American Strategy and US “Energy Independence”

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Changes in energy technology, and in the way oil and gas reserves are estimated, are beginning to raise serious questions about the level of future US dependence on energy imports and how this will affect US strategy. At this point, some answers are highly uncertain. Much depends on uncertain estimates of how new technologies and reserves will be developed over time.

Much also depends on how import dependence is assessed. Direct imports of crude oil, gas, and product are only part of the story. The US imported some $2.3 trillion dollars worth of goods and services in 2012 – equivalent to some 17.5% of the US GDP. They represented an immense volume of indirect imports of energy and well over one-third consisted of goods came from Asian and European states heavily dependent in gas and oil imports. None of the estimates of US import dependence – past, current- or future – take these indirect imports into consideration.

Defining Import Dependence

The US pays market prices for energy. When oil prices rise elsewhere in the world, US domestic oil prices rise as well, just as the US must pay the same world prices for any imports. Moreover, the US have to pay the same premium price causes by any energy interruption regardless of where it occurs since all importers compete for the remaining oil on world markets.

The US is also dependent on the stability of a global economy that is dependent on the stability of oil exports. The not only imports, it exports $1.56 trillion worth of goods and services in 2012. This was equivalent to 13.9% of the US GDP. Moreover, the US finances a substantial part of its economy by having other states – most of which are major energy importers -- invest in the US and it US securities.

It is equally important to point out that the Energy Information Agency (EIA) of the Department of Energy does not estimate that the US will ever achieve independence in the import of the liquid fuels the US must have for its transportation sector in its reference case -- which makes estimates to 2040. Regardless of what various other sources estimate, the US government does not project energy independence in this critical area even in terms of crude oil and other liquids in its most probable scenario.

Current US Strategy

These factors help explain why US strategy still puts so much emphasis on the security of the Gulf – the key source of world oil exports. The new US strategy that the Department of Defense announced in January of 2012 gave equal importance maintaining the security of the Middle East and Asia. It never made any reference to a “pivot” to Asia, but rather
described the need to maintain the security of the Middle East and Gulf region to deal with threat like terrorism and Iran, and to make a limited “rebalancing” of US forces in Europe to Asia.

Later background briefings indicated this “rebalancing” would be equivalent to some 5-10 percent of US air and naval forces – many of which would be based in the US and on the West coat or Hawaii, rather than based forward in the Pacific. Statements repeating the US intention to “rebalance” some forces to Asia were repeated in the US department of defense budget requests for FY2013 and FY2014, but no indications were given of the size of such shifts or where they were to be deployed. It seems unlikely that any near term changes will take place in this aspect of US forces and strategy – although at some point the new strategy will have to be defined in terms of actual force levels and deployments.

As Figure 1 shows, the US remains heavily dependent on energy imports in the near term, including imports from the Persian Gulf and IOR region. Almost all sources agree, however, that US import dependence will be sharply reduced in the future.
The United States imported 11.0 MMbd of crude oil and refined petroleum products in 2012, and exported 3.2 MMbd of crude oil and petroleum products, so net imports (imports minus exports) equaled 7.4 MMbd. The United States imported 2.1 MMbd of petroleum products such as gasoline, diesel fuel, heating oil, jet fuel, and other products while exporting 3.1 MMbd of products, making the United States a net exporter of petroleum products. Over 50% of U.S. crude oil and petroleum products imports came from the Western Hemisphere (North, South, and Central America, and the Caribbean, including U.S. territories) during 2012. About 29% came from the Persian Gulf countries of Bahrain, Iraq, Kuwait, Qatar, Saudi Arabia, and United Arab Emirates. Our largest sources of net crude oil and petroleum product imports were Canada and Saudi Arabia.

The Impact of Increased American Production of Petroleum and Other Liquids

The EIA develops the official estimates used the US government, and projects a major increase in US and Canadian petroleum and gas production. Figure 2 and Figure 3 show that the EIA does project the United States will benefit from major increases in both unconventional oil and unconventional gas production, and from gradually converting some gas to liquid fuels for transportation purposes.

At the same time, these figures shows that much of the projected US energy independence is based on the assumption that the US will benefit from major new energy production and exports from Canada. The US will remain import dependent on liquid fuel imports for its transportation sector indefinitely into the future, and its domestic supply will only increase if it continues to pay world market prices.

Even in the scenarios that are most favorable to a reduction in direct imports, it will be at least a decade before the United States can achieve energy “independence,” even in the sense of increasing its own production to the point where its key imports will consist of liquid fuels and much of its imports can come from Canada.

As Figure 2 shows, the EIA projected in the summer of 2013 that,

Prospects for growth in petroleum and other liquid fuels production in the Americas are particularly strong, reflecting contributions from deepwater pre-salt resources in Brazil, bitumen in Canada, and tight oil in the United States. The result is a net gain in non-OPEC production from the Americas of 7.2 million barrels per day by 2025—an increase that balances liquids production with consumption in the hemisphere as demand growth is tempered by efficiency gains, especially in the U.S. transportation sector.

In the IEO2013 Reference case, the Americas become a net exporter of liquids by the end of the projection period. There is potential for even more production growth in the Americas from both the United States, as discussed in the Annual Energy Outlook 2013 (AEO2013) High Oil and Gas Resource case, and from OPEC’s Venezuela, which has large reserves of extra-heavy oil but does not aggressively develop new fields under the current policies assumption of the IEO2013 Reference case. U.S. production of liquid fuels surpasses that of Russia by 2015. There are a number of factors (including accounting conventions for how liquid fuels are measured) that determine the timing, extent, and significance of such a development. .

Nonpetroleum liquid resources remain a small but increasing source of liquids supply in the IEO2013 Reference case. Production of nonpetroleum liquids, such as biofuels, CTL, and GTL, is spurred by sustained high prices in the Reference case (Figure 32). However, biofuels development also relies heavily on country-specific programs or mandates [23]. World production of nonpetroleum liquids, which in 2010 totaled only 1.6 million barrels per day (less than 2 percent of total world liquids production), increases to 4.6 million barrels per day in 2040, when it accounts for about 4 percent of total world liquids production.

At the same time, the EIA estimates that US will still be the second largest petroleum consumer in the world although the EIA projects that the rate of increase in demand will drop over time as transportation becomes more efficient and substitutes are found for petroleum liquids.

‘The United States is the largest liquid fuels consuming nation in the OECD, and it remains so through 2040. Over the course of the projection, increases in vehicle fuel economy offset growth in transportation activity in the United States, resulting in a decline in the use of petroleum and other liquids even as consumption of liquid biofuels increases. Biofuels, including biodiesel blended into
diesel, E10, E15, and higher ethanol blends used in flex-fueled vehicles, account for 6 percent of all U.S. petroleum and other liquids consumption by energy content in 2040.

Total liquid fuels consumption in the United States rises from 18.9 million barrels per day in 2010 to 19.5 million barrels per day in 2020, after which it falls to 18.7 million barrels per day in 2030 and 18.6 million barrels per day in 2040.

Moreover, it is important to note that while the EIA projects that North America as a whole may become independent of the need to import petroleum and other liquid fuels, it makes no such projection for the United State alone.
Figure 3: EIA Estimate of Key Shifts in World Petroleum Production Affecting United States Import Dependence: 2010-2040

Non-OPEC liquids production by region and country, 2010 and 2040 (million barrels per day)

OECD and non-OECD Americas net imports and exports of liquid fuels, 2010-2040 (million barrels per day)

The Impact of Increase US Gas Production

US import dependence will also be affected by the major increases the EIA and virtually every other source of energy forecasts projected in US and other American gas production. Gas can substitute cost-effectively for petroleum in virtually every aspect of US energy demand other than transportation, and will further reduce US need for petroleum imports.

The key EIA projections regarding US gas production are shown in Figure 3, and the EIA summarizes the trends in US and other North American gas production as follows:

Natural gas production in the OECD Americas grows by 56 percent from 2010 to 2040. The United States, which is the largest producer in the OECD Americas and in the OECD as a whole, accounts for three-quarters of the total regional production growth, with an increase from 21.2 trillion cubic feet in 2010 to 33.1 trillion cubic feet in 2040 (Figure 52). U.S. shale gas production grows from 4.9 trillion cubic feet in 2010 to 16.7 trillion cubic feet in 2040, more than offsetting declines in production of natural gas from other sources. In 2040, shale gas accounts for 50 percent of total U.S. natural gas production in the IEO2013 Reference case, tight gas accounts for 22 percent, and Lower 48 offshore production accounts for 9 percent. The remaining 19 percent comes from coal bed methane, Alaska, and other associated and nonassociated Lower 48 onshore resources.

One of the keys to U.S. production growth is advanced production technologies, especially the combined application of horizontal drilling and hydraulic fracturing techniques that have made the country’s vast shale gas resources accessible. Rising estimates of shale gas resources have been the primary factor in nearly doubling the estimated U.S. technically recoverable natural gas resource over the past decade, and U.S. shale gas production has continued to grow despite low natural gas prices. As North American natural gas prices have remained low and liquids prices have risen with international crude oil prices, U.S. shale drilling has concentrated on liquids-rich shales such as the Bakken formation in North Dakota and the Eagle Ford formation in Texas.

Natural gas production in Canada grows by 1.1 percent per year on average over the projection period, from 5.4 trillion cubic feet in 2010 to 7.6 trillion cubic feet in 2040. As in the United States, much of the production growth comes from growing volumes of tight gas and shale gas production. Four proposed LNG liquefaction and export facilities would use feedstock gas from the Montney tight gas and Horn River shale gas formations in western Canada. If all four facilities were built and operated at their initial proposed capacity, Canada would need to supply 1.2 trillion cubic feet per year to support them—less than the decline in net pipeline exports of natural gas from Canada to the United States in the Reference case.

Currently, in addition to small but growing volumes of shale gas, Canada also produces small volumes of natural gas from coal beds and significant volumes from tight reservoirs. In 2010, almost 40 percent of Canada’s natural gas production came from tight reservoirs...Most of the country’s coal bed methane production is in the province of Alberta, which had more than 11,000 producing coal bed methane wells and 260 billion cubic feet of coal bed methane production in 2010...In 2001, coal bed methane activity in the province consisted of no more than a few test wells.

Mexico’s natural gas production remains fairly flat in the mid-term but more than doubles in the later years of the projection, as production from shale gas resources grows. Total natural gas production increases from 1.8 trillion cubic feet in 2010 to 3.5 trillion cubic feet in 2040. Like Canada and the United States, Mexico is thought to have substantial shale gas resources, the most prospective of which are extensions of the successful Eagle Ford Shale in the United States. However, because the shale resources in Mexico are not as well explored as those in the rest of North America, there is more uncertainty surrounding estimates of their size and producibility. Mexico also faces substantial difficulties in attracting the investment and technology improvements needed to increase natural gas production generally and production from shale resources specifically.

It should be noted that much of the projected increase comes from gas production technologies where it still is not possible to predict the sustained rate of recovery, price, or
environmental impacts. The EIA also notes that the US will make major increases in demand that could pose a significant future need for imports if current forecasts of increase gas production are not correct.  

Annual natural gas consumption in the OECD Americas region rises steadily to 41.6 trillion cubic feet in 2040, …including increases of 4.2 trillion cubic feet from 2010 to 2020 (1.4 percent per year) and 8.2 trillion cubic feet from 2020 to 2040 (1.1 percent per year), and accounts for 60 percent of the total increase for OECD countries and 17 percent of the total increase for the world over the projection period. Although natural gas consumption grows at faster rates in other regions, OECD Americas remains the world’s largest regional consumer of natural gas through 2040.  

The United States—the world’s largest consumer of natural gas—has the region’s highest projected annual consumption growth in absolute terms… U.S. natural gas consumption increases by 5.8 trillion cubic feet through 2040, accounting for 46 percent of the region’s total growth. Projections for combined annual natural gas consumption in Mexico and Chile include absolute growth in the two countries of 4.7 trillion cubic feet (38 percent of total regional growth), followed by Canada (2.0 trillion cubic feet, or 16 percent of the OECD Americas total).
Figure 3: EIA Estimate of Key Shifts in World Gas Production Affecting United States Import Dependence: 2010-2040

World increase in natural gas production by country grouping, 2010-2040 (trillion cubic feet)

OECD America’s natural gas consumption by country, 2010-2040 (trillion cubic feet)

Natural gas production in China, Canada, and the United States, 2010 and 2040 (trillion cubic feet)

OECD Americas change in natural gas consumption by country and sector, 2010-2040 (trillion cubic feet)

US Energy Dependence on Imports, the IOR, MENA Oil, and the Gulf

This complex mix of trends helps explain why the EIA has issued an estimate of US import dependence that shows continued US strategic dependence on oil imports to 2040 – and that this dependence will begin to increase again after 2030. The current EIA estimates of the range of possible US dependence on oil and gas imports are shown are shown in Figure 4.

The EIA reference case estimate indicates the decline in US oil and energy liquids imports will still leave the US strategic dependent on imports and the security of world oil flows through 2040. The EIA Annual Energy Forecast for 2013 states that, \(^v\)

In the Reference case, U.S. net imports of petroleum and other liquids decline through 2019, while still providing approximately one-third of total U.S. supply. The net import share of U.S. petroleum and other liquids consumption continues to decline in the Reference case, falling to 34 percent in 2019 before increasing to 37 percent in 2040.

As Figure 4 also shows, however, the EIA does project other cases where import dependence could be far lower or the US could even export liquids.

It is also important to note that the International Energy Agency (IEA) separately estimated in late 2012 that the US could be a net exporter of natural gas by 2020 and effectively self-sufficient in terms of its net energy needs by 2035. These IEA estimates drew on estimates of the impact on US energy supply of recent improvements in drilling technique that allow the US to access first shale gas and later harder-to-reach oil deposits, along with gradual increases in efficiency and renewable energy generation. \(^vi\)

The Executive Summary to this IEA report stated that, \(^vii\)

The recent rebound in US oil and gas production, driven by upstream technologies that are unlocking light tight oil and shale gas resources, is spurring economic activity – with less expensive gas and electricity prices giving industry a competitive edge – and steadily changing the role of North America in global energy trade. By around 2020, the United States is projected to become the largest global oil producer (overtaking Saudi Arabia until the mid-2020s) and starts to see the impact of new fuel-efficiency measures in transport. The result is a continued fall in US oil imports, to the extent that North America becomes a net oil exporter around 2030. This accelerates the switch in direction of international oil trade towards Asia, putting a focus on the security of the strategic routes that bring Middle East oil to Asian markets.

As Part II of Figure 4 shows, the advances in gas technology seem even more likely to make the US a net exporter of gas.

The Impact of Reductions in Import Dependence on US Strategy

Even if the more favorable predictions of cuts in US import dependence should prove accurate, current forecasts indicate that these cuts will not affect the US force at least the next decade or make the US immune to the global impact of any threat to future energy exports through the Gulf. It is also unclear that that the US will make major changes in its strategy regarding the Gulf even then unless the Gulf proves to be a far more stable area than it is today and the Arab Gulf states share this confidence in their security.

To repeat points made earlier:

- Like wheat and other global commodities, the strategic importance of oil exports is not dependent on whether petroleum goes from one nation to another at any given time, but is dependent on the supply of the overall global market and balance of supply and demand.
• Moreover, US strategists are fully aware that the issue is not simply one of US energy needs, but how the secure and stable flow of world energy exports affects the world economy. Both the EIA and IEA agree that the world economy will become steadily more dependent on Gulf energy exports through 2035-2040. And once again, it must be stressed that the US is becoming steadily more dependent on the overall health of the global economy, and is an indirect importer of oil through its imports of Asia and other manufactured goods – imports that are not calculated by either EIA or IEA.

• While America may not be a major direct importer of Gulf oil, it will pay the increased world prices for all its oil and other related increase in energy costs that come out of a war or crisis in the Gulf, and any reduction or expected reduction in global supply will increase such costs. Moreover, the US is projected to become even more dependent on a global economy -- and imports of manufactured goods -- that require the secure flow of Gulf energy exports to Europe and Asia.

• Senior US policymakers share a common perception with their Asian, European, and other policymakers that that the global economy is critically dependent on the stable flow of Gulf oil exports. The politics of calling for “energy independence” have little – if any – impact on either US threat perceptions or plans for the defense of the Gulf. In practice, US national security planners accept the fact that the Gulf is and will remain is the location of a strategically vital share of the world’s petroleum resources.

Even if optimistic forecasts of cuts in direct US energy imports eventually prove to be correct, this will not affect the critical strategic importance of the Gulf to the US for the foreseeable future. Long after 2020, US consumers will still have to pay global prices for their energy needs in any energy emergency coming out of a crisis in the Gulf. US strategists will also have to consider the fact that the US is currently bound to share any remain access to exports with its partners in the IEA, and the US economy will be critically dependent on the fact that US trading partners (particularly those in East Asia, according to the IEA) will then be even more dependent on Gulf oil supplies.

**Budget Cuts as the Wild Card in US Strategy**

Where the decline in US import dependence could have a major impact on the IOR is a future win which US domestic policies and pressures continue to put acute pressure on the US federal budget and on US defense spending. In such a contingency, the US politics of “energy independence” could become more important that US strategic considerations.

The current US budget crisis has already led to major cuts in US military spending. If these continue at their current rate, they are likely to lead to significant cuts in total US military forces and the forces the US projects into the Pacific, the Middle East, and the IOR. Moreover, these political pressures will be compounded by the impact of the Budget Control Act and Sequestration unless Congress act on a Department of Defense request to ease its long term budget impact, and by continuing US problems with cost escalation.

If the current politics of the US political crisis over entitlements spending, the federal deficit, and the federal debt continue to put pressure on US national security spending, they may lead to enough cuts in US air and sea forces over the coming decade so that the US “rebalancing to Asia” ends by reducing the air and sea forces that US can project into the IOR in 2022 to levels lower than in 2012.

In practice, much of the US response to the drop in US import dependence will also depend on how the military balance in the IOR evolves, US perceptions of the risks in the region, the scale of US competition or cooperation with China, and the extent to which the US search for strategic partnerships in the Gulf and East Asia affect the cost of US power
projection. Regardless of the strategic importance of the energy flows through the IOR, the US may come to feel that the cost-benefits of playing the role of global policeman half way around the world to help secure Asian strategic interests are not favorable enough to sustain the current US strategy and commitments to the IOR.

This is particularly likely if the more favorable forecasts of US and American energy supplies become the reality, and if the US fails to produce a stable solution to its current budget crisis and US politics come to focus on the illusion of “independence” rather than the reality of continuing strategic risks.
In the Reference case Blue, U.S. net imports of petroleum and other liquids decline through 2019, while still providing approximately one-third of total U.S. supply. The net import share of U.S. petroleum and other liquids consumption continues to decline in the Reference case, falling to 34 percent in 2019 before increasing to 37 percent in 2040.

In the Low/No Net Imports case, the United States ends its reliance on net imports of liquid fuels in the mid-2030s, with net exports rising to 8 percent of total U.S. liquid fuel production in 2040. In contrast, in the High Net Imports case, net petroleum import dependence is above 44 percent in 2040, which is higher than the Reference case level of 37 percent but still well below the 2005 level of 60 percent.

In the High Oil and Gas Resource case, changes due to the supply assumptions alone cause net import dependence to decline to 7 percent in 2040, with U.S. crude oil production rising to 10.2 million barrels per day in 2040, or 4.1 million barrels per day above the Reference case level. Tight oil production accounts for more than 77 percent (or 3.2 million barrels per day) of the difference in production between the two cases. Production of natural gas plant liquids in the United States also exceeds the Reference case level.

U.S. dry natural gas production increases 1.3 percent per year throughout the Reference case projection, outpacing domestic consumption by 2019 and spurring net exports of natural gas. Higher volumes of shale gas production are central to higher total production volumes and a transition to net exports. As domestic supply has increased in recent years, natural gas prices have declined, making the United States a less attractive market for imported natural gas and more attractive for export.

U.S. net exports of natural gas grow to 3.6 trillion cubic feet in 2040 in the Reference case. Most of the projected growth in U.S. exports consists of pipeline exports to Mexico. Declining natural gas imports from Canada also contribute to the growth in U.S. net exports. Net U.S. imports of natural gas from Canada decline sharply from 2016 to 2022 then stabilize somewhat before dropping off again in the final years of the projection, as continued growth in domestic production mitigates the need for imports.

Continued low levels of liquefied natural gas (LNG) imports in the projection period, combined with increased U.S. exports of domestically sourced LNG, position the United States as a net exporter of LNG by 2016. U.S. exports of domestically sourced LNG (excluding exports from the existing Kenai facility in Alaska) begin in 2016 and rise to a level of 1.6 trillion cubic feet per year in 2027. The prospects for exports are highly uncertain, however.

In the High Oil and Gas Resource case, with more optimistic resource assumptions, U.S. LNG exports grow to more than 4 trillion cubic feet in 2040. Most of the additional exports originate from the Lower 48 states.


