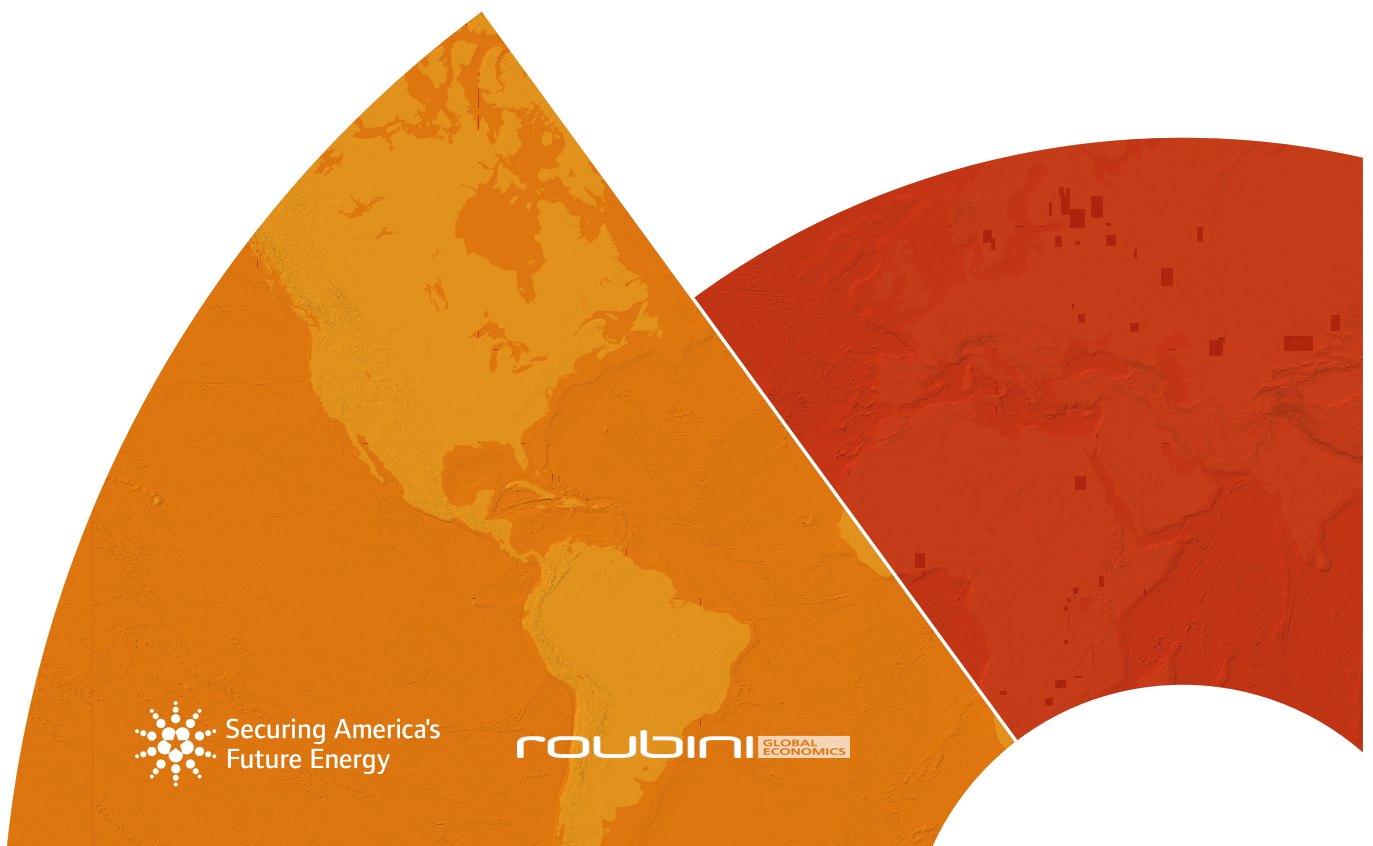


Oil Security Index

Quarterly Update



January 2015



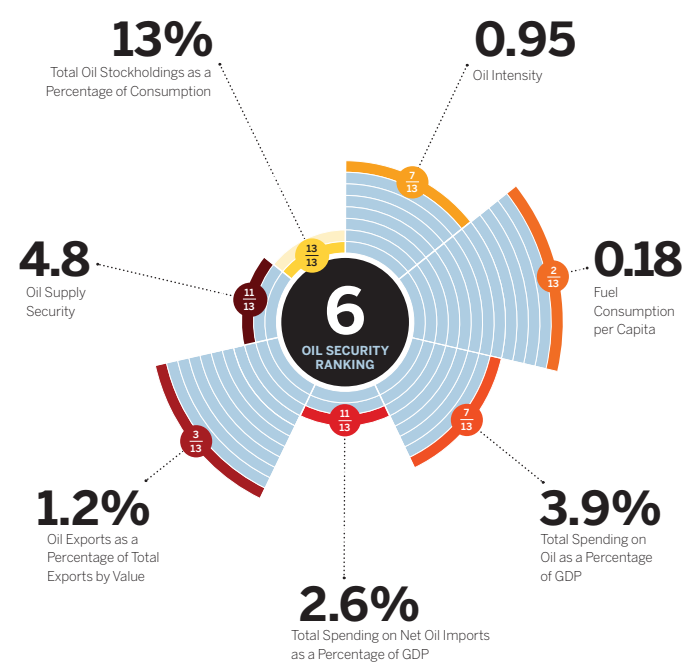
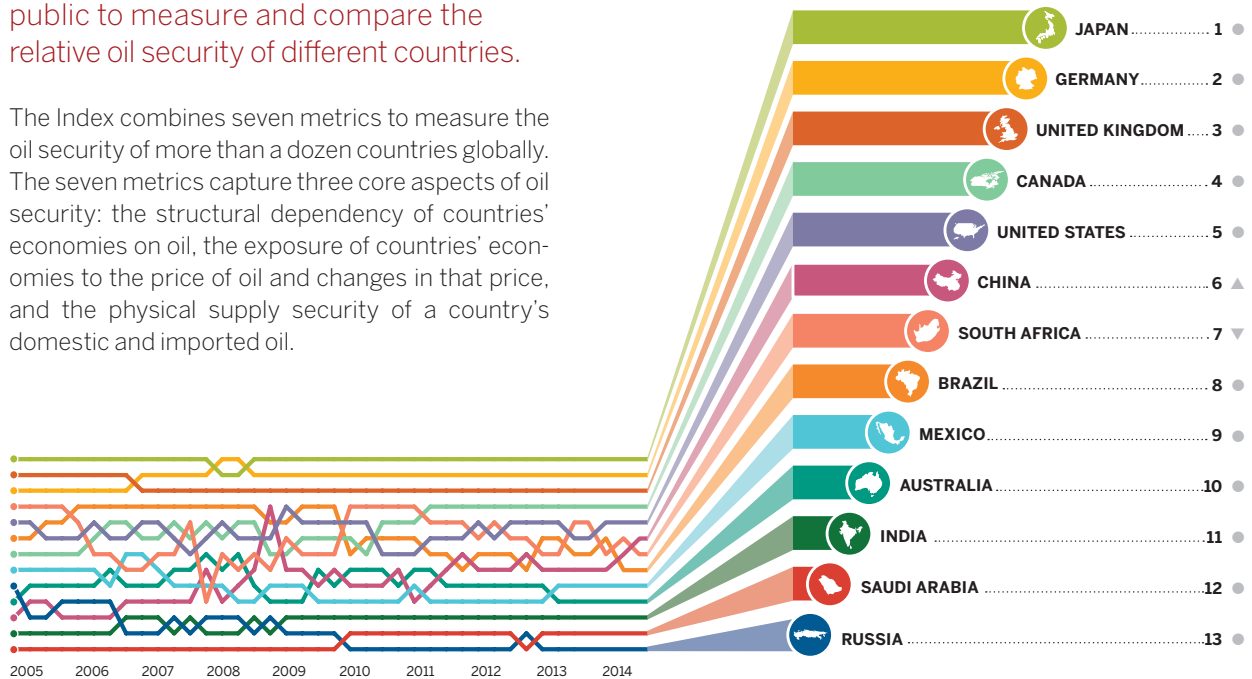
Securing America's
Future Energy

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Oil Security Index Rankings

The Oil Security Index is designed to enable policymakers and the general public to measure and compare the relative oil security of different countries.

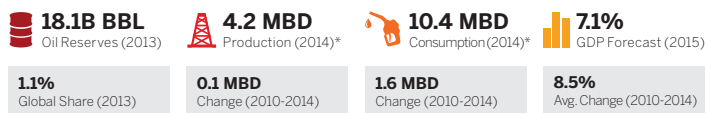
The Index combines seven metrics to measure the oil security of more than a dozen countries globally. The seven metrics capture three core aspects of oil security: the structural dependency of countries' economies on oil, the exposure of countries' economies to the price of oil and changes in that price, and the physical supply security of a country's domestic and imported oil.



Spotlight on China

China, the world's second-largest oil consumer behind only the United States, is the leading contributor to global oil demand growth at a time of flat demand from major developed economies.

China's oil demand growth in 2015 is projected to be more than half of the world's net increase. However, with demand underperforming projections throughout 2014, GDP growth slowing, and a sectoral shift toward lighter industry underway, IEA projections of China's 2015 demand have been cut 0.3 mbd since last June. Despite low oil stocks and supply security risks, continued improvement in oil intensity (down 35 percent since 2000) and oil spending versus GDP have seen China reach the top half of the Index rankings for the first time.



* Estimated

Q3 2014 Global Highlights

Changes in oil demand and supply in different countries around the world impact both those countries' oil security and the global oil market.



- A** After several years of y-o-y growth, Russia's oil production growth turned negative in Q3 2014. The decrease was small—only 0.01 mbd y-o-y and 0.08 versus Q2—but showed that Russia's growth trajectory has been halted by factors including sanctions, geopolitical tensions, maturing fields, and questions over its business environment.¹
- B** OPEC production increased by 0.6 mbd from Q2. While this increase still represented an 0.1 mbd drop in production y-o-y, this was the smallest y-o-y deficit since Q4 2012, the last time OPEC reported a y-o-y increase. Libya's production increased to nearly 0.6 mbd in Q3 from just over 0.2 mbd in Q2 as some of its outages were resolved; of non-NGL production, this increase represented four-fifths of OPEC's quarter-over-quarter increase.²
- C** Non-OPEC supply growth remained strong and driven by increased production in the United States. Output continued to grow in the United States, rising to 11.8 mbd in Q3, although this increase of 0.2 mbd over Q2 was the smallest since Q1 2013. Still, it represented over half of non-OPEC supply increase over the prior quarter, and its 1.3 mbd y-o-y increase represented 78 percent of non-OPEC y-o-y supply growth.³
- D** Unplanned oil supply outages remained substantial, yet improved slightly in Q3. Outages fell by approximately 0.4 mbd on average from Q2 to 3.0 mbd, due primarily to increases in Libya's output, although the nation still represented the world's most significant source of unplanned outages. Persistent outages in Iran, Iraq, and Nigeria also contributed to OPEC's average outage total of 2.4 mbd for the quarter, and Syria remained responsible for about half of the non-OPEC total.⁴
- E** China remained the driving force in absolute terms behind the relatively weak oil growth in Q3. While global demand increased only 0.4 percent, or 0.28 mbd y-o-y, China's demand increased by 0.27 mbd y-o-y, or 2.7 percent. Other non-OECD nations in the developing world contributed significantly to demand growth, with India, Brazil, and Saudi Arabia each increasing demand between 3.7 and 3.9 percent y-o-y, totaling 0.4 mbd in increased demand between them.⁵
- F** OECD demand remained on an overall negative trajectory. Despite a 1.0 mbd increase over Q2, which slightly raised the OECD's share of global demand to 49.2 percent from 48.9 percent, demand in the group dropped by 0.5 mbd, or 1.1 percent, y-o-y. Much of this drop came from recession-hit Japan, which saw a whopping 9.1 percent y-o-y drop in demand (or 0.4 mbd), easily the most of any nation.⁶

1 SAFE analysis based on data from: International Energy Agency (IEA), Oil Market Report (OMR), November 2014.

2 Id.

3 Id.

4 SAFE analysis based on data from: U.S. Energy Information Administration (EIA), Short Term Energy Outlook (STEO), July-October 2014.

5 SAFE analysis based on data from: IEA, OMR, November 2014.

6 Id.

Russia: The Risks of an Oil-Dependent Economy

Russia has been seeking to expand the locations of its production and shift exports away from Europe, but has been wounded by sanctions and Brent's collapse.

BACKGROUND

Russia has held the bottom spot in the Oil Security Index for nearly two years. This is not due to any difficulty in sourcing its oil—Russia produced 10.9 mbd of crude oil and liquids as of September 2014 and only consumed 3.8 mbd.¹ Rather, its precarious oil security derives from the heavy reliance of its economy on oil exports. With just over 51 percent of its total export income coming from crude oil as of mid-2014, Russia's trade income relies on oil more than any other country in the Index besides Saudi Arabia.

WHERE BRENT GOES, SO DOES THE RUBLE

Russia's dependence on oil export revenue has meant that the recent plummet in oil prices has ravaged the Russian economy. With oil income—and thus national export income—drastically falling, the value of the ruble has nosedived almost in lockstep with Brent, falling 49 percent from July to its record low in December (See Figure 1). Russia has reacted with desperate measures, including a severe hike in interest rates—most notably a shift from 10.5 percent to 17 percent on December 16, 2014—and the selling of foreign reserves totaling \$123 billion in 2014, \$26 billion of which came over only two

weeks in December.² U.S. and E.U. sanctions enacted in the wake of the 2014 Ukraine crisis have taken a toll as well and limited Russia's ability to respond to falling oil revenue.

In response to the oil price crisis, Russia has faced speculation that it is seeking action to curb global production, most notably in late November when it met with Mexico and OPEC members Saudi Arabia and Venezuela. However, Russia has not shown a desire to immediately participate in a cut, likely due both to logistical constraints—its Siberian oilfields are not generally conducive to pauses in production—and a need to continue gaining what foreign currency it can get from the oil trade.³ The Russian daily Kommersant reported in late November that shelved efforts to coordinate an output cut with OPEC would have resulted in a decrease in Russian production of 300,000 b/d in exchange for OPEC cutting its ceiling by 1.4 mbd.⁴ Rosneft head Igor Senchin said in November that Russia will only be capable of “taking structured measures” to reduce production in the medium and long term, and that the company has cut production by 25,000 barrels per day

1 IEA, OMR, November 2014

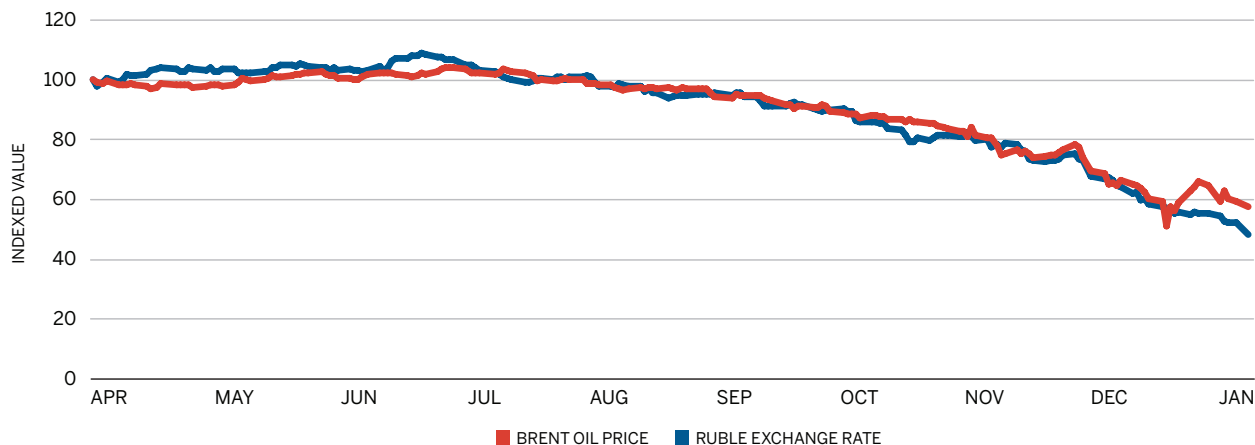
2 Telegraph, “Russia faces ‘perfect storm’ as reserves vanish and derivatives flash default warnings,” January 6, 2015

3 Bloomberg Businessweek, “Why Russia Said ‘No Deal’ to OPEC on Cutting Oil Production,” November 26, 2014

4 Platts Energy Trader, “Crude futures drop despite Iranian talks extension,” November 25, 2014

FIGURE 1

Collapsing Together: Indexed Brent Oil Price and Value of Ruble in U.S. Dollars (April 1, 2014 = 100)



Sources: SAFE analysis based on data from Bloomberg, EIA, Exchange-Rates.org

Structural Dependency

Definition: A country's structural dependence on oil due to capital stock and other economic factors. The structural dependency metrics typically change slowly over time, providing relatively consistent measures of vulnerability, regardless of prevailing price conditions.

Oil Intensity captures the volume of oil consumed per unit of GDP (in this case, per \$1,000 of GDP). As such, oil intensity is a direct measure of the structural importance of oil in a country's economy and is perhaps the most meaningful measure of "oil dependence." Oil intensity changes little over short time periods and is almost entirely determined by oil-use efficiency levels, fuel diversity, and economic growth.

Fuel Consumption per Capita uses the size of a country's population, as opposed to the size of its economy, to contextualize oil consumption. This measure can be useful in comparing the different levels of oil consumption in countries with vastly different population sizes or GDPs. Fuel consumption per capita can give insight into a country's level of oil efficiency or its future demand growth potential.

Economic Exposure

Definition: A country's direct economic exposure to oil price volatility. Economic exposure is a function of structural dependency, but it is also more heavily driven by exogenous changes in global oil prices, and therefore variable over time. Economic exposure is measured by spending on oil across typical indicators like GDP and the current account.

Total Spending on Oil as a Percentage of GDP is the most straightforward measurement of a country's economic exposure to oil. Changes in oil prices have direct effects on the ability of governments, businesses, and consumers to effectively plan, budget, and make expenditures. Transportation can be particularly sensitive to changes in oil prices, as oil is the predominant fuel in the sector and there are few substitutes (demand is therefore highly inelastic).

Total Spending on Net Oil Imports as a Percentage of GDP shows the extent to which countries rely on imported oil. This indicator provides a measurement of revenue either earned or spent through the oil trade and, therefore, oil's effect on a country's current account balance.

Oil Exports as a Percentage of Total Exports by Value highlights the degree to which the economies of oil-producing countries are dependent on oil revenues for economic growth. In other words, "oil dependence" should be evaluated not only in terms of an economy's consumption requirements, but also its production and export requirements. Just as oil price spikes are devastating for many consumers, oil price collapses are highly problematic for non-diversified producers.

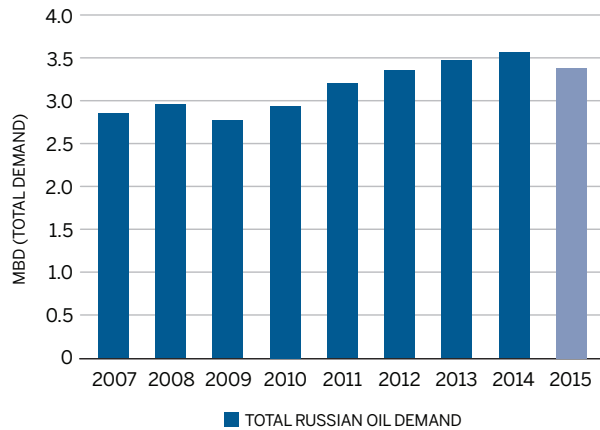
Supply Security

Definition: A country's vulnerability to physical supply disruptions and its response capabilities. While supply disruptions are typically addressed by price changes, the adjustment period can be highly damaging for import-dependent countries, especially if adequate and appropriate emergency inventories are unavailable.

Oil Supply Security is a proxy for the risk of disruption to a country's oil supply in both the short term (e.g. political instability and terrorism) and long term (e.g. tax and regulatory schemes). This metric accounts for the different levels of risk in the sources of supply that a country relies upon to meet its needs (in some instances, both domestic production and imports from a selection of other countries).

Total Oil Stockholdings as a Percentage of Consumption indicates how prepared a country is to meet its own short-term needs in the event of a physical disruption to oil supplies. Total stockholdings include commercial inventories (held by companies) and public reserves (held by governments).

FIGURE 2
Weak Economy to Decrease Russian Oil Demand



Sources: Figure 2—IEA; Figure 3—SAFE analysis based on data from UN Comtrade

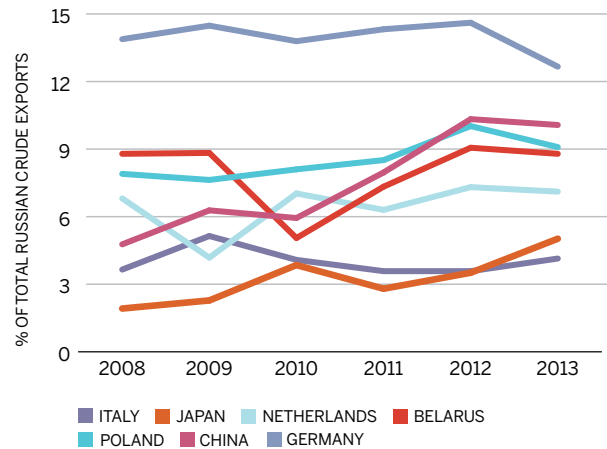
due to market conditions.⁵ In the near term, it appears any decreases in production will come due to market forces rather than a coordinated policy. The IEA projects this decrease to total 110,000 b/d in 2015.⁶

Russia's economic turmoil, driven in large part by the price crash, appears likely to exert significant downward pressure on domestic oil demand. As recently as November, the IEA projected mild growth in domestic demand to 3.62 mbd in 2015 from an estimated 3.59 mbd in 2014. Now, however, the organization projects a plunge to 3.43 mbd thanks to an economic downturn including a GDP decrease of up to 4.7 percent projected by the Central Bank if oil stays at \$60/bbl.⁷ Much of the excess could be reoriented to export markets, with refined products like ultra-low sulfur diesel likely to be destined for European consumers.⁸ This shift will be aided by a tax reform, which took effect at the start of 2014, lowering export tariffs for crude oil and for lighter refined products.⁹

ASIA PIVOT

Russia sells the overwhelming majority of its oil and gas to European nations. However, ongoing trends are prompting an eastward shift in Russia's energy relationships. Most visibly, tensions between Russia and Europe intensified throughout 2014 over the territorial disputes in Ukraine. The European Union joined the United States in imposing sanctions on Russia, including measures

FIGURE 3
Eastward Shift: Russia's Top Crude Oil Export Destinations



targeting investment in the country's energy sector. The dispute has increased European nations' talk of decreasing their dependence on Russian oil and gas. In addition, European oil demand has been hampered by low economic growth. Oil demand in OECD Europe dropped an estimated 1.2 percent in 2014, with an additional 0.4 percent decline forecast for 2015.¹⁰

With these factors adding to China's importance as the major source of global energy demand growth, Moscow has been looking eastward. Overall, Russia has set a target of sending one-third of its crude exports to Asia by 2020.¹¹ As part of a deal introduced in 2013, Rosneft is planned to gradually double an existing 300,000 b/d sale of crude to China National Petroleum Corporation (CNPC) by 2018, making China Russia's largest crude oil customer, while CNPC separately signed a deal to take a 10 percent stake in Vankorneft, Rosneft's upstream unit developing the East Siberian Vankor field. A framework 30-year agreement signed in November between CNPC and Gazprom promises to make China Russia's largest natural gas customer.¹²

Russian oil production, after several years of constant growth, may also be hit by the dual forces of sanctions and falling oil prices in 2015. Total Russian crude oil and liquids production, which had been anticipated to rise this year as of last summer, is now projected to fall from 10.93 mbd to 10.82 mbd, the largest year-over-year decrease this century.¹³ This is largely due to the crossroads Russian oil production finds itself at. West Siberia, with its abundance of long-active conventional

5 Platts Energy Trader, "Crude futures drop ahead of OPEC talks," November 26, 2014

6 IEA, OMR, December 2014

7 IEA, OMR, November and December 2014; Telegraph, *supra*

8 Reuters, "Russian oil use to sink, exports rise on sanctions, tax revamp," December 9, 2014

9 IEA, OMR, November 2014

10 IEA, OMR, November 2014

11 Wall Street Journal, "Russia to Pump Up Oil Exports to Asia," December 4, 2014

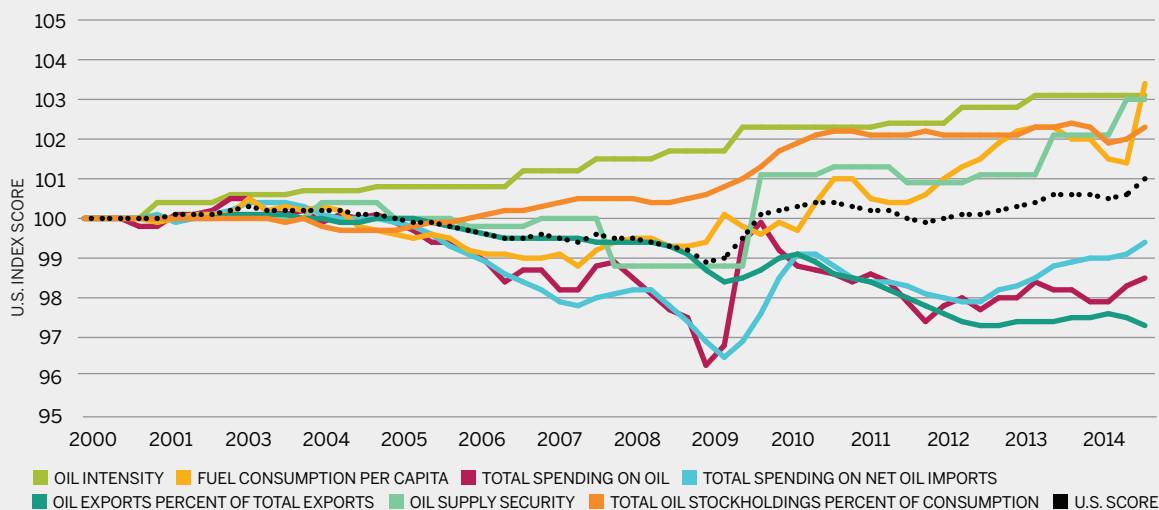
12 Platts Oilgram News, "Russia, China ink fresh oil, gas deals," November 11, 2014

13 IEA, OMR, July and December 2014

Oil Security in the United States

Rising domestic oil production continues to positively impact U.S. oil security, but lower oil prices could spark increased demand, leaving the economy more vulnerable to an increasingly unstable global oil market.

FIGURE 4
U.S. Index Score and All Metric Scores, Q1 2000 to Q3 2014



Source: SAFE/RGE analysis

Net U.S. liquid fuel imports have declined by over 5 mbd since 2008 to 5.0 mbd in Q3 2014.¹ Over the same period, domestic crude oil production has risen by more than 3.5 mbd.² This has helped facilitate a gradual—but increasingly substantial—strengthening in the Oil Supply Security metric result from 5.8 in 2008 to 6.7 in Q3 2014. This improvement comes through substituting oil imports from countries like Angola and Nigeria, where oil production is more at risk of disruption, with oil produced domestically or imported from Canada. Increasing domestic production has also helped reduce Total Spending on Net Oil Imports as a Percentage of GDP to 1.3 percent in Q3 2014 (from a maximum of 2.7 percent in Q4 2008 and more recent high of 2.0 percent in Q2 2012). This is its lowest level since Q2 2005, a period of economic expansion when net liquid fuel imports reached a historic high of 12.6 mbd, but average prices were less than \$50/bbl.³

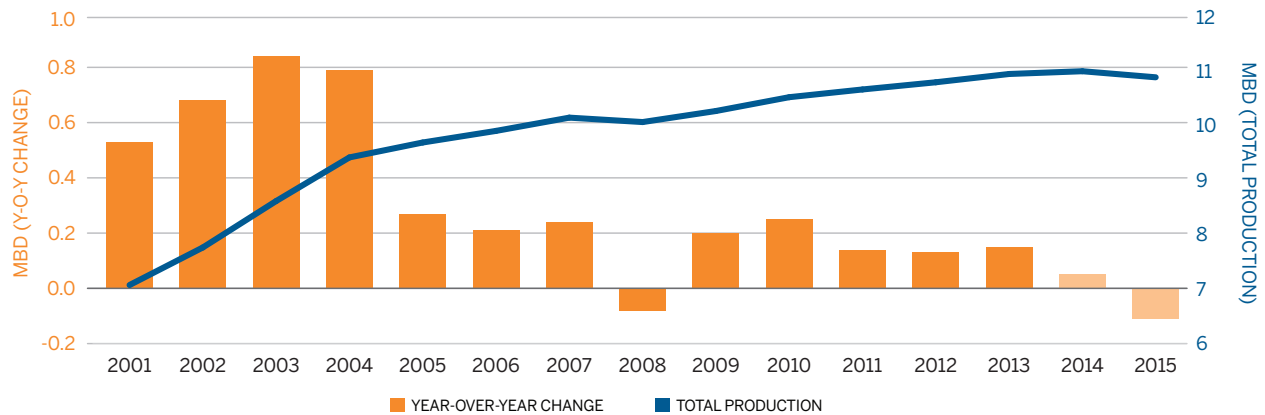
Although the effects of rising domestic oil production are unquestionably positive for the country’s relative

and absolute oil security, the United States remains the world’s largest oil consumer—accounting for a share greater than China, Japan, and Russia combined.⁴ The country’s Fuel Consumption Per Capita metric, while at its lowest level since the beginning of Index data collection in 2000, is the second highest in the Index (1.63 gallons per person per day in Q3 2014) and its Oil Intensity metric (0.56) remains higher than many of its developed country peers, including Japan (0.32) and Germany (0.40). Such high levels of economy-wide oil consumption leave the United States far from being truly insulated from high and volatile oil prices. One potential positive is that Q3 2014 saw the first year-over-year decrease in U.S. oil demand since Q4 2012, but this decrease of only 0.02 mbd⁵ is relatively minor and does not yet show signs of becoming a sustained trend, particularly as decreased oil prices may increase U.S. demand anew, potentially endangering the recent decrease in the United States’ percentage of GDP spent on oil (to 2.83 percent in Q3 2014 from 3.08 in Q3 2013).

1 U.S. EIA, STEO, December 2014
 2 Id.
 3 Id., and SAFE/RGE analysis

4 SAFE analysis based on data from: IEA, OMR, November 2014
 5 Id.

FIGURE 5
Russian oil production set to reverse its recent growth



Source: SAFE analysis based on data from IEA

fields, remains the driving force behind Russia's oil sector, accounting for well over half of its production.¹⁴ The aging and depletion of its wells has prompted a shift toward investment in new fields. In addition to major projects like the growing Vankor field, nascent production offshore in the Arctic and in the Far East has been seen as crucial to Russia's growth as a producer. However, dropping oil prices have decreased the economic incentives to invest in new production, with projects to develop costly unconventional resources like those in the Arctic particularly vulnerable. Gazprom, which operates Prirazlomnoye, Russia's first Arctic offshore project, said in 2014 that government support—something Russia may be unwilling to provide in the current economic climate—allows the field's breakeven price to dip only to \$80 per barrel.¹⁵ Further, development of offshore projects in the Russian Arctic remains complicated by sanctions, which have specifically

prevented international companies from participating in exploration, drilling, or oilfield services there. Energy Minister Aleksandr Novak himself said in December that low oil prices could prompt a decline in oil companies' investments, decreasing national oil production.¹⁶

Overall, these trends look likely to lead to a significant fall in investment in the Russian oil sector. Bernstein Research estimates that 2015 will see capital expenditure in the sector fall by 20 percent between 2014 and 2015, a drastic hit in light of Russia's need to develop new fields to offset declining West Siberia fields.¹⁷ Even with efforts to shift trade patterns to drivers of global growth like China, with whom Russia maintains increasingly warm relations, continued low oil prices will impose accumulating harm on Russia's economy for the foreseeable future, prompting increased likelihood of political unrest which could influence Russia's already aggressive foreign policy.

14 EIA, "Russia looks beyond West Siberia for future oil and natural gas growth," September 19, 2014

15 Barents Observer, "First oil from Prirazlomnaya," April 8, 2014

16 RT, "Russia may 'automatically' cut oil output – energy minister," December 16, 2014

17 Bernstein Research, "A Good Sweating – 2015e Global Upstream Capex to Collapse," December 12, 2014.



The Oil Security Index is an analytical tool developed by Securing America's Future Energy in partnership with Roubini Global Economics. The Index is designed to enable policymakers and the general public to measure and compare the relative oil security of more than a dozen countries around the world.

Learn more at OilSecurityIndex.org



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