

# A Framework for Breaking U.S. Oil Dependence



**POLICY GOALS AND OBJECTIVES DEVELOPED  
COLLABORATIVELY BY THE OIL SOLUTIONS INITIATIVE (OSI)**

17 April, 2009

Esteemed Friends and Colleagues,

Leaders in both the public and private sectors currently face tremendous challenges as they must deliver hope and relief to those affected by the current global economic crisis, while simultaneously addressing a future that is threatened by both environmental and security challenges.

Several organizations believe that it is possible to address both these issues at once. RMI in partnership with the Brookings Institution, convened the Oil Solutions Summit in December of 2008. The Summit brought together top energy, oil, security, and environmental experts, as well as representatives from 15 different off-oil plans, to discuss the best path to breaking U.S. oil dependence. The attached memo is the first documentation of this consensus-based roadmap.

While those of us gathered at the Summit hold widely disparate perspectives, methods and motivations, we share the common goal of reducing U.S. oil use and developing non-oil energy sources for transportation. The conversations at and after the Summit have been challenging and passionate. To support these conversations, RMI has provided data-driven analysis to help prioritize recommendations. RMI modeled the oil use reductions that can be achieved in the near-term by 2012, and the long-term by 2030.

In the attached memo, we recommend immediate steps and policy enablers to achieve reductions in U.S. oil use within the next four years as well as the first steps and policies that can lead our society to secure, reliable, and sustainable energy systems in the long-term. The synergies between these recommendations and the “shovel ready” projects being considered under the American Recovery and Reinvestment Act should be considered.

As our recommendations focus on more efficient and effective methods of enabling the transportation of both people and goods, we believe they should be incorporated in the upcoming 2009 Transportation Bill.

We look forward to speaking with you about the analysis and modeling methods used, and how to turn the Oil Solutions Initiative’s consensus-based recommendations into reality.

Thank you for your time and attention,  
The Oil Solutions Initiative

<http://move.rmi.org/osi>

To learn more about the Oil Solutions Initiative, please contact Bennett Cohen at [bcohen@rmi.org](mailto:bcohen@rmi.org)

## OSI's framework for breaking U.S. oil dependence by 2030, starting today

American dependence on oil burdens the economy, the environment, and national security. This memo outlines the most powerful, achievable steps to quickly reduce oil dependence in the near term, as well as steps to put the U.S. on a path towards long-term energy security. RMI's analysis for OSI indicates that, if met, **these objectives can save up to 10 percent of total U.S. oil use by 2012, and up to 52% by 2030.** With the guidance of informed policy makers, the U.S. can take immediate steps toward achieving a long-term vision of sustainable and secure energy.

This memo outlines measurable **goals** for federal policy within four sectors: personal mobility, light-duty vehicles, heavy-duty vehicles and aviation, and oil supply alternatives. For each goal, complementary short- and long-term objectives are provided that can—with prompt government action—reduce America's dependence on oil (Table 1, page 2):

- **Short-term objectives** focus on achievable, quick action to cut oil dependence by 2012 with **minimal infrastructure changes.**
- **Long-term objectives** lay the foundation for transportation whose energy is secure and sustainable by 2030. These objectives demand **more upfront capital and fundamental changes in the transportation sector** and require sustained executive and legislative commitment.

Policy enablers are provided in the body of this memo as examples of how to accomplish each objective. These objectives and enablers were developed collaboratively by representatives from 15 leading “off-oil” plans and experts from the national security, environmental, economic, business, oil, and energy fields. This diverse network of experts developed a range of ideas to address oil

The Oil Solutions Initiative (OSI) is a collaboration of leaders, technical experts, and activists addressing the economic, environmental and security concerns associated with U.S. oil dependence. In December, Rocky Mountain Institute (RMI) and the Brookings Institution (Brookings) convened this group of unusual bedfellows to find the strongest alignment among all the possible solutions:

*Advanced Technology Ventures • American Progress • Aronoff Group • Better PLC • Chevron • Council on Competitiveness • Council on Foreign Relations • DeMatteo Monness LLC • Earth Track • Securing America's Future Energy • Grove Foundation • Department of Homeland Security • The Hirsch Report • Hunt Green LLC • Innosight • Institute for the Analysis of Global Security • International Council on Clean Transportation (MIT Energy Initiative) • MIT Vehicle Design Summit • National Commission on Energy Policy • National Petroleum Council • Natural Resources Defense Council • Our Energy Policy Foundation • Pickens Plan • Set America Free • Union of Concerned Scientists • Vision Ridge Partners*

OSI participants envisage a future with many options for shipping and transportation, U.S. foreign and military policies unfettered by oil import dependence, an economy resilient against volatile oil prices, reduced greenhouse-gas emissions, cleaner air and water, and better public health. They agree upon the following framework to achieve this vision:

1. **Reduce oil consumption** in personal transportation, light- and heavy-duty vehicles, and aviation through behavioral changes, increased energy efficiency, and logistical improvements (Section 1).
2. **Diversify transportation energy sources** by fostering the development of alternatives to oil, including electrification and sustainably produced biofuels (Section 2).

dependence, and scrutinized the environmental sustainability, economic impact, and social equity of each one.

The expected reduction in oil use was quantified for the short- (2012) and long-term (2030) objectives relative to EIA baselines. This information is summarized in Figures 1 and 2 (page 4). This analysis drove the prioritization of the recommendations included here.

For details about the assumptions and methodology of the analysis, please contact Kristine Chan-Lizardo at RMI: [kcl@rmi.org](mailto:kcl@rmi.org) or visit [move.rmi.org/osi](http://move.rmi.org/osi)

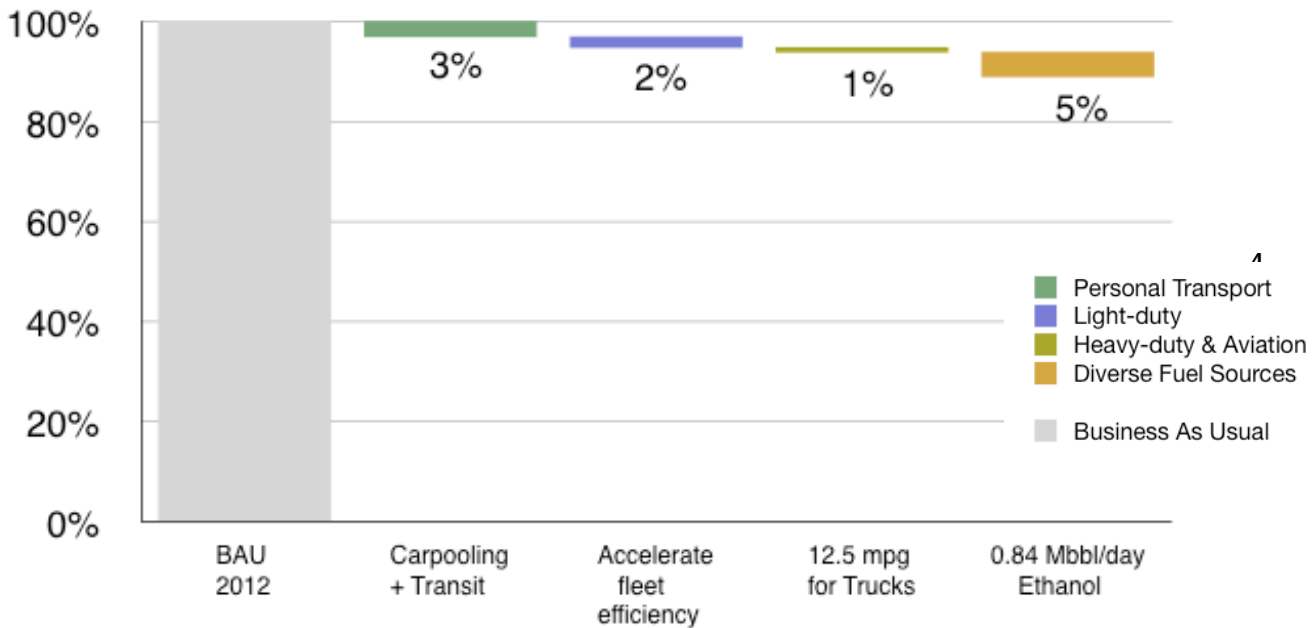
| <b>Table 1: Summary of Objectives</b>                        |  |  |
|--|--|--|
| <b>Reduce Oil Consumption (Section 1)</b>                    |  |  |
| <b>Goal</b>  | <b>Short-Term Objectives for 2010</b>  | <b>Long-Term Objectives</b>  |
| <b>Reduce Personal Transportation Oil Use</b>                | 10% increase in passenger car load factor (c.g. carpooling) and 5% increase in transit utilization | 20% of people-miles-traveled on transit or non-motorized modes                             |
| <b>Increase Light-Duty Vehicle Efficiency</b>                | 50% increase in fleet turnover to fuel efficient, flex-fuel, or electrified vehicles <sup>1</sup>  | 100 mpg-equivalent for all new light vehicles  |
| <b>Increase Heavy-Duty Vehicle &amp; Aviation Efficiency</b> | 50% fleet conversion to technologies that double long haul trucking efficiencies <sup>2</sup>      | 2x to 3x mpg improvement in medium and heavy duty trucks, 20% aviation efficiency increase |
|  | <b>Eliminates 6% of U.S. oil use by 2012</b>   | <b>Eliminates 28-38% of U.S. oil use by 2030</b>   |
| <b>Diversify Transportation Energy Sources (Section 2)</b>   |  |  |
| <b>Goal</b>  | <b>Short-Term Objectives for 2010</b>  | <b>Long-Term Objectives</b>  |
| <b>Develop Alternative Transportation Energy Sources</b>     | 5% substitution of oil supply with alternative liquid fuels <sup>3</sup>                           | Diversity in market ensures demand is no more than 40% for any one fuel                    |
|  | <b>Eliminates 4% of U.S. oil use by 2012</b>   | <b>Eliminates 11-52% of U.S. oil use by 2030</b>   |

<sup>1</sup> A 50 percent increase over two years is equal to ten million cars, based upon fleet turnover estimates (AEO 2009).

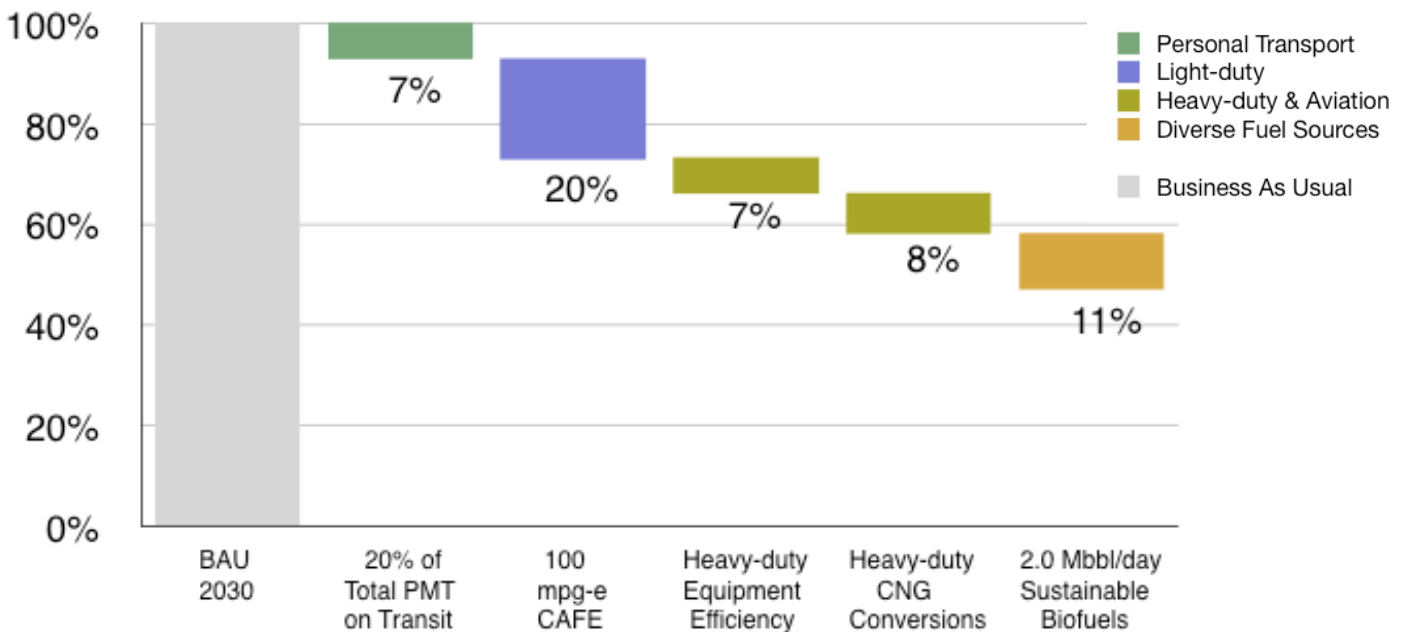
<sup>2</sup> 25% of the total long-haul trucking fleet is equal to 250,000 heavy-duty vehicles (RMI).

<sup>3</sup> Equivalent to replacing 0.9 million barrels per day of oil.

**Figure 1: Estimated impact on 2012 oil consumption with implementation of OSI goals**



**Figure 2: Estimated impact on 2030 oil consumption with implementation of OSI goals**



<sup>4</sup> These percentages represent the oil reduction possible from each objective individually implemented. When modeled, the cumulative oil reduction possible from the entire suite of objectives is approximately 10% by 2012 and 52% by 2030.

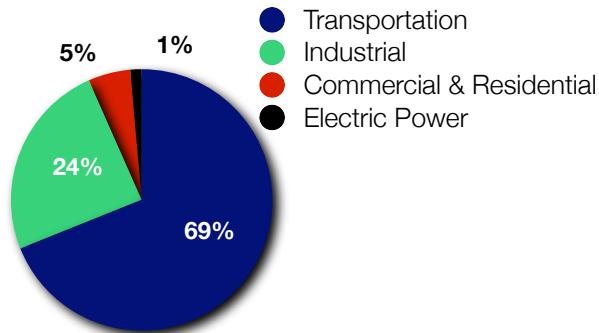
# Summary

## Reduce Oil Consumption (Demand)

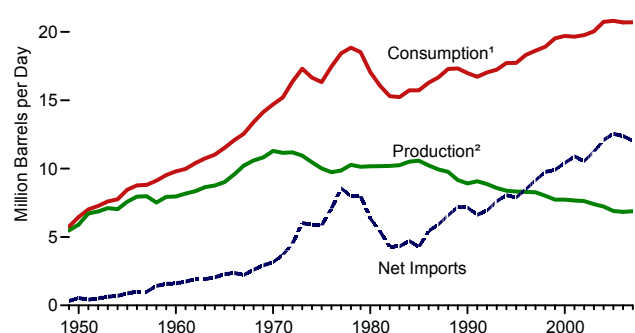
### A heavy focus on transportation

Transportation accounts for the largest and fastest-growing use of oil in the U.S. (69 percent), and is almost entirely dependent on oil (96 percent). This makes the transportation sector highly vulnerable to oil price and supply shocks. In addition, climate experts acknowledge that transforming the transportation sector is critical to reducing carbon dioxide emissions.

**U.S. Oil Demand, 2007 (EIA)**



**U.S. Oil Demand Growth, 1950–2007 (EIA)**



| Goal #1: Reduce oil use in Personal Transport   |    | Goal #2: Increase Light-Duty Efficiency  |      |
|---|----|--|------|
| Oil reduction with short-term objective (2012)  | 3% | Oil reduction with short-term objective (2012)   | 2–3% |
| Oil reduction with long-term objective (2030)   | 7% | Oil reduction with long-term objective (2030)  | 20%  |
| Potential Policy Enablers   |    | Potential Policy Enablers  |      |
| Prioritize funding to keep existing transit operational.<br>Raise allocations to transit from the Highway Trust Fund.<br>Encourage carpooling and higher ridership on transit.<br>Encourage telecommuting.<br>Create a cohesive federal mobility mandate and appoint a cross-agency point person to be responsible.   |    | Enforce EISA CAFE rules scheduled for 2010.<br>Encourage and accelerate demand for vehicles that reduce petroleum use.<br>Fully fund the electric transportations provisions of EISA.<br>Incentivize internal combustion engine conversions.<br>Target a 2030 CAFE increase to 100 mpg equivalent.<br>Accelerate domestic capabilities in advanced vehicle technology. |      |
| Goal #3: Increase Heavy-Duty & Aviation Efficiency  |    |  |      |
| Oil reduction with short-term objective (2012)  |    | 1%   |      |
| Oil reduction with long-term objective (2030)   |    | 5–15%  |      |
| Potential Policy Enablers   |    |  |      |
| Use fuel-efficiency metrics, in addition to existing emissions mandates.<br>Shorten rule-making times to accelerate change in the industry.<br>Increase the oil efficiency of freight transportation by incentivizing efficiency retrofits and logistics improvements.<br>Establish an environmental tax for the entire aviation sector, assessed by impact per flight to reflect cost transparency and fairness. |    |  |      |

## Diversify Transportation Energy Sources (Supply)

### Why oil supply alternatives?

Even with drastic reductions in oil use, oil will continue to be a major fuel for transportation in the foreseeable future. However, by fostering alternative sources of energy for transportation, such as electrification and advanced biofuels, the U.S. can break oil dependence while reducing greenhouse gas emissions and improving energy security.

Currently, the U.S. transportation sector relies entirely on a single commodity that is environmentally harmful and volatile with respect to price and supply. It is no wonder that the United States spends a considerable amount of its military resources, political capital, and budget securing oil supplies. OSI supply side recommendations offer a path towards diversifying the source and type of our transportation energy supply to help create more affordability, reliability, and sustainability.

| Goal #4: Develop Alternative Transportation Energy Sources   |        |
|--|--------|
| Oil reduction with short-term objective (2012)   | 5%     |
| Oil reduction with long-term objective (2030)  | 11–52% |
| Potential Policy Enablers  |        |
| <p>Increase the availability of existing alternative liquid fuels in the near term.</p> <p>Expand research into alternative, next generation fuels.</p> <p>Fund upgrade and research projects to test viability and capability of electric grid to support future demand.</p> <p>Encourage and enable utilities to fund grid improvements.</p> <p>“Re-think” and renew interest in alternative fuel feedstocks, incentivizing sustainable generation and production efficiency.</p> <p>Implement the first stages of “Smart Grid” capabilities for the electric grid.</p> <p>Anticipate zoning and siting barriers involved in any infrastructure expansion to support alternatives.</p> |        |

# Detailed Recommendations

## Section 1: Reduce Oil Consumption (Demand)

### Goal #1: Reduce oil use in personal transportation by increasing the use of alternatives

Reducing the number of vehicle miles traveled (VMT) without restricting consumer mobility and access can allow the United States to make great strides in reducing oil dependence. In the near term, policies should focus on increasing the utilization of existing transit and on increasing the load factor (passengers per vehicle-mile traveled) of light vehicles. In the long term, policies should encourage integration of multi-modal transportation with urban planning and design, as well as enhanced transit systems.

| Goal #1: Reduce oil use in Personal Transport  |    |
|--|----|
| Oil reduction with short-term objective (2012) | 3% |
| Oil reduction with long-term objective (2030)  | 7% |

Travel in passenger cars and personal trucks accounted for 98 percent of passenger-miles traveled (PMT) in 2007. While the average American car can carry five passengers,<sup>5</sup> the average load factor in personal cars is 1.6.<sup>6</sup> If one trip in ten that is normally taken alone were shared, the U.S. could achieve 3 percent oil savings (through a 10 percent increase in vehicle load factors).

Travel by mass transit can provide many Americans with the mobility they want while using far less oil, yet it accounts for just over 1 percent of passenger-miles traveled (PMT).<sup>7</sup> In 2005–2006, transit ridership grew 5 percent. High gasoline prices were credited for this increase.<sup>8</sup>

#### Short-term objective: Increase the load factor of personal cars 10 percent and the utilization of existing transit by 5 percent by 2012

Potential Policy Enablers:

1. Prioritize funding that keeps existing transit operational as transit systems strive to raise utilization rates. (Some systems are mothballing vehicles and laying off drivers due to short-term budget pressures even though ridership is increasing.)
2. When rewriting the Federal Transportation Act in 2009, raise allocations to transit maintenance and expansion through the Highway Trust Fund. The increased allocations should be applied to the transit modes with high utilization potential and greater oil savings per PMT.
3. Encourage carpooling and higher transit ridership:
  - Repurpose existing infrastructure—for example, designating outside lanes of large highways for carpooling/transit—using highway maintenance funding.
  - Systematically move toward greater cost transparency and fairness so that drivers don't just get what they pay for, but also pay for what they get. Many car-related costs are traditionally allocated more to taxpayers than to drivers, which makes driving look artificially cheap at the expense of competing modes. Fairer cost allocation structures could include by-the-mile and pay-at-the-pump

<sup>5</sup> RMI analysis based upon *Transportation Energy Data Book: Edition 27*.

<sup>6</sup> Oak Ridge National Laboratory, *Transportation Energy Data Book: Edition 27* (Oak Ridge, Tennessee: 2008).

<sup>7</sup> Research and Innovative Technology Administration, Bureau of Transportation Statistics, *National Transportation Statistics*, (2008). American Public Transit Association, *Fact Book 2008* (2008).

<sup>8</sup> *Fact Book 2008* (2008).

insurance systems, universal employee parking cash-out rights, and tax credits to employers who fund transit options, carpooling, or telecommuting. Disincentives to excessive VMT could include congestion tolls, the elimination of parking and road building subsidies, and a broader shift from tax- to user-supported roads. Lastly, and controversially, non-regressive taxes at the pump could be raised for petroleum-based fuels to reflect more fully their real social costs.

- Address access and convenience barriers by incentivizing shuttles, park-and-ride lots, and other “last-mile” services that get transit-riders to their final destinations.
4. Encourage telecommuting. According to one study, each day of telecommuting by all white-collar workers saves the U.S. around 116 million gallons of gasoline.<sup>9</sup>

**Long-term objective: Enable 20 percent of people-miles-traveled to be on transit or non-oil-fueled travel modes by 2030**

Traveling on transit uses, at most, half the oil of traveling via automobile.<sup>10</sup> Achieving this objective will require more transit capacity and greater utilization of existing transit. Government policy can help achieve both these goals by prioritizing multi-modal transport infrastructure (mass transit, bike paths, pedestrian paths, etc.) over automobile infrastructure.

Potential Policy Enablers:

5. Encourage higher ridership on existing and proposed transit lines:
  - Increase the attractiveness of transit through financial mechanisms that capture the benefits of improved public health, air quality, and safety—for example, lower insurance premiums for driving less or for using safer commuting options.
  - Increase riders’ safety and convenience by funding bike/walk infrastructure to transit.
6. Create a federal mobility mandate—a long-term strategic plan for getting everyone everywhere at acceptable costs, both environmental and economic—and a point person to champion it. This point person would balance national transit, light vehicle, and freight goals. This official would not only administer transportation systems but also coordinate transportation, land management, urban planning/housing, internet communications infrastructure, and energy priorities. Like other complex national goals, such as homeland security or climate protection, oil-efficient mobility needs a single official whose responsibilities span multiple agencies.
  - Identify transit routes where expanded capacity can double or triple transit share and divert vehicles from the most congested thoroughfares (e.g., via a Boston-to-Washington direct fast rail system).
  - Give funding priority to infrastructure projects that decrease oil use and increase access to multi-modal transportation.

---

<sup>9</sup> Telework Exchange, *Fuel Smart Economy: It's No Gas*, [www.teleworkexchange.com/FuelSmartStudy.pdf](http://www.teleworkexchange.com/FuelSmartStudy.pdf) (21 Sept 2005)

<sup>10</sup> *Transportation Energy Data Book: Edition 27*, RMI analysis of transit fuel/PMT versus non-transit fuel/PMT.

- Identify and recommend zoning and code changes to encourage development that reduces the need to drive and offers convenient, affordable mobility options (such as bus service, work-live zoning, pedestrian/bicycle systems, and even high-bandwidth internet infrastructure). Community development that emphasizes mass transit use would benefit from federal policy attention.

## Goal #2: Speed the adoption of increasingly oil-efficient Light-Duty Vehicles

Light-duty vehicles (cars, passenger vans, SUVs, and pickup trucks) used 65 percent<sup>11</sup> of U.S. transportation oil in 2006. Traveling more miles per gallon (or the equivalent) and using vehicles that run on non-petroleum fuel sources can save that oil. The combination of increasing vehicle efficiency and accelerating fleet turnover has the potential to reduce oil usage by 3 percent by 2012. A 20 percent reduction is possible by 2030 with more aggressive efficiency and fuel substitution targets.

| Goal #2: Increase Light-Duty Efficiency        |      |
|--|------|
| Oil reduction with short-term objective (2012) | 2–3% |
| Oil reduction with long-term objective (2030)  | 20%  |

### Short-term objective: Incentivize the production and the adoption of more fuel efficient vehicles, including electrified vehicles, to save 2-3 percent of U.S. oil use by 2012

Many existing technologies and fuel alternatives could be used to break the “oil monopoly,” yet few are used in significant numbers. For these alternatives to gain significant market share, the light-duty vehicle platform must permit interfuel competition: the more light-duty vehicles available that can run on a variety of fuel types, including electricity and sustainable biofuels, the more options customers have. The more options customers have, the less captive they are to a single fuel.

It is also urgent to make the light-duty fleet more petroleum-efficient as quickly as possible, even if only incrementally in the short-term, to level and reduce greenhouse gas emissions. Climate change models demonstrate that GHG emissions must level and drop within the next 5 to 10 years in order to avoid permanently breaking the feedback loops that currently regulate the global temperature.

Potential Policy Enablers:

1. Enforce the Energy Independence and Security Act (EISA) CAFE increases scheduled to begin in 2010. EIA estimates show that this policy delivers the biggest oil savings because of the quick ramp-up. Delays in the implementation of this mandate significantly reduce its beneficial impact.
2. Enable and accelerate consumer demand for vehicles that reduce petroleum use:
  - Accelerate vehicle turnover with a “cash-for-clunkers” program to get old, inefficient, petroleum-only cars off the street (backed by excellent recycling/redistribution programs)
  - Enact revenue-neutral feebate legislation at the federal or state level: inefficient vehicles would incur a surcharge (“fee-”) and efficient vehicles would be granted a rebate (“-bate”) based on how much less or more efficient the vehicle is from a given “pivot point.” The pivot point can be based on metrics such

<sup>11</sup> *Transportation Energy Data Book: Edition 27*, Ch.1 Petroleum, Table 1.16 “Transportation Petroleum Use by Mode, 2005–2006”.

fuel intensity (gpm), greenhouse gas emissions, or oil use per mile. The fees on the inefficient vehicles will pay for the rebates on the efficient vehicles.

- Create an open fuels standard (OFS) that requires an increasing percentage of new vehicles each year be built for fuel diversity. The number of vehicles built during the initial years can be tied to the availability of liquid fuel alternatives, meaning that they are able to run on all types of alcohol or biodiesel, in addition to oil. Ultimately, these vehicles would run partly or entirely on a full range of alternative liquid fuels or on electricity or other fuels. The OFS needs to reflect a thoughtful balance of environmental and security goals, and would be crafted to work in conjunction with vehicle efficiency incentives.
1. Encourage the retrofit or conversion of existing vehicles with internal combustion engines, allowing them to run on less oil-intensive fuels such as biodiesel,<sup>12</sup> higher blends of ethanol, or electricity. Actions to accomplish this could include financial incentives to subsidize conversions, and fully funding the electric transportation provisions of EISA.

### Long-term objective: Obtain 100 mpg-e for all new light-duty vehicles by 2030

RMI's research indicates that the American light duty fleet average could achieve **50 mpg by 2020, with the same projected mix of vehicle size in the fleet.**<sup>13</sup> The equivalent of 100 mpg is achievable through a combination of incorporating new technologies and moving to more efficient vehicle platforms. This would require both transformational change for the vehicle manufacturing sector and a shift in consumer purchase behaviors.

Potential Policy Enablers:

2. Enact a CAFE increase to 100 mpg-equivalent ("mpg-e," which applies to non-liquid fuel sources) that will become effective in 2030. This mandate, together with the enablers below, would motivate transformation of the light-duty market within a reasonable time frame.
  - Allow alternative technologies (such as electrification and biofuels) to compete for government support according to technology-neutral metrics, such as fuel efficiency.
3. Accelerate consumer demand for vehicles that reduce petroleum use
  - Reward transformational business models that reduce petroleum usage per passenger and reduce VMT, especially in fringe transportation markets (like electric carts for retirement communities or one-person vehicles on corporate or industrial campuses). Historically, nascent businesses and technologies that meet needs outside the mainstream have catalyzed paradigm shifts in mature markets.<sup>14</sup> Federal policy can provide structured fuel efficiency incentives and can also assist with regulatory safety and testing processes to nurture these fringe innovations while they prove themselves in the marketplace.
  - Provide enough direct-to-consumer subsidies to get one million electrified vehicles on the road as soon as possible, whether new cars or conversions.

---

<sup>12</sup> Current production vehicles can run on biodiesel blends, but will void their manufacturer warranties in doing so. Standardization on biodiesel fuels would help address barriers to market adoption.

<sup>13</sup> RMI Analysis and Confidential Research Engagement.

<sup>14</sup> Clayton Christensen, World Economic Forum, *Energy Vision Update "The Need for New Value Networks"* (December 2007). Clayton Christensen, *The Rules of Innovation*, Technology Review, <http://www.technologyreview.com/communications/12843/?a=f> (June 2002).

While one million is a small percentage of the existing stock, this number of cars represents a significant production volume and can be a cost-effective manufacturing trigger.

1. Accelerate domestic capabilities in advanced vehicle technology with signals demonstrating the 10-to-15-year commitment to fuel source diversification (including the CAFE increase above):
  - Allocate funding to support the development of necessary components from traditional OEMs as well as start-ups, and from suppliers. The funding mechanism could be a feebate or a non-regressive gasoline tax. The funding criteria can be aligned with market metrics to reward the most efficient manufacturers or the manufacturers able to achieve scale and secure sales most quickly.
  - Assist in the standardization and design of sustainable, secure infrastructure that supports advanced vehicles—whether electrified or other powered by alternative fuel sources (see Section 2: Diversify Transportation Energy Sources, page 11).
  - Encourage private-sector investment in research and development with investment tax credits or by establishing a predictable price floor for oil (with income tax rebates or other mechanisms to support low-income households). A gasoline price floor can be created through a carbon tax or other pay-per-gallon fees.

**Goal #3: Reduce fuel use in heavy-duty vehicles and aviation with efficiency-enabling technologies and equipment retrofits**

Heavy-duty vehicles and aviation use 25 percent of U.S. transportation oil. Strategies for reducing this sector’s oil use must take into account that fleet recapitalization takes place slowly in the trucking and aviation industries.

| Goal #3: Increase Heavy-Duty & Aviation Efficiency |       |
|--|-------|
| Oil reduction with short-term objective (2012)     | 1%    |
| Oil reduction with long-term objective (2030)      | 5–15% |

**Short-term objective: Increase the oil efficiency of freight 50 percent by 2012 with existing equipment technologies and new legislation**

The immediate steps for heavy-duty trucks and aviation require no new technologies, merely the application of existing technologies via small changes in rules and regulations.

Potential Policy Enablers:

1. Use the right metrics: the current focus on emissions regulations in trucking can effectively hinder fuel-efficiency goals. Mandates that target fuel efficiency, aerodynamic coefficients, or load density optimization—in addition to supporting existing emissions criteria<sup>15</sup>—would shift industry focus towards reducing oil usage. Existing, implementable technologies that can support fuel-efficiency mandates for the heavy trucking sector, particularly Class 8 (long haul) trucks, include:

---

<sup>15</sup> 75% to 80% of long haul trip time is spent cruising. During this time, the total weight is not the key factor in fuel efficiency.

- Powertrain efficiencies (including retrofits, such as auxiliary power units (APUs), and new equipment like compressed natural gas and mild hybrids), equipment choices (optimizing trailer sizes and pallet sizes for each load), aerodynamic improvements, tire selection, driver education, and maintenance.
- Logistical intelligence systems, particularly linking independent haulers and consolidators, that ensure routes are optimized and reduce the number of empty trailers on the road.

RMI estimates that implementing technologies such as these can double the fuel efficiency of the trucking industry.

**Long-term objective: Double to triple fuel efficiency in heavy- and medium-duty trucks, and 20 percent in aviation**

These objectives are technologically feasible, but are not commonly implemented due to lack of awareness and funding. Bold policies and a long-term commitment are needed to coordinate stakeholders across both the trucking and aviation industries. Many paths to increasing fuel efficiency require capital investments and changes to several long-standing regulations.

Potential Policy Enablers:

1. Streamline the administrative and data-gathering hurdles to accelerate change in the trucking industry. Fuel efficiency standards for heavy-duty vehicles have not changed in thirty years, and under the current rule-making process, it takes at least two years before mandates are approved. Additionally, conflicts between state legislatures and federal programs delay change within the industry.
2. Increase the oil efficiency for freight transportation on the ground:
  - Incentivize retrofitting Class 8 engines with oil-efficient or oil-independent engines, such as mild hybrids or compressed natural gas (CNG) engines, by funding the cost differential.
  - Streamline the rail industry and increase utilization rates. The current issues are not with capacity but poor logistics and poor interconnects with other modes of transport. Within the industry there is little collaboration to optimize the inter-modal freight network.
  - Raise the interstate gross vehicle weight rating (GVWR) by 50 percent to allow vehicles to carry more freight per trip. This should be done in tandem with infrastructure improvements.<sup>16</sup> Or alternatively, the GVWR increase could be restricted to specific transport corridors or regions where economically appropriate. Fees or tolls to use the increased load thoroughfares could help fund the improvements. RMI has estimated that the industry can triple fuel efficiency with a combination of increasing load capacity and implementing the efficiency technologies recommended as short-term enablers. However, increasing the GVWR is controversial, and concerns about highway safety and increased road-wear must be investigated further.

---

<sup>16</sup> An increase in GVWR will not increase road damage if combined with an increase in the federal length constraints. Safety can be improved too. Michael Ogburn, Rocky Mountain Institute, *Transformational Trucks: Determining the Energy Efficiency Limits of a Class-8 Tractor-Trailer* (July 2008). [www.rmi.org/images/PDFs/Transportation/RMITransformational\\_Truck\\_Study\\_080709compressed.pdf](http://www.rmi.org/images/PDFs/Transportation/RMITransformational_Truck_Study_080709compressed.pdf)

1. Establish an environmental tax for users across the entire aviation sector—commercial and private, domestic and international—proportional to fuel use and environmental impact. Similar in approach to the personal transportation recommendations, a use-based tax systematically moves toward greater cost transparency and fairness. Proceeds can be pooled into a feebate fund to finance improvements in the fuel efficiency of airline fleets (such as the on-board retrofit to interact with Next Generation Air Transportation System<sup>17</sup> (NextGen), the new satellite-based traffic control system that will enable more efficient flight paths.

## Section 2: Diversify Transportation Energy Sources (Supply)

### Goal#4: Develop and commercialize alternative transportation energy sources

| Goal #4: Develop Alternative Transportation Energy Sources |        |
|--|--------|
| Oil reduction with short-term objective (2012)             | 5%     |
| Oil reduction with long-term objective (2030)              | 11–52% |

#### Short-term objective: Enable competitiveness of oil alternatives to achieve 5 percent substitution (0.84 million barrels per day) of transportation oil usage

As a complement to vehicle efficiency measures on the demand side, oil supply can be replaced with sustainable fuel alternatives for transportation use. Alternative liquid fuels<sup>18</sup> and electrification are major opportunities for such a transition. This short-term objective focuses on alternative fuel sources that already have existing distribution infrastructures, creating pathways for these alternatives to become cost-competitive with petroleum.

#### Potential Policy Enablers:

1. Increase the amount of liquid fuel alternatives currently available in the short term:
  - Phase out tariffs on ethanol imports
  - Allow greater than 10 percent ethanol blending
  - Maintain tax incentives for early pump conversions to alternatives
2. Expand research and demonstration support for advanced alternative fuels (second-generation and third-generation biofuels, electrification, etc.) whose production is sustainable, and whose carbon dioxide emissions per mile are lower than petroleum's.
3. Dedicate funding to electric vehicle pilot projects and the supporting electrical grid upgrades. Pilot projects involving a significant number of vehicles spread out over a city or multiple cities will help identify built infrastructure issues that need to be addressed in order for the successful mainstream adoption of electric vehicles to take place.
4. Encourage and enable utilities to fund grid improvements that help optimize energy generation to demand. For example, current grid monitoring technologies are inconsistently

<sup>17</sup> Congress passed into law the planning, development, and implementation of NextGen with the Vision 100 - Century of Aviation Reauthorization Act in 2003. The next phase of implementation is scheduled for 2012 to 2018.

<sup>18</sup> Such as alcohols (ethanol, methanol), but also bio-diesels and other bio-fuels.

implemented, if at all. Basic monitoring and metering upgrades would allow utilities to anticipate and quantify the effects of electric vehicle demand.

- Funding mechanisms could be enabled with changes in regulation that would allow utilities to rate-base specific improvements or allow more freedom to allocate revenue. Other mechanisms could be regulating electricity transmission (analogous to the federal highway system) or expanded nodal pricing.
- Mandate that new meters on buildings and utility infrastructure be real-time-communication-enabled, which allows demand monitoring and provides data with which to evaluate the most effective capacity-building strategies.

**Long-term objective: Diversify and distribute a variety of fuel sources so that market demand for any one fuel is no more than 40 percent of total transportation fuel**

The long-term vision for energy supply includes fuel alternatives for transportation that are cost-competitive with oil. The policy enablers below focus on incentivizing the private sector to investigate sustainable and efficient alternatives, leverage existing infrastructure, and accelerate commercialization.

In particular, the enablers focus on the U.S. electricity grid. Because there is tremendous potential for much of the future electricity supply to come from secure, renewable, and efficient resources, the electric grid is likely to play a major role in sustainably supporting energy needs across many sectors besides transportation.

Potential Policy Enablers:

2. Encourage a rethinking of fuel feedstocks, incentivizing sustainable generation and production efficiency. For instance, studies conclude that biomass is more efficiently converted into electricity than into liquid fuels, and several European countries utilize waste products as inputs for energy production. Domestic endeavors along these lines exist in the U.S. in small numbers. Renewed interest and attention to holistic system solutions can lead to innovative, market solutions that meet federal priorities for liquid and non-liquid fuel alternatives.
3. Implement the first steps toward “smart grid” capabilities. A smart grid not only includes real-time monitoring of performance, but also allows feedback control of supply and demand at specific times of the day. Currently there are no incentives or consumer demand for this degree of control over how electricity is delivered. Yet, as the number of electrified vehicles increases and the amount of renewable generation grows, real-time feedback offers a pathway to optimized power generation and utilization.
  - Mandate that all new meters have nationally interoperable two-way communication capabilities.
  - Dedicate significant federal infrastructure funding for the purchase and installation of new meters at buildings and substations, as well as the purchase of the necessary software systems.
4. Expansion of any infrastructure—whether “any liquid” pipelines, electric transmission lines, or equipment to harness renewable energy sources—will be challenged by zoning and eminent domain barriers. Initiate federal siting viability research that leads to an increase in federal siting power or establishes metrics for appropriately determining tax credits and other financial incentives.

**This report was collaboratively crafted by thought leaders from the security, environmental, business, oil, and energy communities, and contains a consensus-based roadmap to reducing U.S. oil dependence. While each individual does not necessarily agree with every recommendation in the document, the participants agree that there is great value in the Oil Solutions Initiative's cross-sector approach to addressing U.S. oil policy. We attended the "Oil Solutions Summit" in December 2008, and continue to be in conversation with the leaders of the Oil Solutions Initiative. We applaud the initiative's inclusive, well researched, balanced, and comprehensive approach to reducing oil demand and fostering alternatives to oil supply.**

- \* Charles Ebinger, Director of the Energy Security Initiative, The Brookings Institution
- \* International Council on Clean Transportation, Anup Bandivadekar
- \* Hunt Green, LLC, Suzanne Hunt
- \* Institute for the Analysis of Global Security, Gal Luft
- \* Reuben Munger, Vision Ridge Partners
- \* Doug Staudmeister, RMI MOVE Aviation Advisor
- \* William F. Martin, Council on Foreign Relations
- \* Anne Korin, Set America Free
- \* Johanna Mendelson Forman, Americas Program, Center for Strategic and International Studies

RMI's Oil Solutions Initiative captures the most promising ideas for eliminating America's dependence on foreign oil as quickly as possible, but its ultimate goal is to break U.S. dependence on oil. Homeland security and energy security are inextricably linked. America's increasing dependence on the world's declining oil reserves would represent a growing weakness even in a world without war or terrorism. If we could somehow eliminate every possible concern about climate change, the problem of oil dependence would still be one of our greatest challenges. —Scott Pugh, Science & Technology Directorate, U.S. Department of Homeland Security

We applaud any effort to wean our nation off of foreign oil and the recognition that our continued reliance upon imported oil creates an economic and national security threat. Unfortunately, we are disappointed that the report does not accelerate our transition from foreign oil to domestic resources at the rate we believe is achievable and desirable by aggressively moving heavy duty trucks to use domestic and clean natural gas. Expanded use of clean and American natural gas can help provide the bridge to tomorrow's technologies, some of which are discussed here, and we had hoped its tremendous benefits would be better represented. We look forward to working with Brookings, RMI and all organizations on this issue of critical importance. —The Pickens Plan

It has been a great privilege to participate in RMI and Brookings' Oil Solutions Initiative. Bringing together thought leaders from the public and private sectors, the group has generated terrific insights that will be valuable to our country, our corporations, and to me in my work with transportation and energy companies that are pursuing new business models and disruptive innovations. —Mark Johnson, Innosight

We are generally supportive of RMI's multi-faceted approach to lessening America's dependence on oil, with particular emphasis on incentivizing electrification of the vehicle fleet through retrofitting conventional vehicles and rapid conversion to new PHEVs. —James Jarrett, Grove Foundation

Our Energy Policy Foundation participated in the "Oil Solutions Summit" and continues to be in conversation with the leaders of the Oil Solutions Initiative. We applaud the inclusive approach of the initiative, as well as the well researched, balanced, and comprehensive approach to reducing oil demand and fostering alternatives to oil supply, similar to our efforts with [www.OurEnergyPolicy.org](http://www.OurEnergyPolicy.org). This memo focuses on how to reduce U.S. oil consumption, and ought to be read by all federal, state and local policy-makers. —Yossie Hollander, [www.OurEnergyPolicy.org](http://www.OurEnergyPolicy.org)

RMI has taken on the challenging task of looking for common ground amongst the growing number of plans to get the US off of oil. While full consensus is likely out of reach, RMI's ability to bring in key players and integrate the major themes in their proposals provides an important service to us all. The effort will no doubt uncover a few gems that help us on our way. —Doug Koplou, Earth Track

