vehicles are the cause of 60% of those emissions. So certainly that is where we need to focus, the issue is what do we bring to this fight. For you golfers out there, would you bring just one club when you take on the course? Would a carpenter bring anything less than their whole tool box to a job? So why are our policy makers embracing a silver bullet approach? Particularly when there is no such thing as a zero emission vehicle, but more on that later.

As noted, states are taking aggressive action on the EV front. California believes it has authority

SOURCES OF AIR POLLUTION



Source: US EPA (2022)

under the Clean Air Act to set their own standards and other states can adopt California standards. California intends to ban conventional gasoline and diesel-powered cars by 2035. Sixteen other states have followed suit in whole or part. Again, with the right motives but with a complete lack of reality.

We believe many key influencers in Congress, environmental organizations, and the media have been led to believe they need not worry about cleaning up gasoline or developing alternative liquid fuels. This will spill over to the public also believing EVs are going to be the single solution to end decades of wars over crude oil and domestic battles to develop alternative fuels.

The reality is regardless of the high, medium, or low EV growth scenario achieved, hundreds of billions of gallons of high carbon toxic gasoline will be burned for decades. Think about that—if a ban on internal combustion engine (ICE) vehicles goes into effect in 2035 as proposed in California, an ICE sold on New Year's Eve 2034 will need to use gasoline for twelve to fifteen years (Schwartz, Hart. 2018).

“In terms of climate, improving efficiency of gasoline cars is as critical as electrification”

—MIT, 2019

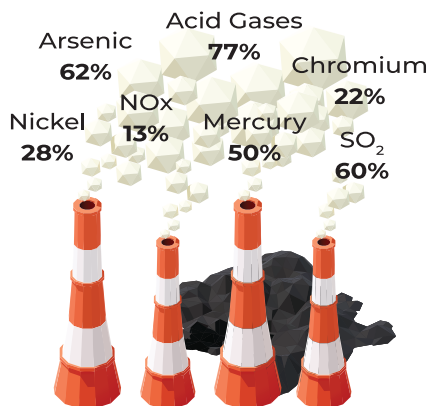
Millions of such vehicles that would have been sold to the public up to that point will have a similar operational life. We can decarbonize that gasoline without any of the trappings of EVs through renewable ethanol blends, using Brazil as our North Star. They are using a minimum of 27% ethanol and experimenting with 40% in a hybrid that would get the equivalent of 100 miles per gallon.

So let's look at several major hurdles that need to be cleared to meet the nation's new goal of fifty percent EV sales by 2030 (White House 2021), and for states to have 100% EVs, keeping in mind the post-COVID and Russian-Ukraine War fueled inflationary economy.

The Reality of Environment: The falsehood of a zero-emission vehicle.

This is what it's all about, right? Reducing emissions? Clearly an EV produces no tailpipe or evaporative emissions. However, the impact on the environment to get there tells a different story. EVs run on batteries that require a range of minerals. These minerals have to be mined and processed and the material sourcing is in itself an energy intensive undertaking. Battery manufacturing is also energy intensive. Once manufactured, batteries need to be charged via electricity. With natural gas and coal still the primary source of electricity in the U.S., this has

PORTION OF U.S. AIR POLLUTION THAT COMES FROM POWER PLANTS



to be calculated into the total lifecycle of EVs. While renewable sources of electricity like solar, biomass or biogas are attractive options, according to the US Department of Energy they account for just 18 percent of electricity generation,

Disposal at the end of a battery's life is another environmental concern. Landfills leaking acid and other chemicals can find groundwater, impacting areas far beyond the site of the landfill.

"Face it: Electric cars don't do much of anything for the environment."

—New York Post, November 8, 2022

Finally, the increase in vehicle weight is significant—the Ford 150 pickup truck, one of the highest selling vehicles in the US in recent years, increases from 5,600 pounds to almost 7,000 pounds in the EV version. This increase dramatically impacts the wear on roadways, causing increases in fine particulate matter. Additional particulates are released into the atmosphere through rapid tire degradation. Both these sources of particulates can be toxic and present a significant threat to public health.

All vehicles and power sources need to be compared on a total lifecycle basis which could still be favorable to EVs but not in every situation and not to the extent they be the only source of propulsion. Numerous studies, including the University of California-Davis assessment, concluded in many regions EVs will increase GHG emissions. Gasoline, with lower sulfur, the additional of clean octane from biofuels, used in new and existing vehicles can provide benefits everywhere, all the time.

"Rush to electric vehicles may be an expensive mistake, say climate strategists."

—CBC News, December 12, 2022

Is the US Power Grid Up to the Task?

If you live in Texas, Florida, California and other places where natural disasters like floods, fires, ice storms and any number of other incidents have taken place you would have to say no. Or in North Carolina where pot shots from a drive by shooter brought down an entire power station. While any source of energy risks supply disruptions, the lack of alternatives in the case of a 100% EV scenario is uniquely devastating. Motorists evacuating Florida as a hurricane approaches, or Californians fleeing a wildfire would literally be risking their lives if electric power went out or was simply unavailable.

Some EV proponents shrug off concerns of strain on the grid by claiming most EV charging will take place at night, therefore the load will be balanced off from daytime highs. That logic is questionable in that the high load times could simply shift from day to night if everyone is charging.

[“It’s common to charge electric vehicles at night. That will be a problem.”](#)

—The Washington Post, September 22, 2022

The additional power that needs to be generated, along with the distribution of that power will require massive investments in not just charging stations but also in transmission lines, transformers, substations and countless other capital-intensive upgrades. Utilities across the country are applying to their

[Energy expert sounds alarm over California power grid: ‘Stressed to the limit’](#)

California’s push for a renewable energy transition brings the grid closer to collapse and will be “incredibly expensive” for consumers, Edward Ring argues.

Read in Fox Business

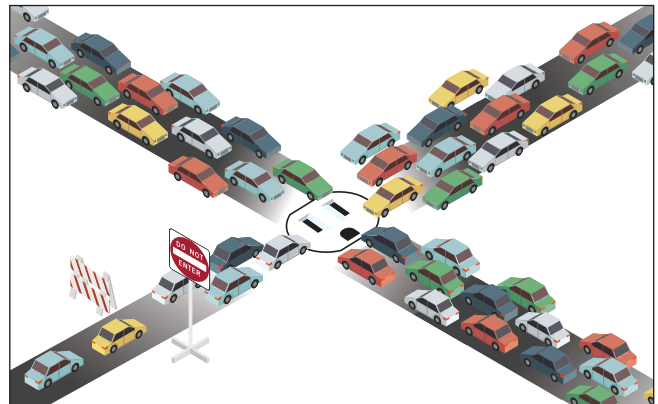
[“Attacks on Pacific north-west power stations raise fears for US electric grid”](#)

—The Guardian

Public Utility Commissions for approval to increase rates. These costs will be passed through to all utility customers, whether they have an EV or not.

A recent Princeton University Study estimated a cost of \$2.5 trillion over just the next decade in total capital investment if the US continues its effort to get to net zero. And one decade will be just the beginning. Even in California, officials have expressed concerns as to how they can possibly fund the necessary facilities. There are 750,000 gasoline pumps in the United States. Just one level 3 fast charge public EV refueling pump can cost \$50,000 (OhmHome 2022). Extrapolating these estimates, installing one pump per gasoline station would cost \$37 billion and \$150 billion if half of them were converted to recharge EVs.

Ready, Set, Charge?



Assuming everyone is charging at night assumes everyone can charge their vehicles to begin with, regardless of the time of day. Among the many questionable pillars of an all EV society, this is one of the most concerning. More than 30% of the US population live in apartment buildings,

condominiums, or other forms of multi-housing dwellings. These consumers of EVs will seldom if ever have their own charging stations. Single family housing owners will have the ability to install at-home chargers, albeit at personal cost and as noted, subject to power outages. The idea of city dwellers needing to share re-charging in the limited parking that comes with a New York City or LA high rise is simply impractical.

Then there is range anxiety—the bigger fear of being stranded and unable to get where one is going. The range of EVs, perhaps even greater than cost, may be the single biggest issue that will turn off consumers. The posted range of an EV is like the posted MPG of a conventional vehicle—it is the best case scenario and rarely achieved. The drag factors on an EV however are much more serious and again highlight the foolishness of across-the-board mandates. For example, cold weather has a significant impact on battery life. *Car & Driver* magazine reported tests showing a loss of roughly 25% of the posted range in cold weather operation with the vehicle heater running. Anyone driving in Minnesota in the winter is going to want to have a heater. Similar range penalties are evident with air conditioning in summer weather.

Speaking of range, drivers still run out of gasoline in the United States despite 111,100 gasoline stations. In 2022 AAA helped millions of stranded drivers—500,000 ran out of gas. Therefore, miscalculations in range by a new EV owner is a given and the resulting congestion and safety

Why America's EV chargers keep breaking

E&E News - March 29, 2023 "The high-tech, high-speed highway fueling system that America is building to power its EVs and replace the gas station is riddled with glitches that are proving difficult to stamp out."

Electric Vehicle Fires Have Burned Down Homes

—*Fortune*, October 15, 2022

issues from vehicles unable to move should be a significant concern.

Reality of Full Public Acceptance

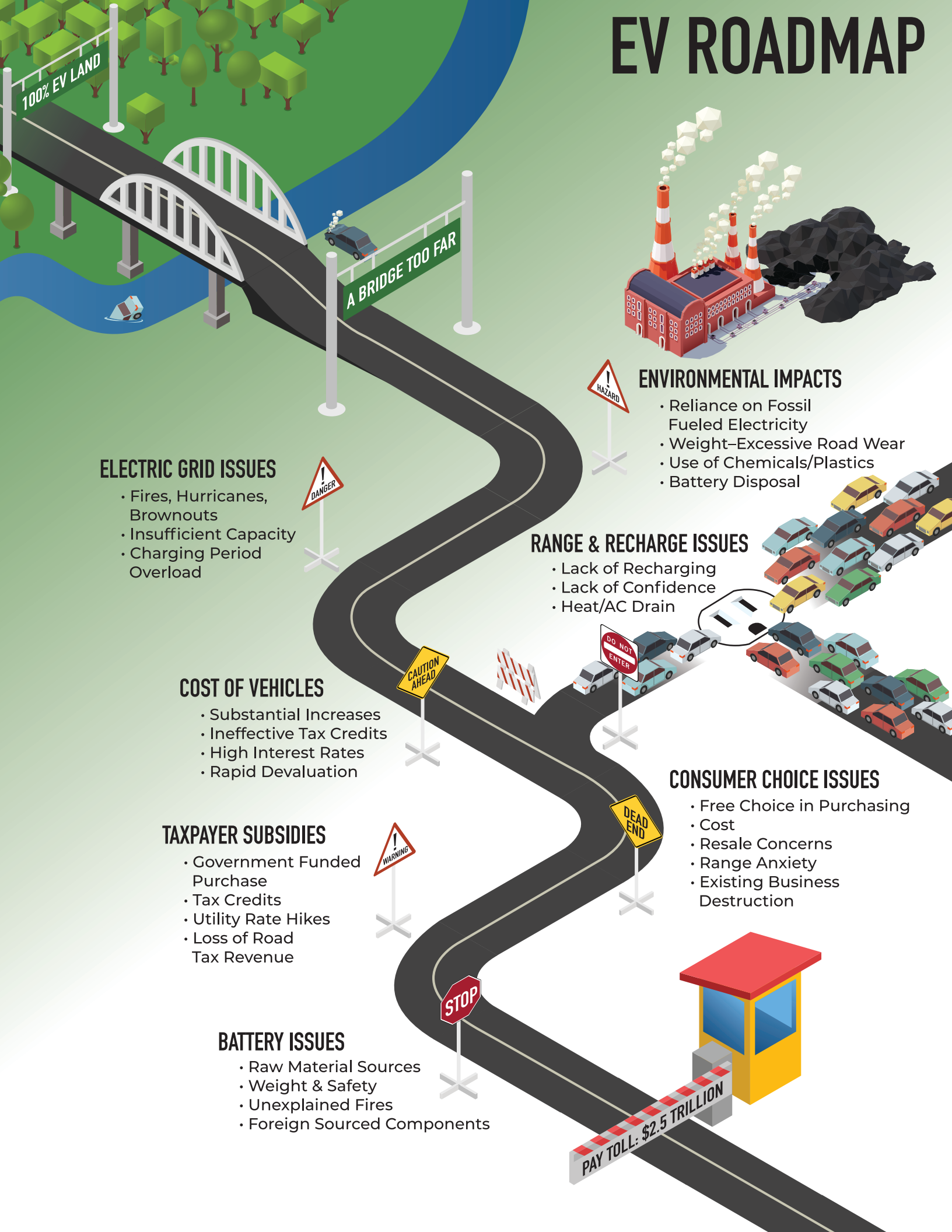
Given these concerns, it is not unreasonable to suggest that those with a one hundred percent EV vision need to rethink mandating these vehicles at the expense of anything and everyone else. It's not even a smart play for the most diehard EV fan. EV mandates require sustaining policies that have unanswered questions and denies consumer choice. This already led to more opposition, and it is likely to grow. Surveys have shown as little as 25% of the public and as much as 36% (CBS News) indicate they would consider purchasing an EV. What that means is 60-75% have said they are not considering it. There is no way this can be translated into a 100% mandate. Gun Control, masks and vaccines during COVID, and other issues requiring government mandates have proved unworkable. Taking away the public's choice as to what kind of vehicle they can purchase will suffer the same fate.

The Affordable Electric Vehicle is Still Mostly Fantasy

—*Bloomberg*, September 17, 2022

The affordability issue is an offset of the consumer choice and acceptance issue. According to Alex Kopestinsky's "What is the Average American Income in 2022?" article, around 15.5% of Americans earned between \$100,000 and \$149,999 (Kopestinsky 2022). In business school terms, data in the Kopestinsky and Lane articles translate into a relatively small 'total accessible

EV ROADMAP



ELECTRIC GRID ISSUES

- Fires, Hurricanes, Brownouts
- Insufficient Capacity
- Charging Period Overload

COST OF VEHICLES

- Substantial Increases
- Ineffective Tax Credits
- High Interest Rates
- Rapid Devaluation

TAXPAYER SUBSIDIES

- Government Funded Purchase
- Tax Credits
- Utility Rate Hikes
- Loss of Road Tax Revenue

BATTERY ISSUES

- Raw Material Sources
- Weight & Safety
- Unexplained Fires
- Foreign Sourced Components

ENVIRONMENTAL IMPACTS

- Reliance on Fossil Fueled Electricity
- Weight-Excessive Road Wear
- Use of Chemicals/Plastics
- Battery Disposal

RANGE & RECHARGE ISSUES

- Lack of Recharging
- Lack of Confidence
- Heat/AC Drain

CONSUMER CHOICE ISSUES

- Free Choice in Purchasing
- Cost
- Resale Concerns
- Range Anxiety
- Existing Business Destruction

PAY TOLL: \$2.5 TRILLION

market' of the 332.4 million people living in the United States that would be considered 'financially suitable targets' to purchase EVs (US Department of Commerce 2022).

Many in the media share this concern. In *The Washington Post* writer Charles Lane's article "Why electric cars still don't live up to the hype" he states, "66% of the EVs registered are owned by people making more than \$100K per year. Mass adoption of electric cars, however, cannot occur unless they can do everything gas-powered vehicles can do... at a comparable total cost of ownership. Otherwise, electric cars will be a niche product for upper-income folks... Government subsidies for them [EVs] will be a regressive transfer of social resources in return for little climate benefit, given that the US power grid the cars draw from is 64 percent fueled by coal and gas" (Lane 2019).

Any new transportation fuel, whether it was ethanol in its infancy, methanol, natural gas, and now EVs will have challenges and hurdles. Practicality, cost, performance, emissions, and countless other issues need to be considered and resolved. Natural gas and methanol were once seen as "the answer." Neither survived the consumer practicality or political endurance tests. Ethanol and biodiesel continue to work through consumer acceptance and regulatory issues but have the advantage over EVs of not requiring massive changes in current vehicle and refueling infrastructure.

News headlines are a good barometer of what is going on in the real world, and Congress would be well served to pay attention. We have categorized nearly one hundred EV related articles before, during, and after the debates over the Inflation Reduction Act of 2022 President Joe Biden signed into law August 16, 2022 (Probasco 2022). The diversity of issues and voices foreshadow numerous battles EV proponents will face in the coming election cycles. It bears repeating that this is not an issue about being for or against EVs but rather the mandating of a policy that simply cannot be done.

Potholes, Speed Bumps, and Toll Booths on the Road to EVs

Increased electricity demand

- 32% of total U.S. energy-related CO2 emissions come from generating electricity
- About 50% of air pollution comes from generating electricity

Cost of recharging at night

Nighttime charging may not use renewable electricity

Higher upfront costs for some segments

- Home chargers, other equipment

Charging infrastructure buildout

Access to critical minerals for batteries

Human rights violations for mining-child labor

China's 90% control of the market

Battery disposal

Workforce development

Collateral damage job loss (auto/refueling/repair)

Consumer resistance

- Cost
- Resale concerns
- Range anxiety
- Existing business destruction
- Resistance to government intrusion

Availability of public refueling

Lack of residential charging availability

Electric grid reliability

Electric brown outs and black outs

Power station vandalism/terror targets

Cyber security

Increased electricity loss due to climate change

Safety due to extreme weight

Wear and tear on roadways

Cost of federal subsidies

Cost of state subsidies

Tesla road rage

The concern of battery fires and explosions

Fear of running out of (gas) power

Loss of transportation in natural disasters

Loss of EV purchase incentives

Loss of EV manufacturing incentives

Political battleground

Political will to maintain program

State EV bans

Total carbon footprint model changes

Cost/availability of battery replacement

Distance EVs travel in cold weather: battery drain

Impracticality for many commercial applications

Increase in electricity costs for non-EV owners

Home electric bills for all

Knowledge, understanding, and trust of EVs

The Overall cost of ownership

Performance, practicality, looks

Moreover, the public is to some extent being sold a bill of goods by not being told the whole story.

Reality in the Data

According to the Massachusetts Institute of Technology's (MIT) *Insights into Future Mobility, Energy Initiative* study, the world's one billion passenger vehicles consumed about 400 billion gallons of fuel. The study projects in 2050 global oil consumption is higher than 2015 levels in each scenario, and only twenty-five percent less in the aggressive climate policy. To reinforce our concern, the MIT study noted only one fifth of the reduction in crude oil is due to light duty EVs, meaning gasoline will remain the primary propulsion fuel. The largest contributors to reduced oil use are improved fuel efficiency, fewer vehicle miles traveled, and reduced industrial use of oil—not EVs. (Massachusetts Institute of Technology 2019).

The MIT study cites more of our concerns when it references the need for significant improvements to upgrade and reinforce the power distribution system and the cost of refueling infrastructure, and noted, "Our analysis does not account for these costs nor does it tackle the question of who will pay for them."

Cost and Subsidies: Everyone will pay.

The MIT study estimates the average additional cost of an EV is about \$10,000. Currently, EVs could receive the full federal tax credit of \$7,500, and the Biden Administration has proposed an additional \$4,500 if the vehicle is made in the United States. (The made in America \$4,500 is causing great angst among our trading partners). The tax credit is capped for each automaker after a certain amount of vehicles. A consumer not within that cap would not get the credit.

In addition, federal EV incentives are not a complete \$7,500 dollar for dollar credit for everyone. It depends on the income of the buyer and amount of the credit available to the manufacturer. Like any tax

IRS regulations "will further reduce the number of eligible EVs. Fewer vehicles (and fewer customers) will qualify for the full \$7,500 credit in the near term. In fact, this period may go down as the highwater mark for EV tax credit eligibility since the IRA passed last year."

—Alliance for Automotive Innovation, March 31, 2023.

credit, one must have tax liability to apply the credit. Many Americans pay taxes out of their paychecks, do not itemize, and do not owe taxes to apply the credit against, therefore those taxpayers cannot use the credit.

The entire tax incentive approach is confusing and convoluted, causing concern for both automakers and consumers. For instance, 40 percent of an EV's battery minerals must be extracted and processed in North America or a free-trade partner of the United States in order for car buyers to claim a \$3,750 tax credit. In 2027, that percentage rises to 80 percent.

At least half of the battery's components would also have to be manufactured in North America to get an additional \$3,750 in credits. In 2029, the same would apply for 100 percent of the battery's components.

The total cost of EV ownership also needs to be considered. The US Department of Energy's Argonne National Laboratory concluded the cost of ownership for an EV under current technology was as much as three times higher for an EV compared to a ICE vehicle, and even under a future scenario assuming increases in efficiency it was 20 cents per mile more with a EV. A study by independent and highly respected consultants A.D. Little estimated the cost of ownership to be 60% higher with a mid-size EV.

Driving on the nation's highways is not free either. The billions of dollars collected in Federal and State

excise taxes on gasoline and diesel fuel pay for maintenance of our roads, bridges, and highways. If EV owners are not paying fuel excise taxes, it is then a hidden subsidy to them that will have to be paid for by the rest of the drivers.

Using the MIT study as the baseline, which is considerably lower than the Princeton Study, if EVs reach fifty percent of fleet by 2050—a much more realistic assumption than by the Biden Administration’s goal of 2030—and receive the necessary \$7,500 federal tax incentive to drive consumer demand, (not including the made in America \$4,500 credit) those 135 million EVs will cost taxpayers about \$1 trillion.

A final thought on the impact of tax incentives on federal and state budgets is best illustrated by the situation in Georgia where electric vehicles sales dropped by 80% after the state tax credit was repealed. The Georgia state legislature repealed the incentive after the cost to the state increased from \$1 million in 2012 to \$14 million in 2013. Prior to that Georgia was ranked second for the most electric vehicles on the road. (Walton 2017). Utility rebates, state and local tax incentives, reduced registration fees, and other subsidies are likely not sustainable when scrutinized by the media, voters, or the oil industry. Incentivizing oil companies to clean up their gasoline, or car makers to add a \$50 flex fuel component seems to be a more practical approach.

Negative Economic Impact

In addition to incredible pressure on federal and state budgets, and recognition by taxpayers that they are footing the bill, can policymakers deal with the destructive impact of established businesses literally being put out of business. The convenience store industry, for example, is a critical link in the chain of fuel distribution. The majority of 7-11s and the new breed of convenience stores across the country have significant investment in gasoline refueling. As this sector’s customer base declines, it will experience stranded assets that will place a drag

“It’s ridiculous for us to move rapidly into a transportation mode that we do not have the ability to supply ourselves or with reliable supply chains.”

—US Senator Joe Manchin (D-WV) in CNN interview April 2, 2023.

on the economy and burden on their customers. Consumers purchasing a conventional vehicle in the years leading up to the point of a ZEV mandate will need service to those vehicles, service that may not exist once bans take effect. And trading a dependence on foreign oil for dependence on Chinese minerals is a lose-lose.

In short the ripple effect to the economy, ranging from the petroleum industry to the farm economy will be devastating.

Even the auto industry is feeling the effects of whiplash. General Motors is promising to go all electric yet investing billions in conventional engines. *The Washington Post* reported recently that Ford expects a *\$3 billion loss on EV development in 2023*. Toyota, now the world largest car maker has been quite vocal in questioning the wisdom of an all EV approach, as has Nissan and others. These folks know a bit more about making cars than politicians—if they don’t think it can be done we should listen. For auto dealerships, servicing vehicles, according to industry experts, is often the entire profit center for a dealership. As dealerships go out of business the hundreds of millions of cars that will remain on the roads until the end of their operational life will be facing challenges to get required maintenance done. Forcing these companies to make the cars the government wants them to make is bad policy. Forcing the American public to drive them is even worse.

Auto Execs Are Losing Faith in Electric Cars

—*FORBES*, December 20, 2022

Not Ready to Go Full EV? Some Car Companies Bet Bigger on Hybrids

Auto buyers' appetite for battery-powered vehicles is helping elevate demand for their evolutionary predecessor, the gas-electric vehicle

—*WSJ*, March 2023

So What Do We Do?

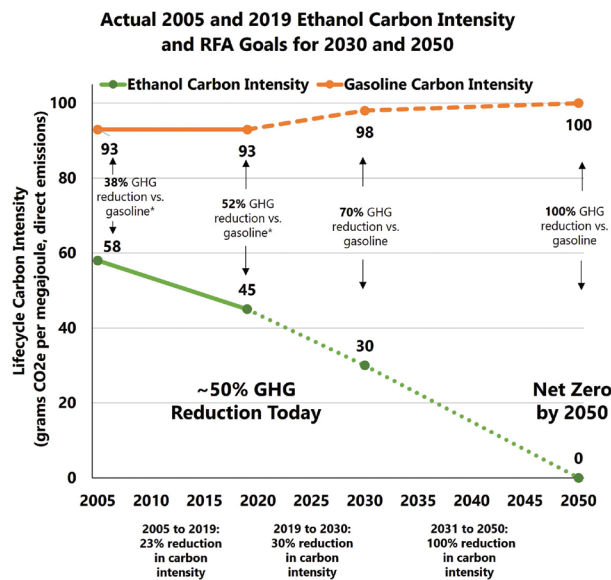
For starters, we get policy-makers to let EVs grow organically. Not by force. Let the natural demand—even with incentives and government backing—build the support system needed for any industry to develop. In the quest to reduce carbon emissions, mandating 100% EVs, banning internal combustion engines, and failing to take advantage of the fact that we can improve fuel quality with what we have is like tearing your house down to install a new appliance. It is simply unnecessary, destructive, and counterproductive.

When automobiles replaced the horse and buggy, the government didn't mandate it, the automobile replaced it because it was a better mode of transportation. EVs are an exciting, new, clean, technology. Let it develop rather than force feeding it to the American public before it is ready. Failure to do that is already resulting in backlash. In a tit-for-tat reaction, several states are saying fine, I'll see your ban on ICEs and raise you a ban on EVs!

[Wyoming lawmakers push for electric-car ban and to limit sales by 2035](#)

—*USA Today*, January 17, 2023

Biofuels, gasoline, and EVs working together can achieve meaningful reductions in emissions to the benefit of public health and climate concerns. In doing so it becomes a major stimulus to the



*Lee, U., Kwon, H., Wu, M. and Wang, M. (2021). Retrospective analysis of the U.S. corn ethanol industry for 2005–2019: implications for greenhouse gas emission reductions. *Biofuels, Bioprod. Bioref.*

Graph courtesy of the Renewable Fuels Association

US economy, forgoing government mandates, increased taxpayer costs, disruption to our current transportation system and importantly, preserve consumer choice. Set a standard and let technology decide.

High octane, low carbon fuels made with ethanol-gasoline blends can achieve significant increases in efficiency—as high as 7–10% according to Ford and other automakers. As supporting infrastructure for EVs develops, HOLC fuels can be providing immediate benefits. Today's corn ethanol reduces greenhouse gases by 46%–52% according the US Department of Energy with anticipated increased into the 70% range. In higher blends ethanol increases octane, allowing automakers to adjust compression in conventional vehicles to achieve reductions equal to or greater than many EVs. This source of clean octane, required under the Clean Air Act, replaces toxic compounds refiners use for octane and further reduces carbon.

Toyota Brazil has been advocating hybrids that combine the best of liquid fuels and electricity. Stellantis, the third largest car company in the

world, has absorbed Chrysler among other brands and is developing an ethanol hybrid. Flexfuel technology is standard in Brazil where blends of 27% are the baseline. India, Indonesia, and other countries are using 20% blends. Transitioning to a 30+% blend in the US can begin immediately in existing and optimized higher-compression vehicles and FFVs, saving both automakers and consumers billions of dollars compared to electric vehicles. It will save billions more annually in reduced oil imports, consumer gasoline costs, and public health expenditures.

Clean burning ethanol already provides the benefits of EVs. Innovative solutions such as the Next Generation Fuels Act introduced in both the Senate and the House would create a pathway for High Octane Low Carbon Fuels to provide a range of immediate climate, health, and cost benefits without the time to market and challenges EVs will need to overcome. Combined with enforcement of existing Clean Air Act requirements, we can produce a better fuel as additional technologies develop.

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