

ISSUE BRIEF

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ENERGY & ENVIRONMENT PROGRAM

Shale Oil and Gas and the Middle East

It is in the interest of the world community to increase all energy resources—oil, gas, coal, solar, green, and nuclear. There are 7 billion people on this planet today. By 2100 that number will rise to 10 billion people. We can only meet their needs by maximizing energy production and using it in the most efficient means available.

Thanks to hydraulic fracturing and deep water technology, oil and gas extracted from rock shale formations will increase dramatically in the next ten years in the United States, Brazil, Canada, Argentina, and South Africa. By the end of 2020, it is expected that the Western Hemisphere will import very little from the Middle East. The United States is already independent in terms of coal and gas. Shale gas is almost 40 percent of US production and amounts to 10 percent of the overall US energy supply. The United States imports 42 percent of its crude now. It is projected that natural gas will displace oil as the largest single fuel in the US energy mix.

US oil production from shale rock will rise with oil fields such as Bakken in North Dakota and Eagle Ford in Texas. The increased oil production will reduce the US oil imports by \$75 billion annually and the shale gas will soon eliminate the US imports of liquid natural gas (LNG). The International Energy Agency forecasts that US oil imports will fall by more than half to just four million barrels a day, from ten million barrels a day now.

Gas shale competes with thermal coal as a fuel to produce electricity and the shale-drilling boom has led to very cheap gas. Gas use by power companies jumped 32 percent in the first half of 2012, while coal demand dropped 18 percent. US coal output stripped demand by 152 million tons in the twelve months ended in June. Thus,

Energy & Environment Program

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shale gas is potentially coal's worst enemy. In 2008, US natural gas prices topped \$12 per million BTUs; it's now around \$3.

There is no doubt that cheap shale gas would stimulate an industrial renaissance in the United States and would benefit the chemical, fertilizer, steel, and gas industries. Such a development would potentially create thousands of jobs in the United States. The wild card right now is the long term direction of natural gas prices, which is the biggest obstacle to a gas-driven industrial renaissance, and environmental considerations. These are the questions that will determine whether the shale gas revolution is durable and sustainable.

There is a lot of controversy regarding shale gas development, especially the environmental questions in the Mid-Atlantic States and the impact on water supplies. Natural gas companies rushing to inject chemically treated water into shale can lead to water contamination, primarily through the impact of surface water discharges. The intensive use of water according to the International Energy Agency, "will increasingly impose additional cost," and could "threaten the viability of the projects" for shale oil

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and gas. Schlumberger, the oil services company, projects that a million new wells will be hydrofracked around the world between now and 2035, reducing fresh water availability. It is estimated that between 70 billion to 140 billion gallons of water are needed to hydrofrack 35,000 wells a year, which equals what Chicago or Houston consumes every year.

As the *New York Times* editorialized:

Can gas be extracted without risk to local water supplies? Can the millions of gallons of chemically laced waste water discharged by every well be recycled or safely stored on the surface? Can methanes, a potent greenhouse gas, be kept from the air? Are the most fragile people – children, the elderly, the ill – unacceptably at risk from industrial pollution caused by trucks and other heavy machinery?

There are significant uncertainties and technical obstacles to shale development. With shale fields, the hydrocarbon tends to flow robustly in the first month of drilling, then decline before plateauing at lower levels. This means the industry needs to continuously drill more wells. A drop in oil prices because of global supply-demand could hinder exploration and development of shale oil and gas and limit the eventual supply of gas production.

The proposed facilities to export shale gas from the United States not only face opposition from environmental groups but also from politicians who will be blamed for higher prices at home. Finally, it takes years and costs billions of dollars to build such export LNG plants, and they would be competing with other such projects in Australia, Russia, and Africa. France, which is believed to hold some of the most potentially recoverable shale gas in Europe, has upheld a ban on fracking. In Poland, the geology has turned out to be more complex and difficult, which led Exxon-Mobil to depart.

Shale energy development overseas is looking tougher than many analysts expected. As the *Wall Street Journal* pointed out:

But oil companies are running into obstacles as they try to replicate the US experience on

other continents. The result is that significant overseas shale energy production could be a decade away.

Among the reasons for the glacial pace abroad are government ownership of mineral rights, environmental concerns and a lack of infrastructure to drill and transport gas and oil. In addition, much less is known about the geology in most foreign countries than in the US, where drilling activity has been going on for more than a century.

Total says energy companies should not drill for crude in arctic water. Royal Dutch Shell said it had to postpone until next year an attempt to drill into oil rock off the coast of Alaska after a piece of safety equipment was damaged after spending \$4.5 billion and seven years preparing to drill. The region's challenges are formidable, ranging from icebergs the size of cities, to storms, darkness and freezing cold. Cairn Energy spent \$1 billion investigating areas off Greenland.

There is a great deal of optimism about electric cars. As of now, they are struggling. Tesla Motors announced it needs to raise more cash. Toyota Motors says vehicles powered by hydrogen fuel cells are more likely to be viable by 2020. Out of the 11.9 million cars and light trucks that were sold in the United States in 2012, only 26,000 were electric.

Natural gas vehicles are costlier and fueling stations are few and far between. Barring a breakthrough, natural gas tanks in cars take up trunk space, and must be refilled frequently. Solving the problem will take time. Time is money. Natural gas in vehicles is likely to be concentrated on heavy-duty long distance trucking.

As of now, there is no economic substitute for gasoline to drive cars, fly airplanes, and fuel military vehicles and tanks. In the US alone there are 250 million cars. Around the world, there are one billion cars and light trucks. The numbers are increasing rapidly in China and India. Cars worldwide burn 260 billions of gasoline and diesel. Transportation worldwide consumes around over 60 percent of the oil produced globally.

Finally, as a result of the Fukushima disaster, Japan,

Germany and other nations are moving away from nuclear power. In sum, the new oil finds are good for everyone. However, because of the technical and environmental issues as well as cost associated with coal, shale gas, nuclear power and deep water drilling off the Alaskan coast, the Arab oil producers will continue to play a pivotal role in the world energy supply.

The world energy supplies will remain tight because of the following. The demand for oil in China, India, the Middle East, and the former Soviet Union is tied to growth. India is currently importing 3.43 million barrels a day. The Middle East itself consumes 7.6 million barrels, which equates to 80 percent of what China consumes. In 2013, oil demand is expected to increase by 1.64 million barrels and 77 percent of the increase will come from China, the Middle East, and the former Soviet Union. OECD oil consumption is down by 640,000 barrels. Saudi Arabia by 2013 will consume approximately four million barrels a day, and it will continue to rise. That would reduce Saudi Arabia's export and tighten prices. During the summer, Saudi Arabia burns as much as one million barrels, or 10 percent of its production. One liter of gasoline costs 12 cents and Saudi Arabia provides subsidies of \$36 billion for electricity and desalination and \$8 billion to subsidize gasoline. This rate of consumption will lower Saudi oil exports and tighten supply. China's consumption of the world's energy supply has increased from 11 percent in 2000 to 20.3 percent in 2010. It will continue to increase in the coming years. Emerging markets are currently consuming 50 percent of the world energy, compared with 30 percent ten years ago. It is expected that world energy consumption in the next twenty years will increase by 30 percent. Thus, it is premature to herald the demise of Arab oil. The additional US energy production has been more than offset by the decline in non-OPEC production. The significance of Middle East oil, does not arise from US oil imports from the region, but from its production capacity to supply some of the major world economies with oil at reasonable prices. The entire world and the US in particular benefit from low and stable oil prices.

As Daniel Yergin aptly argued, "But US engagement in the Middle East is not simply about oil imports. The US buys only 12 percent of its oil from the Gulf. Its interest is less

about how many barrels flow to the US and more about the overall accessibility and stability of supplies on which the world economy depends. After all, the United States will be affected by any disruptions to the global market that drive up prices."

There are many oil experts who claim that the shale revolution will make the United States the big winner, geopolitically, and the Middle East, Africa, and Russia the big losers. The implication here is that the United States will no longer need to import Middle East oil and consequently it will reduce its military presence in the region significantly. It is estimated that the US naval presence in the Gulf costs between \$60-80 billion. Given the huge budget deficit, looming defense reductions, and the newly discovered shale gas production, energy independence could make the United States redefine its military presence and commitment to the Gulf region. As the Boston Globe's Thanassis Cambanis wrote, "the US carries almost all the increasing unsustainable cost of securing the Gulf...The consequences have been profound. Every conflict in the Gulf since has involved the US. Our Navy patrols its waters. Hundreds of thousands of American combat troops have done tours in the Middle East, and Washington has spent billions of dollars in the process."

Thomas Donilon, the president's national security advisor, said after Obama's reelection: "We were over weighted in some regions, such as our military commitments in the Middle East," and underweighted in Asia, where US future prosperity lay. The United States will remain deeply engaged in the region for a long time, until an alternative energy source is found, especially in the transportation sector and the geopolitical problems, such as the Iranian nuclear program, the Arab-Israeli conflict, and the political transition in the region are resolved or stabilized.

Hurricane Sandy showed how vital and essential oil and refined products such as gasoline and diesel are to US transportation and economy. As Robert Bryce, an energy expert at the Manhattan Institute, concluded: "In the wake of hurricane Sandy, all of the critical pieces of equipment were burning gasoline or diesel fuel: the pumps removing water from flooded basements and subway tunnels, the generators providing electricity to hospitals and

businesses, and the cars, trucks and aircraft providing mobility...This year, some 222 million engines will be manufactured around the world. These engines will power everything from hedge trimmers to super tankers, water pumps to generators. Every one of them will run on refined oil products.”

The Gulf oil producers are essential to world energy supplies and price stability, and Saudi Arabia will be the unrivaled power house of global production for the coming decades, especially if it uses natural gas and solar power to meet its domestic power needs. As Ed Crooks with the Financial Times reminded us recently: “As the only Opec member with both significant spare capacity and the capacity to invest in capacity additions, Saudi Arabia holds a pivotal role. If it stepped up production and drove down the oil price, it could devastate the US shale industry.” We should keep in mind that US shale oil producers’ cost is high, with a range of \$44-68 per barrel, compared to the much cheaper cost of production in Saudi Arabia. Thus, a major drop in oil prices could undermine oil shale production.

Shale gas is no substitute for refined gasoline and diesel yet, and shale oil in the next three years will reach only 3.2 percent of the global oil supply. The logistical trade constraint on exporting oil from the US, environmental difficulties, technical obstacles, regulatory restrictions, and slim profit margins of shale oil and gas due to lower prices could throw out the window the optimistic projections about the shale revolution and energy independence.

Finally, despite the projected decline in US imports from the Gulf region, as Gerald F. Seib of the *Wall Street Journal* noted correctly, “the world still looks to the US as the military power best able to ensure stable and steady flow of that oil to the world economy.”

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