# Cheaper Transportation

How electric vehicles will make transportation cheaper for everyone

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**www.RapidSubstitution.com**

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# Executive Summary

In 2019, American consumers spent $450 Billion on oil. That's much more than is necessary. Unfortunately, the burden of high gasoline prices falls disproportionately on lower-income Americans, who spend over six percent (6%) of their household expenditures on gasoline.

However, it doesn't have to be this way. As electric vehicles (EVs) displace vehicles with internal combustion engines (ICE), the price of oil will crash saving individual consumers thousands of dollars each year and building political and financial support for the energy transition. The savings realized by a crash in oil prices will positively affect the lowest income bracket without the need for added government subsidies.

The reason oil prices are unnecessarily high has to do with the characteristics of oil production, most notably the inelastic nature of oil supply. In other words, it's really hard to rapidly increase or decrease oil production in response to price changes. So as demand increases and supplies stay the same, prices skyrocket. On the other hand, as EVs become more common, oil demand will drop and supply will stay the same, crashing prices.

Annual oil demand has dropped precipitously three times since 1975. Each time, oil prices crashed.

Unlike these temporary, historical shocks that caused the price of oil to drop, the consequences of EVs replacing ICE vehicles will be permanent.  EVs will likely cause oil prices to drop when there are around 126 million of them on the road. Since today, there are around 20 million EVs on the road, we estimate this threshold will be reached between 2025 and 2030.

Energy transitions are complex. EVs displacing ICE vehicles create lots of opportunities, but also lots of risks. That's why we recommend President Biden appoint an Energy Transition Project Manager to expedite and facilitate this transition.

One way to take advantage of an oil price crash due to inelastic oil supply is through a floating tax. A tax based on these principles presents the US Federal Government with an opportunity to generate tens of billions of dollars in new revenue.

## Key Takeaways

1. The price of oil will crash saving consumers thousands of dollars and building political and financial support for the energy transition.
2. The savings realized by a crash in oil prices will positively effect the lowest income bracket without the need for government subsidies.
3. Unlike temporary, historical shocks causing the price of oil to drop, the outcome of EVs replacing ICE vehicles will be permanent.
4. We are idealistic, but not deluded. We are aware of how difficult this will be, which is why we recommend appointing an Energy Transition Project Manager to expedite and facilitate this urgent, existential need.
5. One way to take advantage of an oil price crash due to inelastic oil supply is through a floating tax. A tax based on these principles presents the US Federal Government with an opportunity to generate tens of billions of dollars in new revenue.

# About

The ideas and analyses put forth here come from Paul Klemencic and his team.

Klemencic, founder of Skibo Energy, was an oil and gas industry insider for two decades, including 18 years at Chevron Corporation, where he gained particular knowledge about drilling and refining power management solutions, as well as insights into the challenges of adding new oil supply and the stopping and starting of oil production.

In the mid-1990s, Paul realized and embraced the need to dramatically and permanently decrease the world's dependence on oil. Paul then began applying his technical knowledge of oil production and energy markets to develop his ideas including what he calls *Rapid Substitution*.

**Rapid Substitution** is a strategy to dramatically and permanently reduce the cost of oil by quickly lowering consumption. The key insight is that more EVs will lead to much cheaper gasoline. The tipping point will be reached when about five percent (5%) of the vehicles on the road are EVs. This will result in as much as a fifty percent (50%) decrease in the price of oil. Permanently!

The **Rapid Substitution** research team is responsible for this document, as well as the website www.rapidsubstitution.com, blog posts, social media, and advocacy work focused on accelerating the energy transition using the **Rapid Substitution** strategy.

Paul's goal is for these ideas to become more widely recognized. He wants people to know that more electric vehicles will make gasoline cheaper for everyone. He hopes that will make electric vehicles more popular and accelerate the energy transition happen faster for the sake of our pocketbooks and the planet. So please use the ideas and information in this report in whatever way you feel will be useful.

# Introduction

**Rapid Substitution** is a strategy to dramatically reduce the cost of oil through accelerated Electric vehicles (EVs) will save everyone money whether or not they buy and operate an electric vehicle or not. An electric vehicle will reduce your transportation costs, even if you continue to drive a gasoline-powered vehicle.

The more electric vehicles we drive, the cheaper gasoline will get.

If you own an EV, you will save thousands of dollars per year by not buying gasoline and in much lower maintenance costs. Drivers who continue to operate gasoline-powered vehicles will save money, because the cost of the gasoline they use will be cheaper. Even people who get around by walking, bicycling, or taking public transit will still save, because all of the goods they buy will be less expensive due to cheaper fuel costs.

Put simply, electric vehicles save everyone money.

The reason is obvious, but often overlooked. Electric vehicles reduce demand for gasoline. Everyone who replaces a gasoline-powered car with an electric one is one less person filling a tank. Demand for gasoline then decreases in proportion to the number of electric vehicles on the road.

The point here is that getting ICE vehicles off the road reduces demand for gasoline. They could be replaced by EVs or people who replace their ICE vehicles with e-bikes or switch to using public transportation.

**Rapid Substitution** researchers predict that EVs will crash the price of oil when the number of EVs on the road reduces oil demand by five percent (5%), which is the equivalent of around 126 million vehicles. Due to the shape of the oil supply curve, a five-percent (5%) drop in oil demand means that the most expensive oil will no longer be economically viable to produce, thus driving down the price of oil.

Note that this five-percent (5%) drop in oil demand cuts prices in half at any price point. If oil prices are high, lowering demand will make them more reasonable. If prices are reasonable, it will make them cheap.

In the last five decades, there have been three historical precedents for this phenomenon, the introduction of CAFE standards in the US in the late 1970's, the 2008 financial crisis, and the 2020 pandemic-related drop in oil demand. Global oil consumption has only dropped a few times since 1975, and each time it was followed by a crash in oil prices.

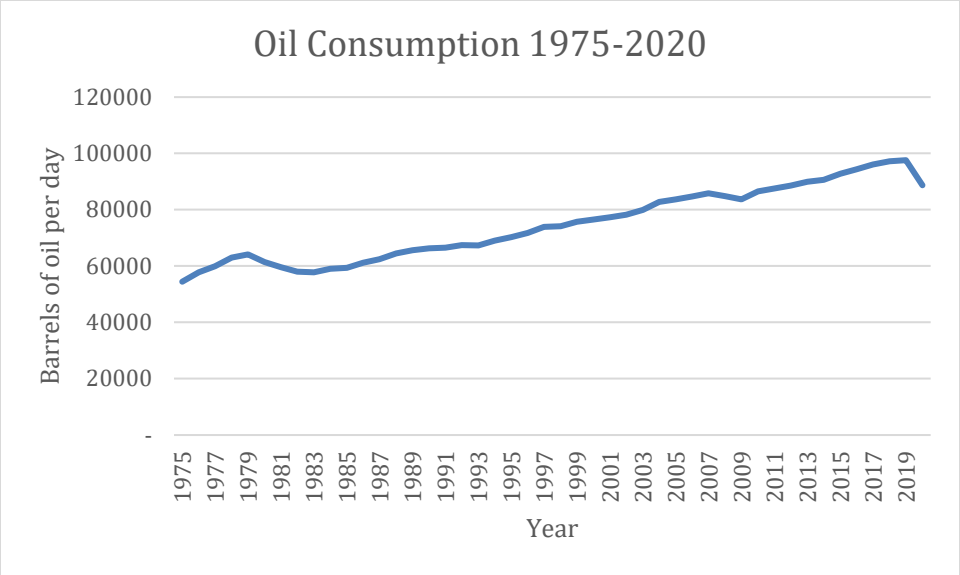



**Table 1: World Oil consumption 1975-2020. Source 2021 BP Statistical Review of World Energy, Rapid Substitution Researchers.**

When the adoption of electric vehicles reduces oil demand by percentages similar to these historical precedents, the price of oil will crash, saving consumers thousands of dollars and building political and financial support for the energy transition.

# The Fuel Burden

Before getting deeper into the details of how EVs will save everyone money, it's important to understand just how much the world spends on oil. It's a lot!

Using 2019 as a reasonable pre-COVID baseline, a barrel of oil averaged $64.21 and the world consumed nearly 98 million barrels per day. That's over $6 Billion/day and nearly $3 Trillion/year![1] In the US we used around 19.4 million barrels of oil a day and spent a total of $450 Billion in 2019!

Average annual household spending on gasoline in the US is over $2,000 which is more than three percent (3%) of total household spending.[2] The burden of fuel falls hardest on the poorest families, as those in the lowest twenty-five percent (25%) income bracket spend over more than six percent (6%) of their household expenditures on gasoline[3].

Lowering this spending is a tremendous opportunity to improve the checkbooks and lives of all Americans, but especially those with the lowest incomes and doing it without additional government subsidies or controversial programs.

# Why EVs will save EV drivers money

Owning and operating an EV is much less expensive than owning an equivalent gasoline-powered vehicle, even considering the initial higher purchase prices for EVs.

A 2020 Consumer Reports analysis shows that during the first seven years of ownership, EVs save their owners between $6,000 and $10,000 over the cost of buying and operating a similar gasoline-powered vehicle.[4]

A typical EV owner spends around sixty percent (60%) less on fuel than the owner of a gasoline-powered vehicle.

For the owner of an SUV, that means spending an average of $780 a year instead of $1,800. The difference varies based on the vehicle as shown in the table below which compares annual ICE fuel costs to the equivalent battery electric vehicle (BEV).

Annual Fuel Cost Comparison between ICE and EVs

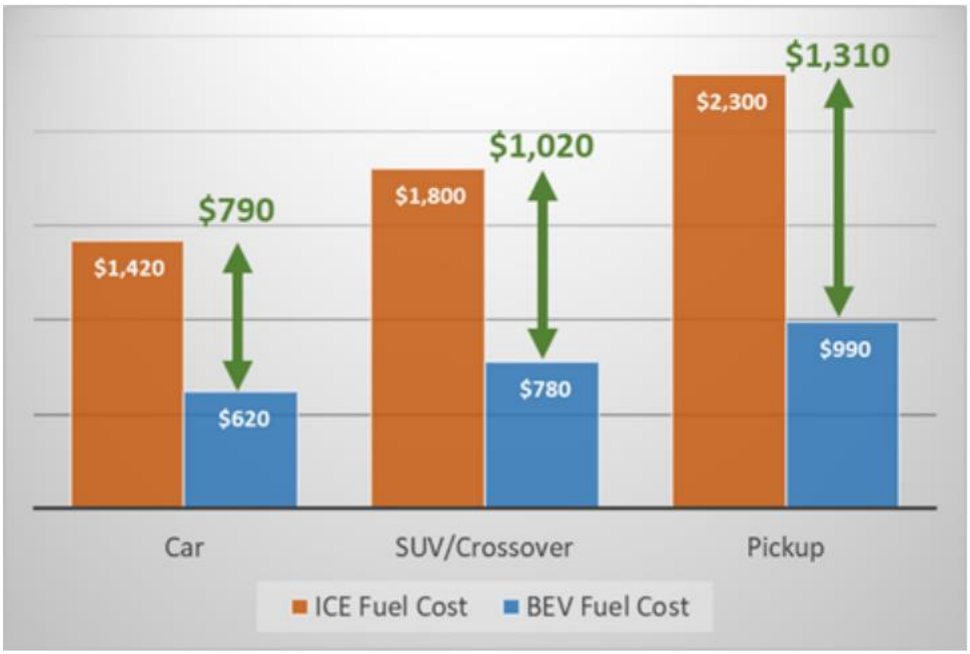



**Table 2: Fuel cost comparison between ICE and BEV vehicles. Source: Consumer Reports**

EVs are also cheaper to maintain. Real-world maintenance and repair data from Consumer Reports customers shows that EV owners spend less than half as much on maintenance and repairs as the owners of gasoline-powered cars. Lifetime maintenance costs for gasoline-powered cars average $9,200, compared to $4,600 for EVs. This makes sense, since gasoline-powered vehicles have about five times more parts to go wrong than EVs.

The Consumer Reports analysis comes to a clear conclusion: “The latest generation of mainstream EVs typically cost much less to own than similar gas-powered vehicles, a new development in the automotive marketplace with serious potential consumer benefits.”

## Why EVs Save Everyone Money

EVs will crash the price of oil by lowering demand for oil. It’s that simple. The less demand for any product, the cheaper the price. That means that people still driving gasoline-powered cars will also save money thanks to more people driving EVs.

As EVs gain market share and start to meaningfully reduce miles driven in ICE-powered vehicles, demand for oil will drop and then prices for oil and gasoline will drop. This will make consumers happy and build political support for the energy transition.

The **Rapid Substitution** research team predicts that a five-percent (5%) reduction in oil demand will lead to a fifty-percent (50%) reduction in oil prices. An average American household that spends around $2,000 per year on gasoline will save around $1,000. Businesses and governments will also pay less for gasoline, freeing up cash for other purposes.

While lower demand means cheaper prices for most products, there are several characteristics of oil production that make this dynamic especially relevant.

# Characteristics of Oil Production

There are several characteristics of oil production that lead to the phenomenon where a small decrease in oil demand causes a much larger drop in oil prices. This has to do with oil supply elasticity, the shape of the oil supply curve, and what the **Rapid Substitution** team calls the **Oil Scarcity Premium.**

These characteristics all contribute to explaining why relatively small changes in oil demand have a huge influence on oil prices.

## Oil Supply Elasticity

Finding and developing new supplies of oil takes a long time and costs a lot of money. Eventually, higher oil prices encourage companies to make investments in increasing oil production, but not right away.

A working paper from the Federal Reserve Bank of Dallas argues that the, “one-month oil supply elasticity is close to zero,” meaning that oil companies won’t increase or decrease production in less than a month based on changes in oil prices.

That’s the academic explanation, but practical explanations better illustrate the concept. Below are a few quotes from oil production experts as they received questions about stopping oil supply in Spring 2020:

> “Capping an oil well is not like putting the cap back on the ketchup bottle.” – Kent Smetters (Professor of Business Economics and Public Policy and Faculty Director of the Penn Wharton Budget Model.)

> “While it can cost millions of dollars to drill a new oil well — tens of million for offshore wells — it doesn’t cost much to keep an existing well running. That’s one reason so many companies were slow to respond to the virus outbreak. If you can clear your operating cost and continue to produce profitably, that’s the analysis that producers go through.” – Mark Berg (Vice President at Pioneer Natural Resources)

And re-starting production isn't much easier. Here's a quote from Art Berman, a petroleum geologist who writes about the oil industry:

"It takes several months between an upward price signal and a signed contract for a drilling rig. It takes another 9 to 12 months from starting a well to first production for tight oil wells." Demand for oil does not respond much to the price of oil. Most people still have to commute or drive for work even if the price of gasoline doubles.

A study by the International Monetary Fund confirms this point. The paper considers twenty years of historical data suggesting that the short-term elasticity of oil demand is –0.019, meaning that the first one-percent (1%) decline in demand should result in an approximate fifty-three-percent (53%) price drop. While that number may seem shocking at first glance, consider the oil shock in 2008 when, during a six-month period, a three-percent (3%) drop in demand was accompanied by a seventy-percent (70%) drop in the price of oil. Recall that this function can be explained by the shape of the supply curve (see next section), where the steepness of the 'blade' portion results in exaggerated movements in price in response to changing demand.

**Table 3.1. Oil Demand Price and Income Elasticities**
*(Subsample, 1990–2009)*

| | Short-Term Elasticity | | Long-Term Elasticity | |
|---|---|---|---|---|
| | Price | Income | Price | Income |
| Combined OECD[1] and Non-OECD | –0.019 [–0.028, –0.009] | 0.685 [0.562, 0.808] | –0.072 [–0.113, –0.032] | 0.294 [0.128, 0.452] |
| OECD | –0.025 [–0.035, –0.015] | 0.671 [0.548, 0.793] | –0.093 [–0.128, –0.057] | 0.243 [0.092, 0.383] |
| Non-OECD | –0.007 [–0.016, 0.002] | 0.711 [0.586, 0.836] | –0.035 [–0.087, 0.013] | 0.385 [0.193, 0.577] |

Source: IMF staff calculations.

Note: Median elasticities and confidence intervals showing 10th and 90th percentile of the distribution in brackets are estimated by Monte Carlo simulations. Long-term elasticities are calculated using a 20-year horizon.

[1]OECD = Organization for Economic Cooperation and Development.

**Table 3: Oil Demand Price and Income Elasticities, Source: International Monetary Fund** [5]

Recent history indicates that a relatively small, short-term drop in oil demand leads to an exponential drop in oil prices.

We saw evidence of this in 2008 when over a six-month period, a three-percent (3%) drop in the demand for oil[6] resulted in a seventy-percent (70%) plunge in the price of oil[7], and again in 2020, when a sudden, Covid-driven decline in demand briefly resulted in negative prices for oil futures.

Of course, those were short-duration shocks that caught suppliers off guard, and they may not provide an accurate assessment of how markets might respond to a more gradual, anticipated and permanent decline in oil demand, such as will occur as Electric Vehicles (EVs) become an increasing percentage of the world's fleet.

If a more gradual drop in oil demand results in a similar disproportionate drop in oil prices (utilizing the long-term Demand Price Elasticity figure), we expect that as EVs replace gasoline-powered vehicles, oil prices will crash and then stabilize by 2030 at just above the cost of production, which presently is in the vicinity of $30 a barrel.

## Oil Supply Curve

As oil demand decreases – even by a relatively small amount – it moves down the oil supply curve. Due to the steep shape of the oil supply curve a small reduction in oil demand means that the most expensive oil won't be produced. This lowers the point where supply and demand intersect, lowering the market-clearing price.

Most of the oil the world needs is produced relatively cheaply in the Middle East, Russia and South America. As demand increases buyers look for new sources of oil which means that oil production increases in the more expensive areas like the Canadian oil sands. [A]

Consider the following graph which details the approximate components of the Oil Supply Curve for 2019, showing the relative production of oil sources around the globe and the cost of a barrel of oil from that source. The dynamics of oil production create a supply curve that resembles a horizontal hockey stick. There is a long period where gradual price increases are met with gradual increases in production, followed by a steep upturn in price, reflecting the increasing difficulty and expense of finding and developing that new oil. [B]

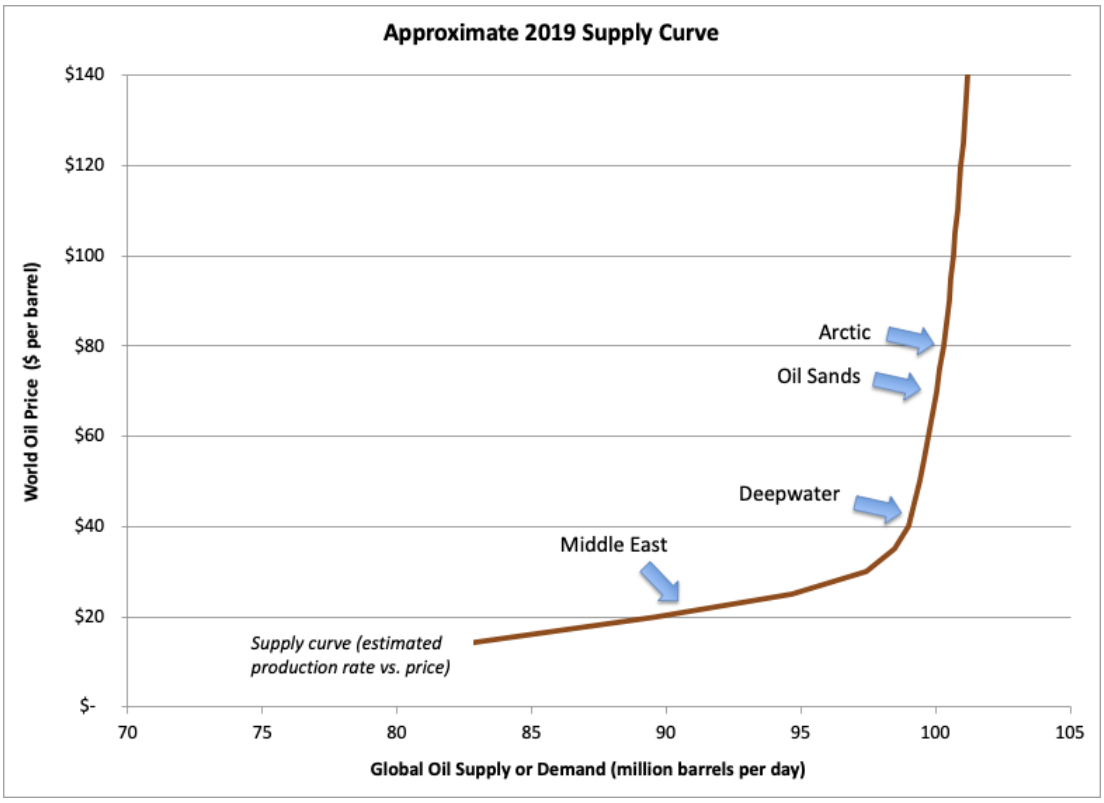



**Table 4: Source: EIA, Rystad Energy, Rapid Substitution Researchers**

[A] https://www.rystadenergy.com/newsevents/news/press-releases/as-falling-costs-make-new-oil-cheaper-to-produce-climate-policies-may-fail-unless-they-target-demand/
[B] https://www.woodmac.com/reports/upstream-oil-and-gas-global-oil-cost-curves-and-pre-fid-breakevens-updated-h2-2018-211878

Below is a more detailed graph from Wood Mackenzie showing the same dynamic.

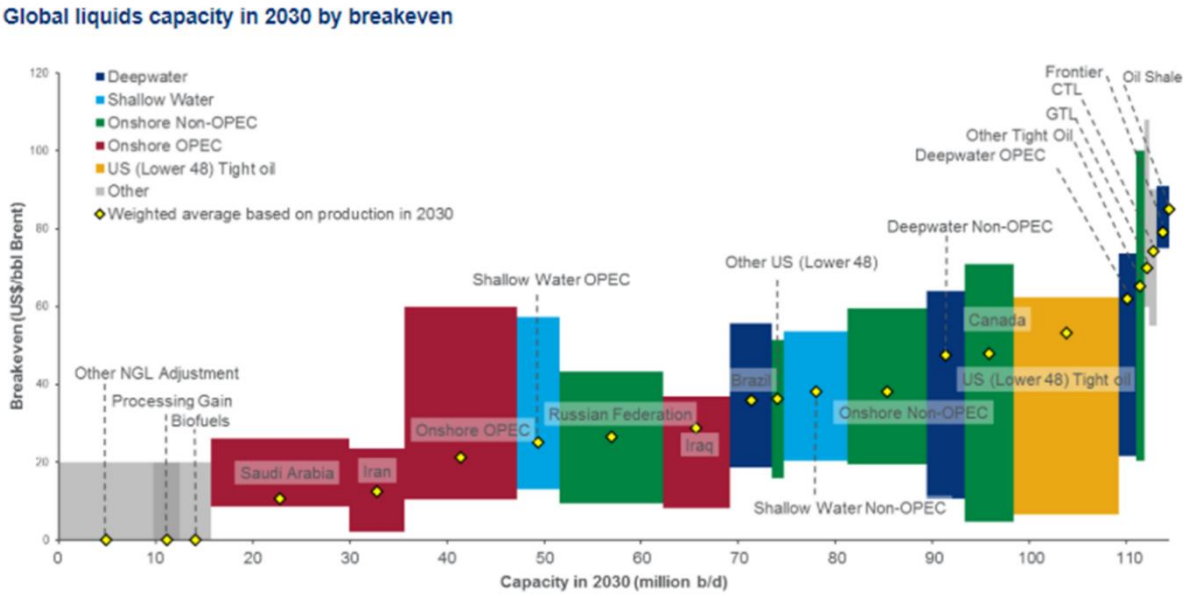



**Table 5: Estimate Global Liquids Capacity in 2030 by breakeven price**
**Source: Wood Mackenzie**

Compared to the world's more easily extracted oil, such as from vast fields in Saudi Arabia, producers require higher prices to justify the much more costly exploration, leasing, and drilling for that new oil, as well as getting that oil to market. Examples of this include development of wells in deep water and Arctic situations, along with oil derived from less conventional sources, such as tar sands.[8] At some point, however, the supply of developed oil hits a limit where no amount of demand or price increase can generate further near-term increases in production capacity.

The fact that tar sands and other unconventional methods of oil extraction have become an increasingly greater percentage of global oil production since 2000, when prices rose dramatically, is testament to both the exigent nature of oil demand and the increasing difficulty and expense of finding and developing new production.

## Oil Scarcity Premium

The **Rapid Substitution** team has developed the concept of the **Oil Scarcity Premium**. The Oil Scarcity Premium kicks in when high demand for oil runs into a fixed supply, each additional barrel drives the market price dramatically above the production cost, especially since oil companies have high fixed costs and low variable costs.

The concept of the Oil Scarcity Premium also draws on work done by Paul Leiby on the monopsony oil premium.[9] Since the supply of oil at any time is relatively fixed, increased demand for oil drives prices up because supplies cannot be increased fast enough.

Two factors mean the supply of oil that can be produced at any given time is *relatively* fixed.

1. In the short term, only a certain amount of oil can be easily extracted from the ground, namely from wells in established fields that have necessary infrastructure already built around them.

2. Discovering and developing new sources of oil, then constructing new production and distribution infrastructure to service them requires considerable time and financial investment.

Consequently, over the short term, rapid increases in oil demand have a relatively muted effect on the quantity of the global oil supply.

Instead, because of market forces, as consumers compete for a limited supply, increased demand usually drives up the price of oil. When supplies are limited for any reason, such as a conflict in an oil-producing region, prices go up as buyers compete for the remaining supply. Other producers cannot increase production fast enough, so the only option is for prices to go up.

This leads to the following two situations:

1. When demand for oil increases quickly – even by a small amount – the price rises out of proportion to the demand increase.
2. And conversely, when demand for oil decreases quickly – even by a small amount – the price goes down out of proportion to the demand decrease.

This is where EVs come in. They decrease the demand for oil on a steady and sustained basis, driving the price of oil down out of proportion to the demand decrease.

## Oil Price Crash

Because of the shape of the oil supply curve, the inelasticity of oil supply, and the removal of the Oil Scarcity Premium, the introduction of EVs will permanently drive down the price of oil.

EVs will decrease demand for oil moving down the oil supply curve and crashing the price. In other words, because it's so difficult to stop the production of oil and since the last few million barrels pumped per day are always the most expensive, EVs will dramatically lower the overall price of oil.

It will take around 126 million EVs to lower oil demand by five percent (5%). According to Bloomberg New Energy Finance's 2022 report there are already around 20 million EVs on the road and there will be 77 million on the road by 2025. The best estimate is that EVs will start to impact the gasoline price between 2025 and 2030. [10]

When EVs displace enough gasoline-powered vehicles to lower oil demand by around five percent (5%) the most expensive sources of oil will no longer be needed to meet demand. This will lower the market clearing price lower, making the price for all oil lower. If oil producers are unable to reduce production fast enough, the price of oil will drop by around fifty percent (50%).

# Historical Precedents

Oil consumption has grown gradually over the years, nearly doubling since 1975. Demand has very rarely gone down, but over that time, there have been three major decreases in oil consumption. Each has been followed by a crash in oil prices.

## CAFE Standards

For evidence of how this could work, look back to the mid-1970s, when the introduction of Federal CAFE (Corporate Average Fuel Economy) standards for vehicle efficiency contributed to a sharp decline in oil demand that resulted in much lower oil prices for almost a decade.

First implemented in 1978[11] in response to declining U.S. control of oil markets because of the OPEC cartel (and rising oil prices), CAFE standards were initially intended to double the average fuel economy of the new passenger vehicle fleet, a gradual process to be implemented over a roughly twelve-year period.

During the same period, oil prices[12] gradually fell from a high of $120 per barrel in 1980 to below $40 per barrel (inflation adjusted), where they would remain until the early 2000s.

In other words, a long-term, twenty-percent (20%) reduction in demand for oil was accompanied by a consistent seventy-percent (70%) drop in the price of oil. [13]

## The 2008 Financial Crisis

In June 2008 the cost of oil was well over $100/barrel as small increases in demand had bid up the price of oil. The financial crisis reduced economic activity causing oil demand to decline by a few percentage points. Oil demand dropped by just three percent (3%), but that was enough to crash the price of oil.

However, the relatively small decline in oil demand stopped buyers from bidding up the price of oil and made producers compete with other producers to sell their oil. This crashed the price of oil, as it plummeted from $128/barrel to $38/barrel in just a few months.

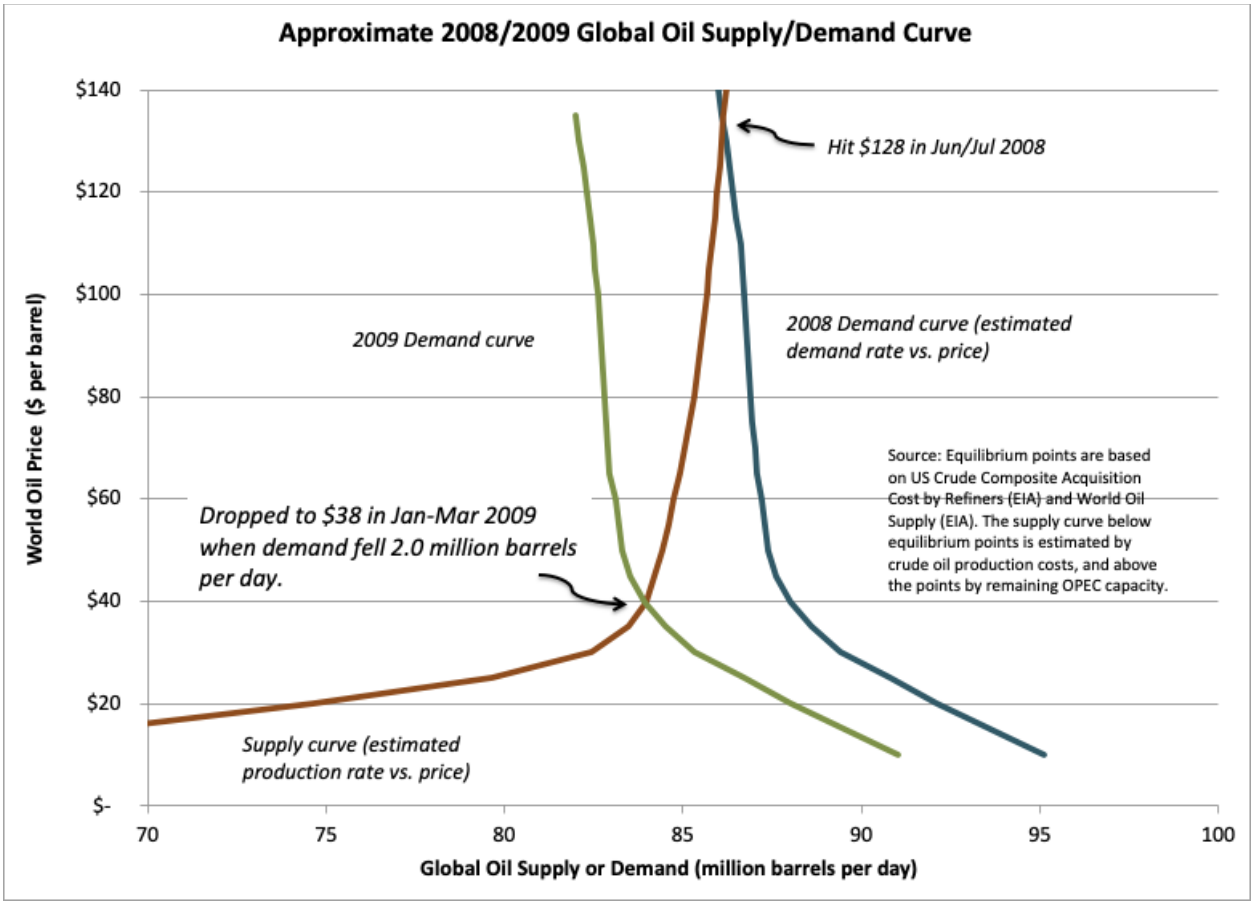



**Table 6: Approximate 2008-2009 Global Oil Supply/Demand Curve**
**Source: Rapid Substitution Researchers, BP Statistical Review of World Energy**

## The 2020 COVID-19 Pandemic

The COVID-19 Pandemic, which began in the early months of 2020, resulted in a near world-wide shutdown in March of 2020.

Prior to the pandemic oil prices had been around $60 a barrel for most of 2018-19. In weeks the price of oil dropped to $20 a barrel. A drop of over sixty-five percent (65%) in a very short period of time. While it felt as though the world had stopped, actual oil consumption dropped by less than twenty percent (20%).[14]

Part of the theory of **Rapid Substitution** played out: a drop in demand caused oil prices to crash. As demand increased, oil prices soared for the same reason. It is really hard to stop and then restart oil production.

# The Many Paths to Using Five Percent Less Oil

Assuming that every EV sold represents one internal combustion engine (ICE) vehicle not driven, we can conclude that EVs will have the effect of reducing the demand for oil commensurate with the gasoline needs of the ICE vehicle that was replaced. In this way, the replacement of ICE vehicles with EVs will cause downward pressure on the price of oil.

So how many EVs will it take to significantly reduce the price of oil and create financial savings for oil consumers?

If we set a goal of a fifty-percent (50%) reduction in oil prices, then one major element of achieving that would be to require that enough EVs are sold to reduce demand for oil by five percent (5%). Five percent (5%) of all oil produced in 2019, the most recent year for which we have "normal" data, is 1.8 billion barrels.

A typical ICE vehicle uses between 11.3 barrels (for cars) and 15.6 barrels (for pickup trucks and SUVs) of oil each year, depending on the type of vehicle. The number of barrels consumed each year depends on the type of ICE vehicle considered. Trucks and SUVs have lower fuel efficiencies than cars and thus have a greater effect on oil demand destruction. We assume on average both cars and light trucks will drive approximately 11,500 miles per year.

Considering current vehicle-buying preferences[15], we are assuming that seventy-two percent (72%) of EVs sold will replace an ICE truck or SUV and twenty-eight percent (28%) will replace a car.

It would take selling a total of 126 million EVs (91 million trucks and SUVs and 35 million cars) to reduce oil demand by 1.8 billion barrels (or five percent (5%) of 2019 demand), which would push oil prices below $35 per barrel (1,800,000,000 = .28X*11.3+.72X*15.5).

Obviously, some drivers use more gasoline than others. For example, a contractor who drives a truck around all day uses more gasoline than someone who works from home. The more these "superusers" replace their ICE vehicles with electric ones, the fewer vehicles will need to be replaced to reduce oil demand by 5%. In fact, Coltura (a non-profit organization with the mission of improving climate, health and equity by accelerating the switch from gasoline and diesel to cleaner alternatives) has a plan to direct EV subsidies to these superusers, which is a more efficient way to reduce overall carbon emissions and would drop the price of gasoline more quickly than non-targeted subsidies.[16]

Using BloombergNEF's Electric Vehicle Outlook 2022[17], we expect there will be at least this number of EVs on the road at some point between 2025 and 2030. As supportive government legislation is enacted around the globe, EV manufacturers may reach this milestone even earlier, especially in consideration of recent large (and increasing) EV investments by legacy auto manufacturers[18], new startups[19], and Tesla[20] in EV production.

To view various scenarios on how replacing ICE vehicles with EVs will impact overall demand for oil , check out the **Rapid Substitution Calculator.**

# Why EVs Keep Getting Cheaper

Fortunately, the path to reducing oil consumption by five percent (5%) through electric vehicles will be even less costly than it might seem. In addition to spending less on oil, we will also be spending less on electric vehicles since making more EVs will enable us to make EVs cheaper.

Wright's Law states that, "for every cumulative doubling of units produced, costs will fall by a constant percentage." Basically, the more we make of something the cheaper it gets. Prices get exponentially cheaper.

Theodore P. Wright developed the rule while studying airplane manufacturing in the 1930's, but his rule applies to most goods.

Take television sets for example. As the following graph shows, over the years they have gotten much cheaper and better.

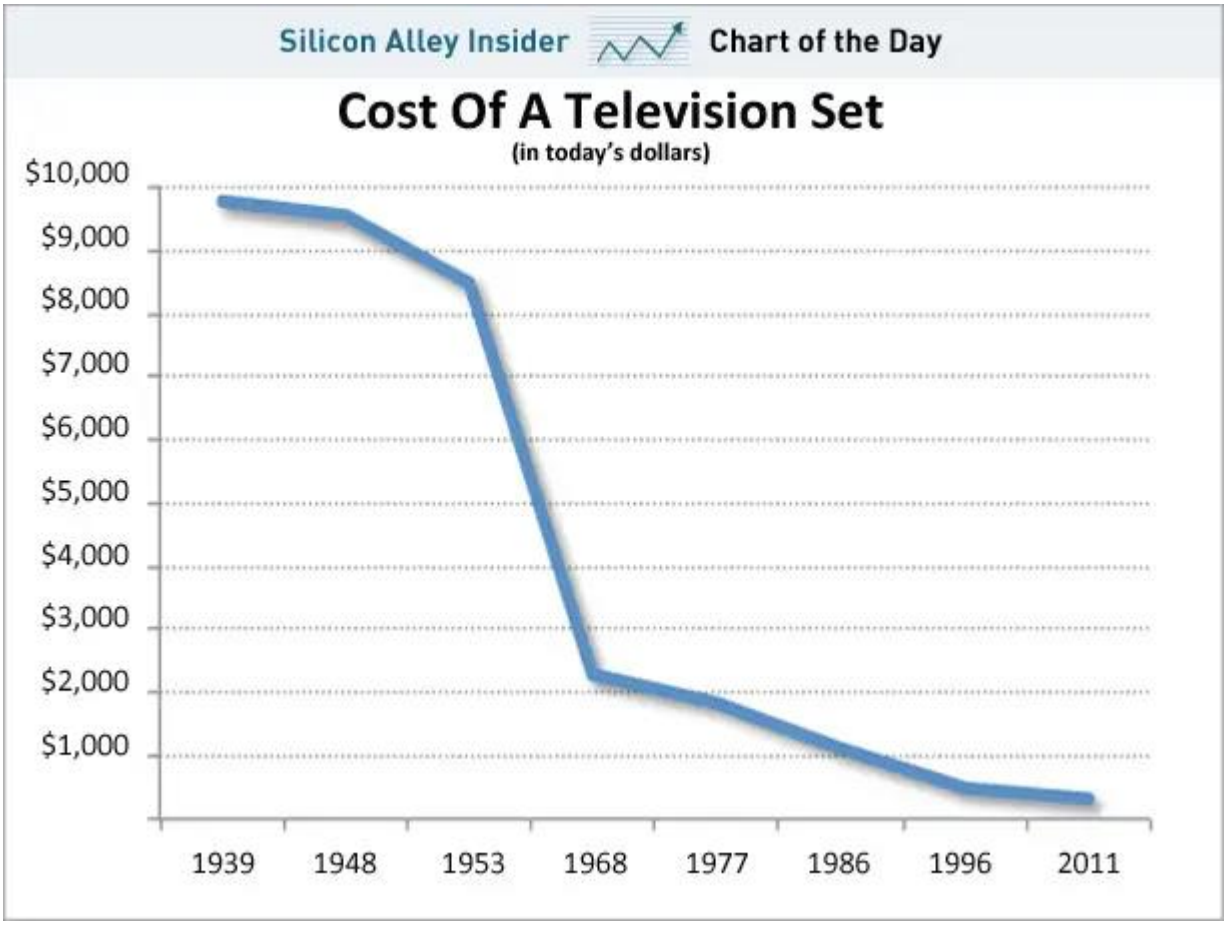
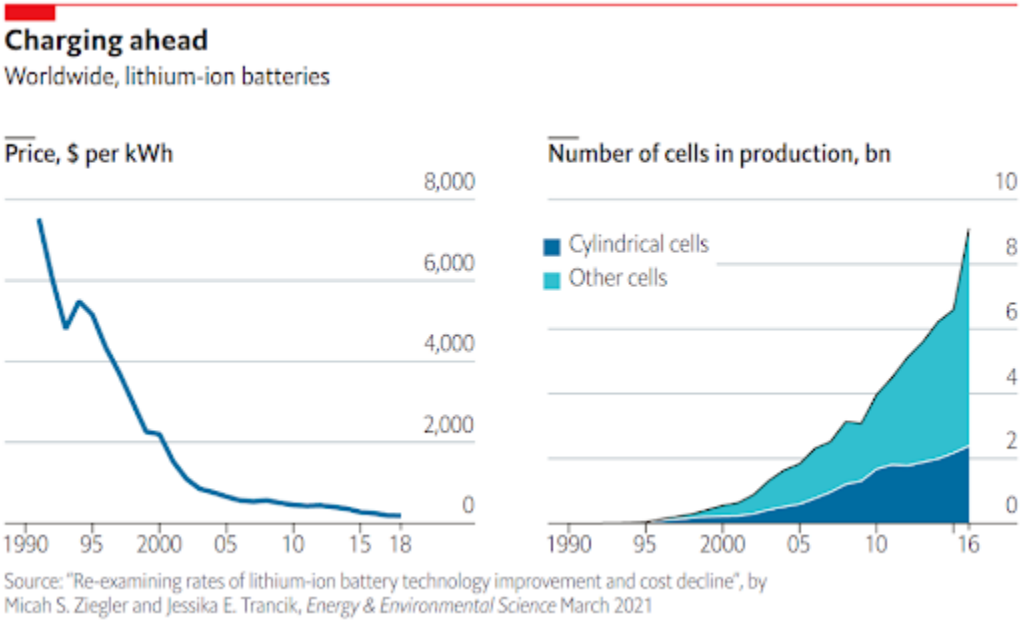



**Table 7: Declining cost of a TV set[21] Source: Business Insider**

The same phenomenon is happening with electric vehicles. The price of lithium-ion batteries has fallen exponentially over the decades as we've been making more of them. This is one reason why EVs have already become less expensive, and they will continue to get even cheaper the more of them we make.




# Policies to save everyone money

If getting 126 million EVs on the road will crash the price of oil and make transportation cheaper, it seems like a logical policy would be to encourage EV adoption so we reach 126 million EVs sooner rather than later. A number of policies that would accelerate EV adoption such as targeted subsidies for EVs, improvements in urban planning and micro-mobility, and appointing a federal "project manager" to accelerate the transition. A floating tax on the crashing price of oil could also help the government capture savings and apply the revenue to funding additional green infrastructure.

## EV subsidies

**Rapid Substitution** provides an important argument in favor of subsidies for electric vehicles. Expanded EV subsidies would encourage mass adoption of EVs, causing prices to drop and reducing our dependence on oil and gasoline. The drop in oil and gasoline prices will create a huge benefit to consumers and businesses and is an important justification for subsidizing EVs.

## E-bikes, scooters, transit and urban planning

According to the 2017 National Highway Transportation Survey[22], sixty percent (60%) of car trips in the US were five miles or less. With the right combination of protected bike lanes, sidewalks, and neighborhood greenways, many of those trips could be made by bike, e-bike, e-scooter or simply walked. The planning and infrastructure required to make it easy to take short trips by e-scooter also make it easier to get around by walking or biking. Think about how much more pleasant it would be to get around if even half of the drivers on short trips switched to e-scooters or e-bikes!

The E-BIKE act would allow a thirty-percent (30%) refundable tax credit for e-bike purchases.[23] E-bikes are a great option for short trips and a way for households to reduce the number of cars they own. Every ICE car that is replaced by an E-bike reduces oil consumption by 11 barrels per year and each SUV or truck by 16 barrels.

## Project Manager

Transitioning from carbon-based to a mostly electric economy means that a lot of stuff (solar panels, heat pumps, electric vehicles etc.) will have to be built.

To get an idea of the scale of the transition required consider the case of electric vehicles. In 2020, 296,000 plug-in light duty electric vehicles were sold in the US, out of a total market of around 15 million light-duty vehicles (cars, SUVs, light trucks). Eventually most new vehicles will need to be electric. That will require a giant increase in manufacturing capacity, creating major disruptions to existing supply chains, requiring new skills for workers, and a host of other issues. It is also a huge opportunity, as some industries grow and others are created.

Ensuring that this energy transition maximizes benefits and minimizes costs will require some entity to manage the transition.

Examples of similar government project managers from US history include:

- The War Production Board during World War II which supervised the Arsenal of Democracy
- The Texas Railroad Commission which effectively controlled oil production and oil prices during the middle decades of the 20th century
- Ron Klain's role as White House Ebola Response Coordinator
- A National Climate Advisor with expanded powers

Another example of a similar role is W. Edwards Deming's work on Total Quality Management and the rebuilding of industry in Japan after World War II.

Some entity needs to have the authority and responsibility for managing the energy transition in order to maximize benefits and minimize disruptions to daily life. There will certainly be big changes to both the economy and how we live our lives. The private sector has an important role in innovation and deployment of clean energy technologies. However, without an enabling policy environment, the transition will be too slow and the cost of energy will be too high. On the other hand, with the right leadership and policy environment, clean energy can dramatically improve our quality of life.

## A Floating Tax

One way to take advantage of an oil price crash due to inelastic oil supply is through a floating tax. A tax based on these principles presents the US Federal Government with an opportunity to generate tens of billions of dollars in new revenue.

If, for example, Congress was to establish a floating tax that would be automatically implemented when the cost of oil drops below a certain level (say $50/barrel), the Federal

government could raise billions of dollars that could be re-invested in other clean energy efforts. Here's how that math works.

In 2019, American consumers (including business and government entities) spent around $479 billion on oil products. If the price of oil were to drop by fifty percent (50%) to $32 a barrel, consumers would be paying around $240 billion for their oil and **not spending** another $240 billion!

At that point, the Federal government triggers the floating tax, collecting the difference between $32 and $50. That's $18 per barrel!

Unlike traditional carbon taxes, this price floor on oil would be less likely to cause public outrage. As oil prices fall below $50/barrel, consumers and businesses will be paying lower prices at the pump and focus less on the fact that global oil prices have fallen even lower.

To provide further context for what these prices mean for consumers at the pump, in May 2017, oil prices averaged around $50/barrel. That month, US consumers paid an average of $2.30 per gallon of gasoline.[24] In November 2019, the average price of oil was $64 per barrel, and the price at the pump was $2.50 per gallon.

Obviously, numerous details must be worked out in order to implement this tax. Where in the value chain would the tax be implemented? Would it float daily, weekly or monthly? Regardless, the revenue potential is massive and the idea merits further study.

# What If the Energy Transition Is Too Slow?

As the name suggests, the **Rapid Substitution** team advocates for quickly switching from fossil fuels to clean electricity to power our transportation systems. That has two main advantages:

1. It will be a lot cheaper in the long run
2. It will immediately reduce greenhouse gas emissions

Conversely, the consequences of switching too slowly are:

1. It will be much more expensive n the long run
2. It will result in much more greenhouse gas emissions.

According to the International Energy Administration, fossil fuel investment is already dropping in line with a pathway to limiting global warming to 1.5 degrees Celsius. The problem is that investment in clean energy is far below what it needs to be to provide enough electricity to meet world demand over the next few decades.  When demand exceeds supply, prices will soar.

Understandably, fossil fuel companies have cut their capital expenditures in recent years. Why make an investment with a thirty-year time horizon when it is uncertain how much fossil fuels we will be using in thirty years? That means that we can't really continue using fossil fuels at current levels. We need to effect a **Rapid Substitution.**

We need to switch quickly to clean electricity and electrified transportation in order to avoid high energy prices over the next few decades, [25] not to mention being increasingly dependent on the whims foreign despots.

# Why are gasoline prices still high?

This report asserts that when electric vehicles are able to lower oil demand by five percent (5%) then prices will crash. So why are gasoline prices still high?

First, EVs haven't really done much to lower oil demand. As of April 2022, there are only around 20 million EVs on the road, and it will take 126 million to lower oil demand by enough to impact oil prices.
As EVs take over they will lead to a structural shift in the oil market. However, for now their impact is minimal, so EVs have no impact on current gasoline prices.

The rise in EVs will crash oil prices for the same reason that oil prices are so high in 2022. Oil supply is inelastic. It's very difficult for oil companies to quickly increase or decrease their production. So, when people use more gasoline, it can quickly drive up the price of oil. However, the reverse is also true. When people start using less gasoline oil prices will drop.

That leads to an optimistic prediction. As EVs become increasingly popular, gasoline consumption will decline and prices will drop saving consumers and business billions of dollars.

# Conclusion

More electric vehicles will make gasoline cheaper for everyone. It won't happen overnight, but EVs will lead to a structural shift in oil markets. Just like the three previous cases where oil consumption declined, EVs will cause oil prices to plunge, but this time permanently.

Lower oil prices will save consumers thousands of dollars which will build political support to accelerate the energy transition especially among the lowest income bracket which is most burdened by high fuel costs.

The shift from ICE vehicles to EVs and the broader energy transition will cause a major disruption to the economy. A dedicated federal "project manager" can maximize the benefits from the transition and minimize the disruption. There are plenty of precedents in American History for this sort of "project manager."

Ultimately, the faster we transition to EVs the sooner we will see the price of oil fall and the more money we will save.

The more electric vehicles there are on the road, the cheaper gasoline will be for everyone!

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