The Case For Oil

BY LEE LANE

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Back in 2006, President George W. Bush charged that "America is addicted to oil." And five years later, President Obama echoed the view, lamenting "the hard truth" that price volatility at the pump is inevitable as long as we are dependent on the stuff. Indeed, both presidents shared the near-consensus view of the policy establishment that Americans must cut back on oil use in general and gasoline in particular, favoring tougher fuel efficiency standards for autos, mandated use of renewable fuels and subsidies for plug-in electric vehicles like the Chevy Volt.

But could presidents who have agreed about little else be wrong this time around? I think so. Someday, some way, the global economy will make the transition to other fuels for transportation, space heating and industrial feedstocks. But the economic and geopolitical arguments for proactive policies that aim to wean Americans from the pump don't wear well in the light of day.

Skeptical? Read on.

JUST THE FACTS

The anti-oil establishment is right about one thing: Americans use a lot of gasoline, which adds up to a lot of oil. In 2011, the consumption of motor gasoline, used mainly by autos and light trucks, averaged 8.74 million 42-gallon barrels a day. All told, the United States used 18.84 million barrels of liquid fuel a day, meaning gasoline represented a bit less than half the total.

Much of the concern about highway fuel use centers on oil imports. But the trend is toward less import dependence, not more. In 2006, imports represented 60 percent of United States oil use. Meanwhile, the Department of Energy forecasts that the current domestic oil boom (production is the highest it has been since 1998) will reduce that figure to 42 percent this year and 40 percent in 2013.

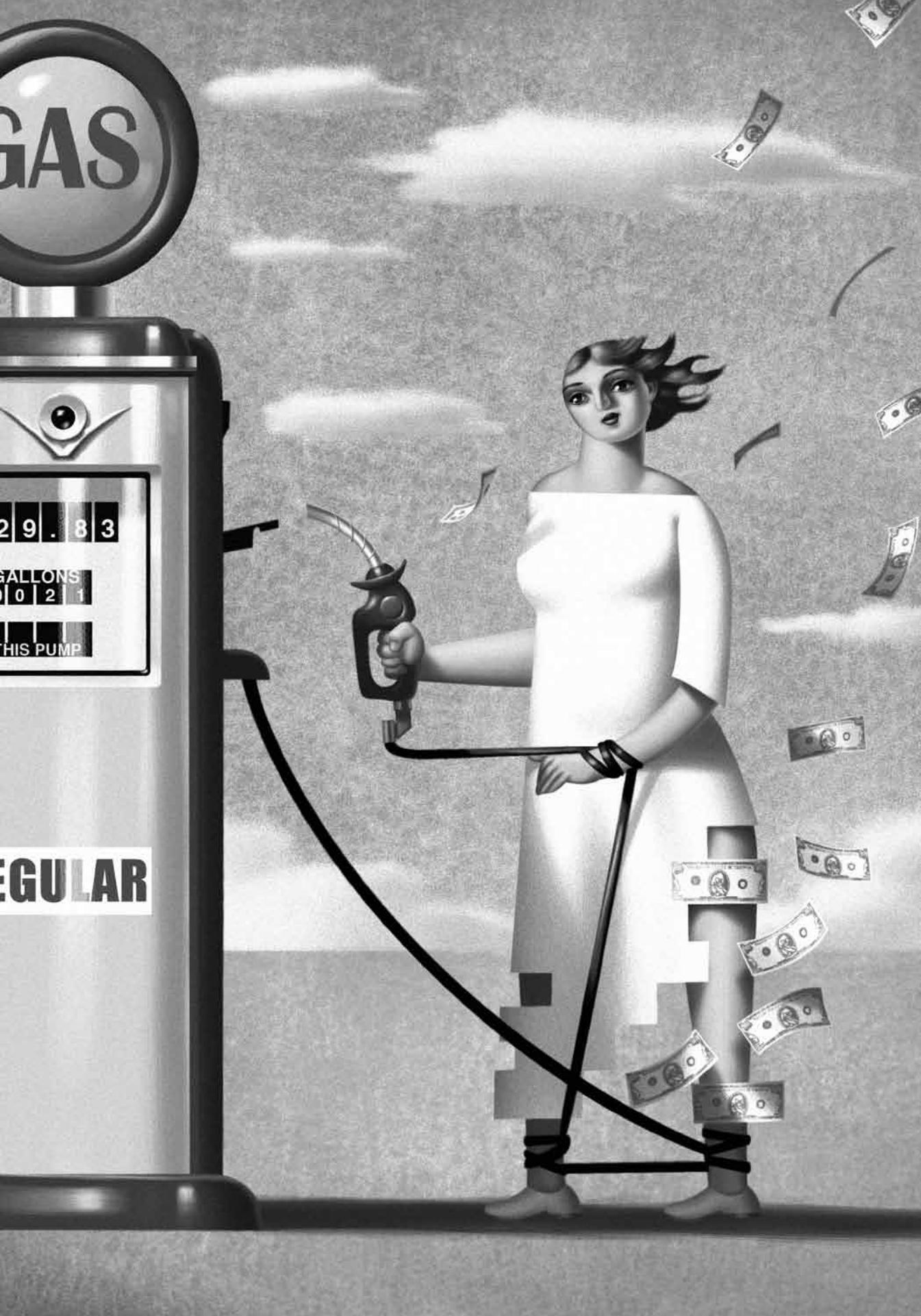
To be sure, the decline was caused in part by the recession and the subsequent slow recovery. A lot of it, though, stems from the technological dynamism of the industry. Offshore drilling has been able to advance into ever-deeper water. New ways of extracting oil (as well as gas) from shale formations have made it economical to exploit deposits that were previously out of reach. And the significant growth in production from Canadian tar sands promises very secure sources to feed a host of refineries in the United States capable of processing this high-sulfur crude – provided, of course, that the pipelines from there to here are built.

THE DOWNSIDE

So why has the conventional wisdom about oil not changed? One reason is that some long-term trends do remain worrisome. They're worth reviewing.

First, the price of oil (relative to services and industrial goods) is historically high. And while there will surely be dips along the road, it's likely to get higher as demand from China, India and other emerging-market countries grows faster than supply. Since the United States is a net importer, higher oil prices reduce national income. If we import eight million barrels a day (a conservative figure) and pay an average of $90 per barrel (also conservative), Americans will spend about $260 billion on

JIM TSINGANOS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foreign oil – about 2 percent of GDP and about 12 percent of total imports. That's probably less than you thought, but still nothing to sneeze at.

Second the price of oil, like the price of many commodities, is exceptionally volatile. Large corporations can (and do) use financial derivatives to hedge against volatility. The price of such insurance is not always cheap, however. And, in any event, smaller businesses and households generally must absorb the shocks without a buffer. But the economy as a whole is far less sensitive to price volatility than it was in the 1970s and 1980s – a change in oil prices alone is no longer likely to trigger a recession (or a boom). Yet, the subtler costs of oil price uncertainty, ranging from households' difficulty in planning budgets to auto companies' problems forecasting the composition of demand, are still significant.

Third, oil combustion accounts for more than one-third of global emissions of carbon dioxide, the primary man-made greenhouse gas. And while there is some room for disagreement about the magnitude and timing of the consequences, there's no doubt that climate change driven by carbon emissions will exact a cost. What's more, the division of the burden will have more to do with a country's geography and stage of economic development than with its contribution to the problem.

Finally, the distribution of easily exploited oil reserves is sharply skewed toward Persian Gulf countries, so, with time, production is likely to be increasingly concentrated in the region. And that raises issues ranging from the vulnerability of oil supplies to terrorism, to the risks inherent in depending on a politically unstable region.

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The global economy may be less sensitive to energy price and supply vulnerability than it was a few decades ago, but all bets would be off if, say, a revolutionary government in Saudi Arabia cut global supplies by 10 percent overnight. And the seriousness of such a possibility is reflected in the U.S. investment in military capacity in the region.

Thus, defenders of policies to conserve oil and substitute other fuels rightly point out that oil use entails a number of costs not reflected in the free market price of oil. Since the price of oil is not adjusted to internalize these "external" costs, the argument goes, consumers use too much of it and government efforts to conserve oil and switch to other fuels are justified.

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The reality that the societal cost of oil use exceeds the free market price doesn't necessarily imply that oil is used in excess, though, since the price at the pump includes taxes. The key question here is whether those taxes cover the externalities. And estimates of the external costs suggest that we come pretty close.

A good starting point is the National Highway Traffic Safety Administration's analysis used to assess the benefits of fuel efficiency standards for new cars and trucks. The NHTSA's study quantifies both the national security costs and environmental costs of fuel consumption. These include the risk that an oil price shock would trigger an economic contraction as well as the costs of greenhouse emissions and other pollutants. Converting the agency's estimates to a dollars-per-gallon basis suggests each gallon of oil-based fuel saved avoids about 61 cents in external costs.

To be sure, the NHTSA approach neglects some costs. For example, it excludes the effect of U.S. oil use on world oil prices. Reduced

consumption would tend to lower prices, and lower prices would save money for American consumers at the expense of the economic "rents" collected by foreign exporters. On the other hand, the NHTSA's global viewpoint badly overstates the value of oil savings from a parochial United States perspective. The analysis includes damage to other countries caused by climate change, which may well exceed 90 percent of the total. Luckily, though, the NHTSA's two big omissions are roughly equal in size. So the NHTSA number serves as a rough-and-ready reference point for assessing the magnitude of excessive U.S. oil consumption (if any).

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Note, though, that there is one other conceptual issue here that, to some, undermines the value of the NHTSA estimate. Most states devote fuel taxes to building and maintaining highways. And in recent years, as taxation has become less palatable politically, fuel taxes have been rationalized as "user fees" to cover the external costs of vehicle use. So, if fuel taxes offset damage to highways (and, arguably, the time lost to traffic congestion), wouldn't it be double-counting to assign them to cover emissions and national security externalities?

Not really. Fuel use is distinct from vehicle use – if automobiles and trucks ran on fairy dust (but were otherwise unchanged), the external costs of congestion and pavement wear would not be different. Or think of it another way: taxing fuel is, at best, an extremely inefficient way to internalize highway wear and congestion costs. The tax is the same whether one drives on the Dan Ryan Expressway in Chicago at rush hour or an empty rural road in North Dakota, or whether one is driving a fuel-sipping Prius or a fuel-guzzling Ferrari. Research shows there are good reasons to tax the externalities of highway use by means of tolls that vary with distance and time of day. But fuel taxes are no more highway externality taxes than are sales taxes on road maps or excise taxes on hotel rooms at Disney World.

Back to fuel taxes as taxes on the external costs of oil consumption. As of April 2012, the combined federal, state and local tax on gasoline averaged 49.5 cents per gallon, while the average for diesel was 54.6 cents per gallon. And that's only about a dime less than NHTSA's 61-cent external social cost estimate.

To equalize external costs and benefits, then, fuel taxes would need to be about 10 cents a gallon higher. In June 2012, gas prices averaged $3.62, so raising them by 10 cents a gallon would amount to 2.7 percent increase. Now, the elasticity of demand for gasoline – the responsiveness of demand to changes in price – is, at most, minus 0.7 (0.3 from driving less, 0.4 from shifting to more fuel-efficient cars). That is, a 1 percent increase in prices would lower demand by 0.7 percent. So if all the external costs of fuel use were included in the price at the pump, a 2.7 percent price increase would lead to only a 1.9 percent reduction in consumption in the long run.

OVERKILL OR WASTE – OR BOTH?

To be clear, the analysis above suggests that the taxes already in place cover most of the


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identified externalities of oil use (certainly of gasoline use) and that in an America in which the negative externalities were fully incorporated in the price, oil consumption would be about 2 percent lower. So from this perspective, a little fine-tuning might be in order. But oil-policy-as-usual hardly qualifies as fine-tuning.

Presidents Bush and Obama started from the premise that the current level of consumption constituted a crisis waiting to happen. Accordingly, Bush set the goal of cutting gasoline consumption by 20 percent in a decade. To my knowledge, Obama hasn't set a formal target. But his efforts to tighten automobile fuel economy standards (CAFE) and to increase subsidies for electric vehicles support an even more aggressive agenda.

To achieve their goals, the Bush and Obama approaches rely on three main components. They mandate the use of biofuels, toughen CAFE standards and subsidize plug-ins. All three are potentially wasteful, however, and should be viewed with skepticism even by those who support strong oil conservation measures.

First, they require a lot of redundant infrastructure. Ethanol must be kept separate from gasoline for storage and distribution. It cannot, for instance, be moved in oil pipelines. By the same token, electric vehicles (including plug-in electrics) would require a huge investment in charging systems and electricity distribution infrastructure if their use is to be scaled to the point that it makes much difference to oil consumption.

It follows that alternative fuel technologies are subject to enormous economies of scale – the production and distribution facilities need to be very large to reduce costs to manageable levels. And that reality increases the odds that a single technology will eventually dominate. Thus, trying multiple technologies simultaneously (as opposed to sequentially) almost guarantees that enormous sums will eventually be lost in the systems that lose the race.

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A government-financed program that invested solely in research and development could sidestep this problem, seeking to prove technologies ranging from EVs to cars built with lightweight materials to fuels synthesized from algae. Such a program could publish its findings, license technologies and allow the market to decide what commercial use, if any, should be made of them. Some of the concepts would flunk the market test – but, then, nothing more than the R&D costs would have been at risk. But under the current approach, federal mandates (and dollars) promote head-to-head commercial competition, and the likely losses in the winner-take-all contest will be much greater.

Second, the attempt to mandate accelerated technological change is problematic in itself. The Renewable Fuel Standard program (RFS2), for example, required a rapid ramp-up in the production of ethanol synthesized from inedible plants. But production has been disappointing, and the EPA has had to suspend the initial targets.

Private investors have good reason to doubt the goals' realism, suspecting that when push comes to shove, Washington will dump cellulosic fuels. Thus, ambitious targets increase regulatory uncertainty. And that uncertainty

JIM TSINGANOS

is likely to inhibit the very investments that the program aims to call forth.

In the case of EVs, battery technology is the giant question mark. Subsidizing today's battery technology runs the risk of locking in an inferior technology that delays or even prevents its replacement later on by better options. In another time (the 1980s) and another place (Japan), government policymakers made just this sort of mistake, creating a huge infrastructure for analog high-definition television that was made obsolete in the 1990s by the development of digital HD.

After accounting fully for gasoline's external costs, the use of corn ethanol yields a net loss to society well in excess of $1 per gallon. And while biofuel costs are likely to fall a bit with time, they will almost certainly remain more expensive than gasoline.

Third, the programs are not coordinated; each is driven by its own rigid targets, timetables and interest-group pressures. Each is likely to evolve in its own stovepipe, heedless of the changing costs and prospects of the others.

Indeed, the programs are not just poorly coordinated, they're actively in conflict. Higher CAFE standards and subsidies for electric vehicles depress demand for liquid fuel, while RFS2 requires that fixed volumes of renewable fuels be used. If total fuel use falls, the percentage of renewable fuels in the mix must rise. But older vehicles can accommodate only about 10 percent ethanol in their fuel.

Actually, a closer look at the individual programs suggests they aren't doing well even in their own terms.

The costs of the RFS2 program greatly exceed its benefits. The program divides renewable fuels into four classes, with each determined by the feedstocks from which the biofuel must be made. To qualify, fuels in each class meet a test for minimum reductions in lifecycle greenhouse gas emissions – although certain existing facilities are grandfathered.

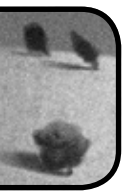
Ethanol from all feedstocks is proving to be very expensive. For example, to supply the energy in a gallon of gasoline with corn-based ethanol costs 45 percent (about $1.22) more than the gasoline. So after accounting fully for gasoline's external costs, the use of corn ethanol yields a net loss to society well in excess of $1 per gallon. And while biofuel costs are likely to fall a bit with time, they will almost certainly remain more expensive than gasoline.

The ultimate goal of the RFS2 is not corn-based fuel, but cellulosic ethanol that doesn't compete for land with food crops. But cellulosic ethanol is so expensive that it is not being produced in commercial amounts, even though the market is rigged by minimum-use mandates for alcohol. Indeed, the failure of cellulosic ethanol to appear on schedule threatens to destabilize the entire renewable-fuels program.

Because of this shortfall in cellulosic ethanol, fuel vendors have been forced to use an ever-larger percentage of corn-based ethanol

JIM TSINGANOS

in the fuel mix. Moreover, the cost of meeting the mandated ethanol volumes is driving up competitive prices at the pump. Yet, rising gasoline prices will further depress total fuel use, implying that the ethanol volume mandates will drive up ethanol's share in the fuel mix still more.



One unintended consequence of our crash program for reducing CO2 emissions by developing renewable fuels is the clearance of forests that sequester CO2 from the atmosphere.

At some point, ethanol proportions in the fuel mix will rise above the levels that are safe for older cars and for small gasoline engines used for other purposes, effectively forcing the retail industry to accommodate separate mixes. Even so, fueling mistakes (and engine damage) will always be a risk.

RFS2, by the way, has already diverted roughly a third of the U.S. corn crop from use in human food and animal feed. Combined with effects of the European Union's parallel Renewable Energy Directive, the result has been to raise world food prices. Americans, one might argue, can afford to pay the extra dime for a pound of ground beef or a six-pack of Mountain Dew. Billions of consumers in developing countries cannot.

Consider another strand of the tangled web woven by RFS2: it increases the pressure to fell tropical forests in order to expand cropland needed to make up for land diverted to fuel. So one unintended consequence of our crash program for reducing CO2 emissions by developing renewable fuels is the clearance of forests that sequester CO2 from the atmosphere.

CAFE standards must undermine welfare unless one believes that car buyers are systematically wrong about what they like. Roughly two-thirds of the benefits that NHTSA claims from raising CAFE standards would accrue to auto buyers themselves in the form of lower driving costs. Or to put it another way, the NHTSA assumes that we need the CAFE standard because consumers wouldn't otherwise act in their own interests.

For the NHTSA to be right, drivers must not only make mistakes when assessing the costs and benefits of higher mileage vehicles, the mistakes must be strongly biased in favor of purchases of gas guzzlers. This bias seems unlikely. For one thing, buyers have access to diverse sources of information about these matters – among them, the Monroney sticker attached to every new car, which shows an estimate of annual fuel savings. For another, individual buyers presumably know more than NHTSA researchers do about the benefits they derive from features that reduce fuel economy – safety, ride comfort and luxury features.

Certainly, the NHTSA's estimates of the external costs of fuel do not support its claims about the new standards. Using a 3 percent discount rate, the NHTSA estimates that the present value of all the external costs avoided by the CAFE standards is $28.8 billion. However, it neglects the fact that fuel taxes already internalize about two-thirds of these costs. When this factor is accounted for, roughly $9.9 billion in external costs remain. The claim that spending an extra $50 billion on the standard would generate net benefits thus rests on the idea that car buyers don't have the foresight to include the full value of

fuel savings in their own calculations.

Plug-in electric vehicles receive taxpayer subsidies that far exceed the social savings in reduced external costs. Currently, the U.S. government pays a subsidy of $7,500 for each PEV sold, and the Obama administration wants to raise the figure to $10,000. Other programs subsidize home and commercial charging stations for EVs.

The potential savings from reduced gasoline use do not come close to justifying such huge subsidies. Imagine that each $7,500 subsidy payment replaces one new gasoline-powered car (an upper bound, since some people would buy PEVs without subsidies). The NHTSA estimates that the average automobile will travel 161,847 miles before it is scrapped. At 25 miles per gallon, the replaced vehicle would have burned a total of 6,474 gallons of gasoline.

Thus, *even if we ignore the net impact of taxes at the pump*, according to the NHTSA's own figures, the substitution of a PEV that never used its auxiliary gasoline engine to recharge would reduce external costs by less than $4,000 (6,474 gallons times 61 cents per gallon). In any event, an electric vehicle couldn't save that much in externalities because the production and distribution of the electricity it used to recharge would inevitably entail some CO2 emissions.

The root problem with EVs is that their batteries are bulky and expensive. So the best case for subsidies really comes down to the idea that stimulating the demand for EVs will lead to better technology sooner.

However, a recent study by a panel of the National Research Council found that, barring surprise breakthroughs, hopes for quick progress on battery costs are chimerical. Costs will decline, but lithium-ion batteries are already being produced in great numbers for other applications. All told, the NRC estimated that the incremental cost to produce PEVs is likely to fall by about one-third by 2020; thereafter, progress will slow. The NRC panel also concluded that even were technology breakthroughs to occur within the next decade, they could not have much impact on fuel use before 2030 because it takes many years to put large numbers of vehicles incorporating new technology on the road.

FACT-BASED OIL POLICY

Some intervention in the market for oil might increase efficiency – but it would be a modest intervention. One might:

- impose a modest fee on oil imports that reflects the national security externalities of dependence on foreign producers.
- start fresh on taxes, shifting the burden of highway wear and congestion externalities to road tolls and axle-load fees.
- concentrate public spending on long-sighted energy R&D instead of technology deployment.

Experience suggests, though, that modest, narrowly targeted government programs have a way of bloating, as interest groups line up for a share of the cash. And with or without these reforms, moves to scale back or abolish programs that assume oil conservation and substitution of renewals would generate big gains in welfare that would make a lot of sense. Cutbacks might even become politically palatable as the need for deficit reduction looms larger.

Compared with calls for energy independence and for winning the future through technology, proposals with the more modest goal of making the market for liquid fuels more efficient seem a letdown. But ask yourself what 40 years of throwing money at ill-defined energy problems has actually accomplished. Sometimes, less really is more – and this is one of them. M