Explanation of This Bill

Summary

This bill has three goals: (1) to move us as fast as possible to total independence from oil imports, so as to reduce the imminent threat to the US economy from a return to high oil prices projected to raise our import bill to $700 billion per year or more; (2) to reduce the growing risk of ever more dangerous problems in our relations with the Middle East; and (3) to make it possible to reach the goal of a true 80% reduction in US greenhouse gas emissions by 2050.

This bill was motivated in part by EPA predictions in June 23, 2009, of the impacts of passing the House Act HR 2454 into law. Despite the firm targets of an 83% reduction of CO2 by 2050, EPA projected that **CO2 emissions will only decrease by 44%.** It also projected that **US petroleum use, at 38 quadrillion BTU per year, will be as large in 2050 as it is today.** Many national security experts believe that this would be a recipe for disaster. **We can and must do better on both counts, as a matter of national survival, including the need to avoid continual, extensive, and costly US military involvement in the Middle East and in other oil-producing regions.** Even companies like Exxon will it find more and more advantageous, as this century begins, to buy the crude oil for their refineries from sustainable fuel production plants in the United States than from the Middle East and from nations which may tear up their past contracts (as many have already).

This bill is complementary to the Clean Transportation Act (Clean Tea), introduced by Senators Specter and Carper this year. That bill would reduce the highway vehicle miles traveled. This bill would make deep cuts in the carbon dioxide (CO2) and oil requirement per mile which remains. Together they provide a comprehensive approach to that larger challenge. This bill is instead to provide a balanced, synergistic mixture of "carrots" (tax incentives), "sticks" (fuel and vehicle standards), and "grease" (new technology), taken from leading creative thinkers and past bills from Democrats and Republicans alike, particularly from the Environment and Public Works Committee.

Progress towards energy independence in transportation has been severely hampered by a series of "chicken and egg problems." For example, which comes first – vehicles which can use a new domestically produced fuel, or availability of the new fuel at a gas station? If we hesitate to deploy **both** of these, as each one waits for the other, we will never achieve energy independence, but we might well achieve a gasoline price of $10-$20 per gallon, and end up sending $2 trillion to the Middle East. In order to reach energy independence as soon as possible, we must start to some extent with **fuel-flexible vehicles** which can still operate on the road while gasoline is available, and make it profitable to start supplying new fuels. But in fact, production of renewable fuels has already become so great that we need a quick infusion of fuel-flexible cars and gas stations simply in order to make full use of the newly emerging supply.

GOALS: **In order to achieve low carbon transportation and independence from fossil oil**, we must achieve three goals, hopefully in parallel:

a. The production of the low-carbon alternatives to fossil oil must be increased as rapidly as possible;
b. The three important alternatives (new liquid fuels, gaseous fuels, electricity) must become available in local refueling stations for the bulk of car drivers in the US; and
c. The cars must be able to use these alternatives

To prevent risks of real losses in the transition, it is important that the refueling stations and cars have the greatest possible flexibility in general and make their transition early. There is little risk of dislocation in producing too much electricity or natural gas, but with alternative liquid fuels it is both essential and relatively inexpensive to reduce potential risk by requiring more flexibility as to the type of liquid fuel.

The short title of this title, in Section1, is what was proposed in the Obama/Reid Low Carbon Fuel Standards Bill, S. 1234 of the 110th Congress.

Sections 2 and 3 address fuel production (goal a above). Section 3 addresses goal c. Sections 5 and 6 address goal b. Section 4 improves our chances of finding research breakthroughs which would change the game for goals a and c.

Explanation of Sections 2 and 3 (Fuel Supply)

Section 2a inserts a new section, Section 220, into the Clean Air Act.

The main part of this section is simply an edited version of the Low Carbon Fuel Standards Section of the Waxman-Markey discussion draft, as posted on the web site of the House Energy and Commerce Committee, prior to the first introduction of HR 2454. That section in turn was intended to fulfill the intent of the Obama-Reid Low Carbon Fuel Standards (LCFS) bill of the 110th Congress, except that certain administrative details have been accounted for, most notably the link to the Renewable Fuels Standards provided in the Energy Independence and Security Act of 2007 (EISA). The main changes are:

1. The Administrator is required, not requested, to create an opportunity for natural gas and electricity to be allowed to participate as transportation fuels.
2. The energy content of electricity is adjusted to reflect the greater miles per unit of energy. In principle, it would be better to use miles delivered instead of energy content throughout this bill, but the adjustment is important and desirable only in the case of electricity; a simple multiplication factor is implied here, to be estimated by the Administrator.
3. A safety valve is added, so that companies which do not have enough credits may buy them at $150 per barrel. This ensures that fuel costs will not rise above the high levels seen in 2008, unless the world oil price itself gets higher despite the greater supply of fuel stimulated by this section.
4. Instead of requiring a 5% reduction in CO2 from 2005 to 2023 and 10% by 2030, it requires 10% and 20% respectively; however, since this version refers to **total transportation fuel**, it is actually somewhat weaker than the Waxman version was intended to be. The Waxman version involved subtractions complex enough that they seriously confused lawyers expert in legislation trying to interpret it; the change here was made simply for the sake of clarity and simplicity.

This section also includes important technical guidelines for calculating life-cycle costs, both here and for EISA.

Section b(3) excludes consideration of emissions during the actual production of shale oil, as does the cap-and-trade part of HR 2454. Such emissions should be included in any complete cap-and-trade or carbon tax bill, and may yet be, but to include them here would amount to double-counting. Emissions are considered for the alternative fuels, despite the double counting issue, for two reasons: (1) use of these fuels is not expected to be highly responsive to a modest carbon price, yet we do need deep reductions in greenhouse emissions from transportation; (2) life-cycle carbon emissions tend to be associated with long-term sustainability and availability for these alternatives, and we need sustainability for long-term energy security. .

The other new technical guidelines are designed to provide much faster encouragement of new breakthrough technologies than now exists under EPA's initial tentative rule-making for EISA. If corn ethanol can be grandfathered up to about 10% of US fuel demand, it is fair to offer these new competitors at least 1%. We need to move as fast as we can here, and investors in new technologies need stronger assurances to help them get started.

Section 3 provides a unique opportunity to enhance national security – an investor-oriented "carrot" to balance out the 'stick.".Its benefits are based on the fact that future world oil prices are both uncertain and subject to change based on our actions. If we do not enact this new bill, and if the world economy is recovered by the time this takes effect (2012 or so), world oil prices will probably rise to $150 per barrel again (since nonOPEC supplies have not increased and world demand is expected to be even greater than in 2008). Thus in that case, **this section will cost nothing at all to US taxpayers**. In that case, the sole effect will be to provide some degree of assurance to new fuel investors, who are highly dependent on such assurance. It will provide an immediate badly needed economic stimulus due to new private investment without adding to the deficit.

But what if actions in this bill cause the world oil price never to rise above $100 ever again? In that case, the benefit to the US economy and the US balance of trade will be far greater than the cost of these entitlements. US economic security and recovery depends more on the balance of trade than it does on the amount of the government deficit, because what we owe to others is more of a problem than what we owe to ourselves.

Either way, we win.

Note that sustainable domestic fuel supply both for liquids and gasses is considered. Electricity supply is not within the scope of this bill, but the research in section 4 would have important benefits to solar electricity, wind and biofuels as well. Some have questioned whether the renewable fuels industry can expand fast enough to meet the requirements under LCFS or RFS; however, just in the last few years, the rate of development of new ethanol capacity is already large enough and fast enough to prove that these fears are misplaced. Furthermore, the inclusion of natural gas, methanol and electricity also opens the door quickly to very large additional sources of alternative fuel. New catalyst production plants are coming online which will allow even faster scale-up in the future.

Explanation of Sections 5 and 6 (Vehicles)

Section 6 addresses one part of issue c, the deployment of new cars and trucks. It **combines** those (complementary) measures which are considered most important to those who would want to sell more natural gas to cars, to those who would wish to sell more plug-in hybrid cars, and to those who would want to see use more renewable liquid fuels; by expanding and combining all three of these near-term options (and hydrogen as well), we will get to energy independence much sooner than we could if we only relied on one "winner." It was largely based on the Pryor-Inhofe bill to stimulate greater use of natural gas in transportation, altered to provide a level playing field with hybrids and plug-in hybrids. Section 5 is an edited version of the Brownback bill, S.835, to stimulate greater use of renewable liquid fuels. The overall approach is to encourage natural gas, renewable fuels and electricity all at the same time, in order to get to zero dependency on fossil oil at the soonest possible time. In all three cases, this title focuses on those measures which experts in these three believe are most important to faster development of their respective technologies, while also taking care to provide a level playing field between them.

SPECIFICS:

1. The **most important change to existing law is with the termination time of the credits**. Since our goal is to reduce CO2 in transportation down to a reasonable minimum, and to totally eliminate our dependence on foreign oil, there is no excuse for stopping until the job is actually done; thus the termination criteria here require that a majority of the cars on the road are capable of using at least some kind of alternative fuel, **including hybrids**, which get the credit after 2011 only if they qualify as alternate fuel vehicles.

2. Another major change is that alternate fuel vehicles are **required** to be fuel-flexible to qualify. This tightening of standards is important for national security and the ability to move towards low-carbon fuels as soon as possible, with minimum risk of economic dislocations during transition.

3. Credits are also made available for aftermarket conversions to be able to use natural gas. As a practical matter, this would mainly affect retrofits of large trucks or busses, where the fuel savings would justify the costs and where there is room for the new gas tank. Reducing the use of gasoline in large trucks and busses, because of these retrofits, would have a worthwhile impact in reducing our dependence on oil, and immediate benefits to the environment.

4. Credits are also extended for plug-in hybrids. There is no proposal to extend the specific credits for plug-in hybrid cars under section 30D, because these credits will hopefully become excessive in the future as the costs of plug-capability decline. Instead, plug-in cars will be subject to exact same treatment as other alternate energy vehicles, under section 30B(e), in order to create a level playing field. A special termination clause is allowed for cars which are both alternate fuel vehicles **and** plug-ins, and for fuel cell cars, because they represent more futuristic types of car – a kind of "second wave" of low carbon and efficiency improvement.

5. An Open Fuel Standard provision is included, modeled on S 835 of the 11th Congress. The set of vehicles which count towards the requirement includes all the vehicles which count in S. 835 plus additional types of vehicle. Also, the schedule is far less ambitious here. The auto industry certainly has the ability to meet this schedule – considering how it ramped up to more than 50% gasoline/ethanol flexibility in Brazil in a period less than two years, considering that those same companies manufacture cars in the United States, and considering that full liquid fuel flexibility requires the same technology with only an upgrade to other off-the-shelf parts and metals. The cost of this extra flexibility is very small compared to annual fuel bill of the United States. (See the discussion of refueling.)

Explanation of Section 7 (Refueling Stations)

To prevent risks of real losses in the transition, it is important that the refueling stations and cars have the greatest possible flexibility in general and make their transition early. There is little risk of dislocation in producing too much electricity or natural gas, but with alternative liquid fuels it is both essential and relatively inexpensive to reduce potential risk by requiring more flexibility as to the type of liquid fuel. This section as well is largely based on the Pryor Inhofe bill.

SPECIFICS:

1. This section makes **small but important amendments** to section 30C of the Internal Revenue Code, which already provides tax incentives for alternative fuel refueling stations (e.g. gas stations).

2. The **most important change is with the termination time**. Since our goal is to reduce CO2 in transportation down to a reasonable minimum, and to totally eliminate our dependence on foreign oil, there is no excuse for stopping until the job is actually done; thus the termination criteria here require that alternative fuels are at least potentially available in the majority of gas stations which sell petroleum. It is curious how recent energy bills have often provided very large permanent tax breaks for oil, while requiring annual re-authorization at the cost of great political effort for activities which may free us from dependence on oil. The larger goals require that this imbalance be corrected.

3. The next change is that sellers of **liquid fuel must meet higher standards** in order to be eligible. Gaseous fuels and electricity -- which require zero oil imports (except in Hawaii, where things are improving) -- still qualify automatically. But liquid fuel tanks/pumps are required to have at least three-way flexibility, for three reasons: (1) in spending taxpayer money, it is reasonable to ask for full value in meeting the goals of national security and environment; (2) flexibility in liquid fuel tanks/pumps is relatively inexpensive, compared with the national bill for liquid fuels themselves; and (3) flexibility is essential, to make our economy more resilient and adaptive in the face of future possible price shocks for any of these fuels, and uncertain future prices and technologies.

4. The amount of the credit for new fueling stations is unchanged, but a credit is also added for retrofits. In the case of liquid fuels, retrofits of existing tanks/pumps is typically much less expensive than buying a new tank. Encouraging retrofits is one way to make it possible for us to move faster towards the goal here. A new limit has been added on total cumulative tax credits to any one taxpayer, for the sake of equity.

5. A couple of additional requirements have been added for electric recharge stations, to fulfill the original intent.

Note that **flexibility** still allows gas stations to sell fossil gasoline in all their liquid fuel pumps, so long as fossil gasoline remains affordable and renewable liquid fuels are not available enough. However, ethanol production has already reached the point where the ability of cars and refueling stations to sell more of it is becoming a binding constraint, and there are risks of great price spikes in the future. Flexibility will allow gas station owners and car

drivers to decide what to do, based on their needs and changing market conditions. In the case of natural gas and electricity, the risk to supply is not so serious, and flexibility is not required. The change in the termination time here will position us to make better use of the expected boom in US natural gas supplies, due to technology breakthroughs in low-carbon shale gas.

Comments on Section 5, R&D

Because of the "findings" part, this section may be more self-explanatory than the others.

Washington has a long history of spending billions upon billions of dollars on very large projects required to go to very large stakeholders. Even in basic research projects, the US government often requires that a new breakthrough business secure the approval of a big established stakeholder, in the form of cost-sharing, before it can explore a new direction of technology. This can be a real problem, when a disruptive technology might undermine a large and more expensive alternative. Large pilot and demonstration projects and large projects at national laboratories certainly can play a vital role in the energy field – but ***in addition to these (which are already funded at a reasonably high level)***—there is a crucial hole in funding smaller, more daring and more unconstrained efforts in universities and small businesses. Once successful, such efforts will need to be able to tap into other private and public sources of funding, in order to build pilot plants and go into full production – **but they need to get off the ground first.**

This section does not limit the spending on these specific activities to $20 million per year. It merely sets a floor on the spending for these three very specific new activities. It still gives ARPA-E and DOE in general the latitude to spend the bulk of its funds on other, more traditional larger types of projects, and on projects in other parts of the energy sector. Many of us would very much like to see additional, similar focused efforts in areas like concentrating solar power, true intelligence for the power grid, and even energy from space or energy scavenging; they are not part of this bill, because this bill is focused on independence from oil and reducing CO2 in the transportation sector. The complexities of renewable electricity are more within the jurisdiction of the Energy Committee, which has not neglected that topic.

The research topic which includes advanced Stirling and JTEC would have direct relevance to the cost of solar energy as well. At present, the cheapest possibility for large-scale "solar farms" is the technology of moving reflector dishes developed at Sandia National Laboratories, which uses a small 30% efficient Stirling engine to convert heat to electricity. If we could pull out the 30% engine, and plug in a 55% engine, we would get almost twice the electricity for almost the same cost of system; thus the cost per kilowatt hour of electricity would be cut in half. Since these engines could be mass-produced in existing (underutilized) engine factories, a very rapid scale-up and deployment would be possible, once a working manufacturable prototype engine is available, which some think could be done in two years, with the right kind of project. Since these Stirling systems produce AC electricity directly, they do not require the expense of DC-to-AC converters, a major cost item with solar cells. JTEC has the potential for even more efficiency, but is less mature than the Stirling engine as yet.

Likewise, the development of lower cost batteries would allow us to put a lot more storage into the electric power grid, not only in plug-in vehicles but also in stationary sites. If we could move wind power "for free" to any time of day, the effective cost of wind power to electric utilities would be cut in half or more. Many nations simply throw away one-third of the available wind power, because it comes at times when it is not really useful; laws which prohibit that sometimes in the US do not make the effective cost of wind power less here, because they actually raise costs to electric utilities. Better storage, and better use of that storage, may well be our best hope of deep cuts in the cost of wind power.