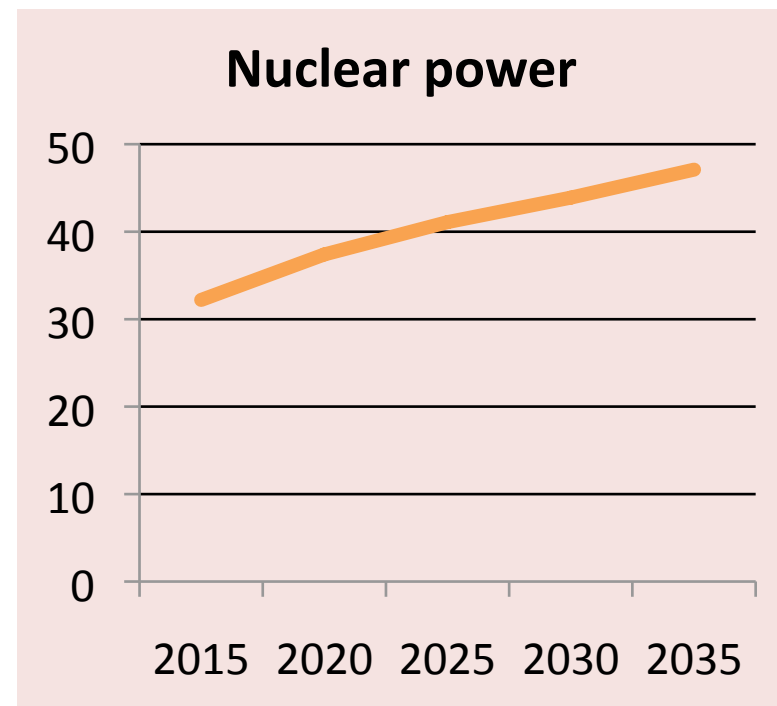
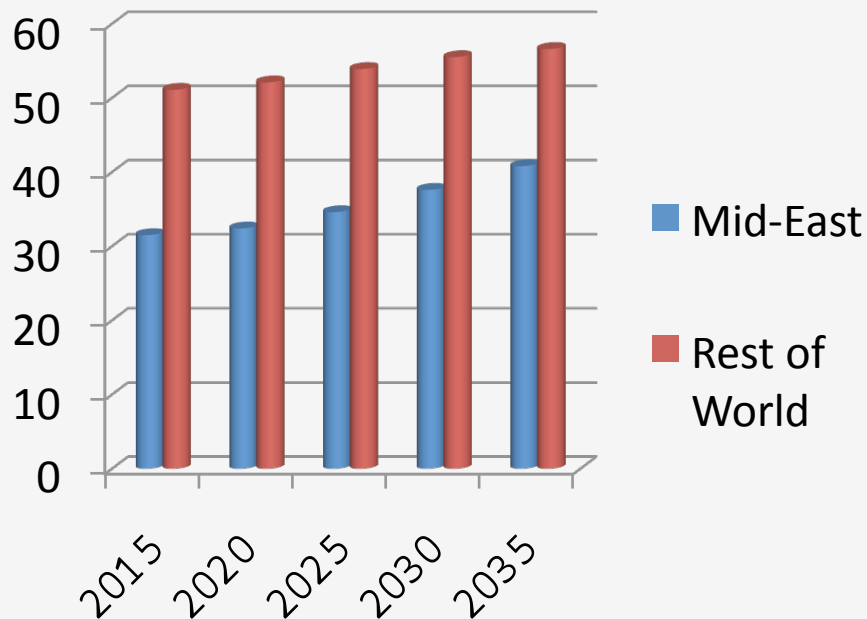


GLOBAL TURMOIL AND THE FUTURE OF ENERGY

A Presentation by Michael Klare
Five College Professor of Peace &
World Security Studies
Hampshire College

Shocks to the Global Energy Order

- Prior to the developments of 2011, energy experts at the US Department of Energy predicted that the Middle East would provide an ever-increasing share of the world's petroleum supply and that new nuclear reactors would boost the world's supply of nuclear energy.
- These assumptions no longer appear valid.



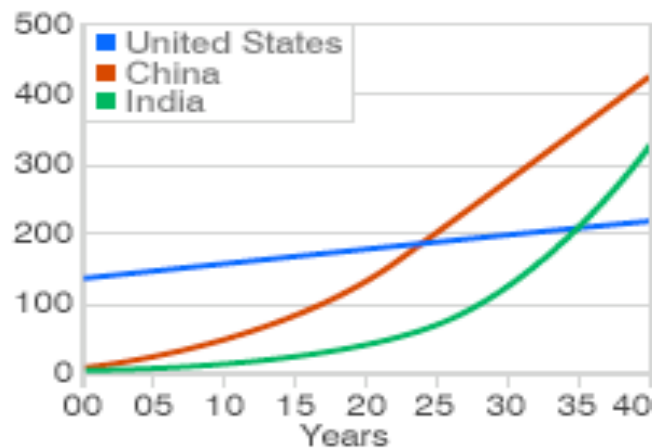
Left: Oil production in million barrels per day. Right: Nuclear energy output in quadrillion British thermal units.

Satisfying *Future* Oil Requirements

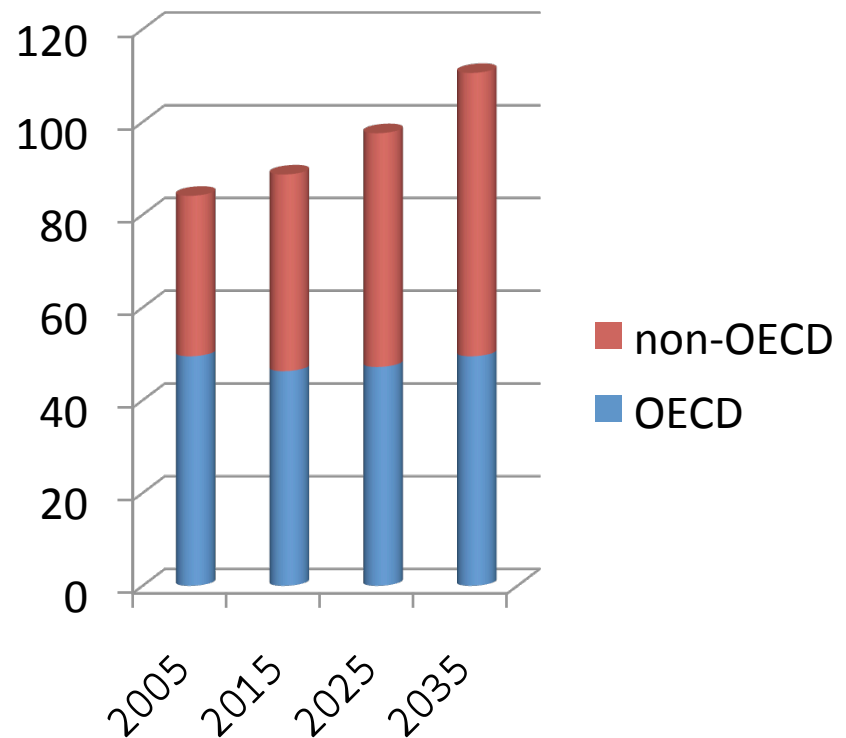
- With the rise of China, India, and other Asian dynamos, flat oil production is not sufficient: the world energy industry must provide *ever-increasing quantities* of oil to avoid shortages, high prices, and global economic trauma.

GLOBAL CAR OWNERSHIP

forecast for car ownership
millions



SOURCE: Goldman Sachs/Economist



World liquids consumption in million barrels per day.
Source: US Dept. of Energy, *International Energy Outlook 2010*, Table A5.

The Middle East and World Oil

- The Middle East and North Africa are expected to provide a large share of the *increment* in the world's oil supply over the next 25 years.
- Iraq and Saudi Arabia are especially critical in this regard.

Projected oil production in million barrels per day (actual for 2008).

Source: US Dept. of Energy, *International Energy Outlook 2010*, Table G2. Excludes unconventional fuels.

	2008	2015	2020	2025	2030	3035	Increase 2008-35
Iran	4.2	3.9	3.7	3.6	3.6	3.7	-0.5
Iraq	2.4	2.6	3.1	3.9	5.1	6.1	3.7
Kuwait	2.7	2.9	3.0	3.2	3.6	3.9	1.2
Qatar	1.2	1.6	1.9	2.0	2.2	2.2	1.0
Saudi Arabia	10.7	10.7	11.2	12.1	13.3	15.1	4.4
UAE	3.0	3.4	3.4	3.4	3.2	3.1	0.1
<i>P. Gulf, total</i>	<i>24.2</i>	<i>25.0</i>	<i>26.2</i>	<i>28.2</i>	<i>31.0</i>	<i>34.1</i>	<i>9.9</i>
Algeria	2.2	2.6	2.8	2.9	3.0	3.0	0.8
Libya	1.9	1.7	1.4	1.4	1.5	1.6	-0.3
Other Mid-East	2.1	2.1	2.1	2.1	2.1	2.0	-0.1
Total, all above	30.4	31.4	32.5	34.6	37.6	40.7	10.3
Rest of World	51.2	51.2	52.0	53.9	55.5	57.0	5.8

The Old World Oil Order

The predictions of ever-increasing output from the Middle East rest on three assumptions:

- Relative stability will prevail throughout the region, providing a secure environment for new oil investment.
- The USA will serve as the ultimate guarantor of that system of stability.
- Public and private investors will advance the hundred of billions of dollars needed to develop new fields and production infrastructure.
- *All three* assumptions are now in doubt.



Turmoil in North Africa and the Middle East, 2011



Protests erupt in Tunisia, January 2011. Long-time dictator Zine El Abidine Ben Ali (below) flees, Jan. 15th.



Turmoil in North Africa and the Middle East, 2011



Protests fill Tahrir Square in Cairo, Feb. 2011.
Long-term strongman Hosni Mubarak resigns,
Feb. 11th.



Turmoil in the Middle East and North Africa, 2011



Predominantly Shiite protestors in Bahrain, Feb. 2011.
Saudi government sends armored forces to Bahrain (top right) to help fellow Sunni monarch King Hamad bin Isa Al Khalifa crush protests, March 15th.



Turmoil in the Middle East and North Africa, 2011



Protests erupt in Yemen against 30-year rule of Pres. Ali Abdullah Saleh, Jan. 2011. Dozens of protestors killed by pro-government forces, March 16th.



Turmoil in North Africa and the Middle East

- Anti-government protests have also occurred in Iraq, Jordan, Oman, Sudan, and Syria.
- All of these countries lie near or adjacent to Saudi Arabia.



Turmoil in the Middle East, 2011



Anti-regime protests in Saudi Arabia have, so far, been quite modest compared to those in Tunisia, Egypt, Yemen, and Bahrain. Most have been in the Shiite-populated areas near Bahrain (where most of the Saudi oil fields are located). But King Abdullah has been sufficiently worried to rely on a massive police crackdown and a promise of \$93 billion in stimulus spending.

Turmoil in North Africa and the Middle East, 2011



Anti-government forces seize Benghazi and other Libyan cities, Feb. 2011. Long-time dictator Muammar el-Qaddafi attacks rebels with full military might in March (below right). Pres. Obama authorizes use of force against Libyan air defenses, March 19th.



The U.S. and Regional Stability

- The United States has long served as the ultimate guarantor of stability in the oil-producing areas of the Middle East.
- This has entailed close collaboration with key regimes in the region, notably those in Egypt and Saudi Arabia.



Above: President Bush meets with King Abdullah in Riyadh, May 2008. Right: Pres. Obama meets with Pres. Hosni Mubarak of Egypt in Cairo, June 2009.

The U.S. and Regional Security



- The USA first pledged to ensure regional stability in Feb. 1945, when Pres. Franklin D. Roosevelt met King Abdul Aziz aboard the USS *Quincy* and promised to protect the royal family in exchange for privileged access to Saudi oil.
- This resulted in the establishment of a US naval base at Bahrain and a US air base at Dhahran in Saudi Arabia.

The U.S. and Regional Security

- The US pledge to ensure regional security and protect the flow of oil was given added emphasis in the “Carter Doctrine” speech of Jan. 23, 1980.
- Pres. Jimmy Carter declared that the safe flow of Persian Gulf oil is a “vital interest” of the USA and that any effort to block that flow “will be repelled by any means necessary, including military force.”



The U.S. and Regional Stability

- In accordance with this policy, Carter established a new US force to safeguard US interests in the region, the U.S. Central Command (Centcom).
- Centcom has a naval base at Bahrain (below) and maintains close ties with friendly forces in the region. (Map shows Centcom's jurisdiction in bright colors.)



The U.S. and Regional Stability



Given all that has occurred over the past few months, how will America's regional role evolve in the future?

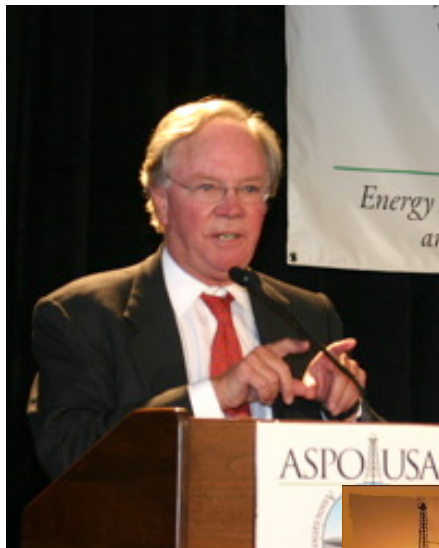
- With Mubarak gone, will Egypt remain a major anchor for Centcom?
- How secure is the U.S. naval base at Bahrain?
- Saudi King Abdullah has expressed displeasure at Obama's failure to save Mubarak.

An Altered Investment Climate

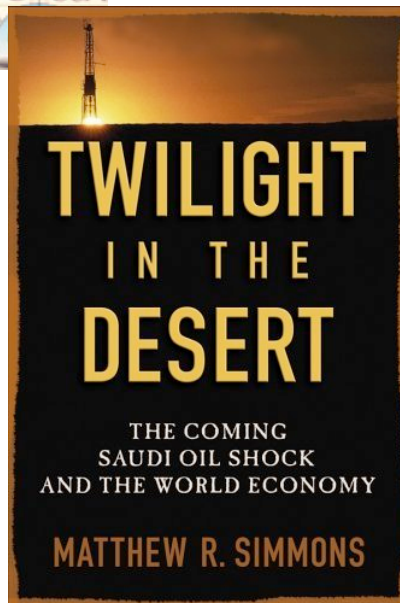
- Any real increase in Middle Eastern oil production will require hundreds of billions of dollars in fresh investment to develop new fields and install new infrastructure.
- With the Middle East in turmoil and the US role in doubt, will investors commit the funds needed to make this happen?



Questions About Future Saudi Output



Vastly increased investment will be especially vital to ensure greater output in Saudi Arabia.



Houston oil investor Matthew Simmons, author of *Twilight in the Desert*, says Saudi Arabia must invest hundreds of billions of dollars to prevent decline in output at Ghawar and other existing fields and to add production at challenging new fields.

Questions About Future Saudi Output

With constant reminders of the (mainly) youth-driven protests in Bahrain (bottom left), Egypt (below), and Yemen (right), will the Saudi royal family choose to deploy its wealth on raising oil output - mainly to satisfy export customers - or to create domestic job programs? King Abdullah's March 2011 announcement of \$93 billion in new domestic programs suggests the latter.



A Decline in Exportable Oil?

- Even if Saudi Arabia manages to maintain oil output at current levels or increase it slightly, an ever-increasing share of its production will be devoted to domestic consumption and petrochemical industries , in order to create job and satisfy the aspirations of a growing, youthful population.
- In 2010, the chief executive officer of Saudi Aramco, Khalid al Falih, said Saudi Arabia's domestic oil consumption would jump from 3.4 mbd in 2009 to 8.3 mbd in 2028.
- If this proves accurate and Saudi production fails to grow, Aramco will supply almost 5 mbd less to world markets in 2028 and beyond than it does today.



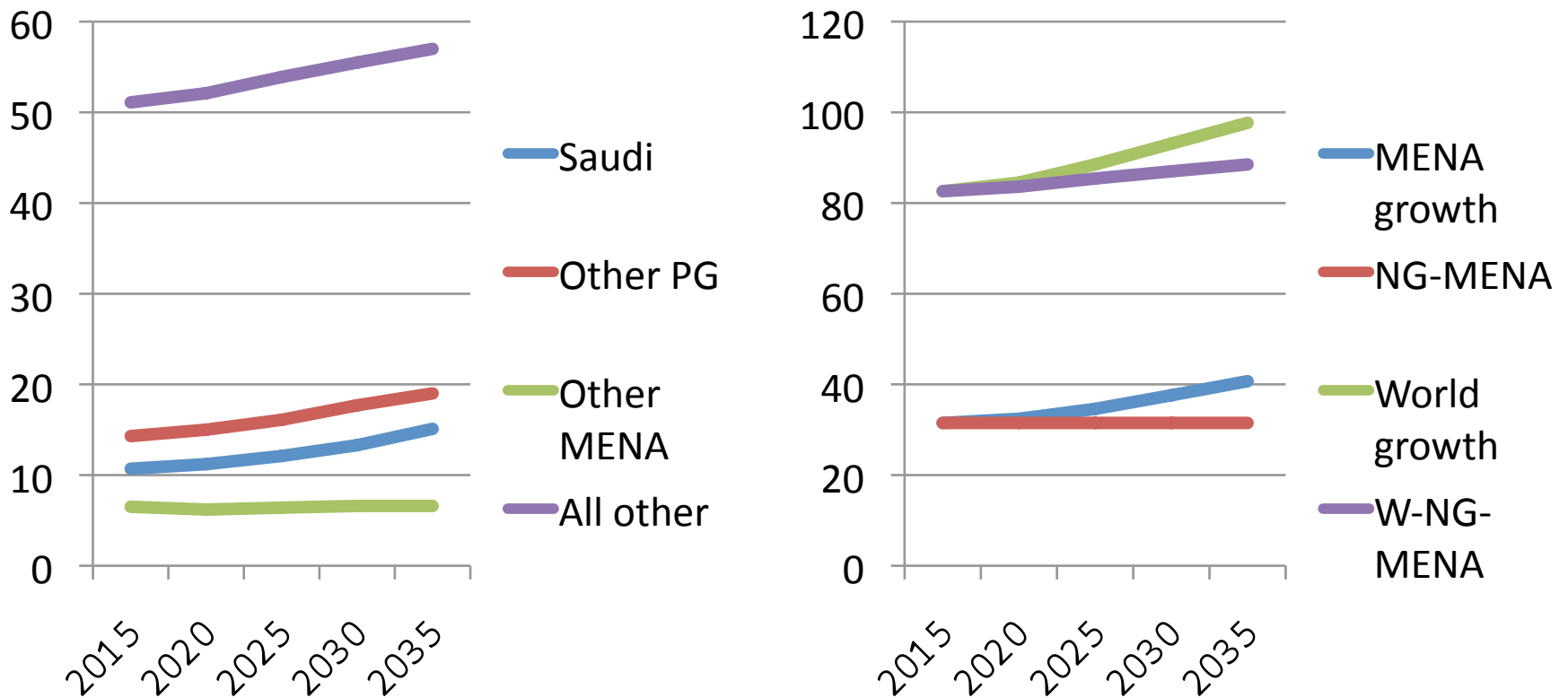
Investment Doubts Elsewhere

- Algeria, Egypt, Iraq, Libya, Kuwait, Oman, and Tunisia are all oil producers, of varying degrees of importance.
- All have experienced protests and, in some cases, significant violence in recent weeks.
- Will they attract the investment funds needed to maintain future productivity, let alone boost output?



Above right: Iraq's largest refinery damaged in sabotage attack, Feb. 25, 2011. Right: food riots in Algeria, Jan. 2011.

Potential Impact of Reduced Middle Eastern Oil Output



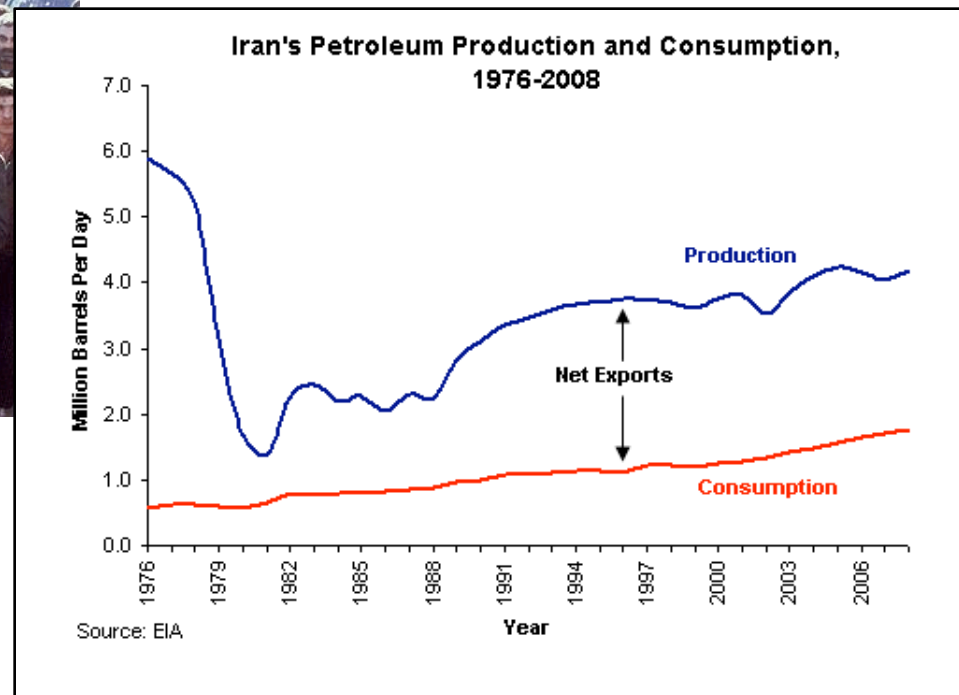
Left: Projected oil output through 2035, in million barrels per day (mbd). Right: Impact on world oil availability of no growth (NG) in production from the Middle East & North Africa (MENA). PG = Persian Gulf. Source: US Dept. of Energy, *International Energy Outlook 2010*, Table G2. The gap in 2035 world output with no growth in MENA production is 9.2 mbd, or 9.4% of projected output.

Counterfactual: Arab Regimes Will Aim to Boost Output to Generate Increased Income

- Whatever their composition, Middle Eastern governments will have to devote more resources to generate employment at home and otherwise satisfy the needs of their swelling populations of young people.
 - This will undoubtedly create pressures to increase oil output – to generate the revenues needed to finance all these job-creation schemes.
- History suggests, however, that governments with a strong social agenda of this sort place greater priority on the political loyalty of (usually-government-appointed) oil-company officials than on their professional acumen.
 - As a result, oil production often *falls* following the installation of populist-type regimes.

Iranian Revolution, 1979

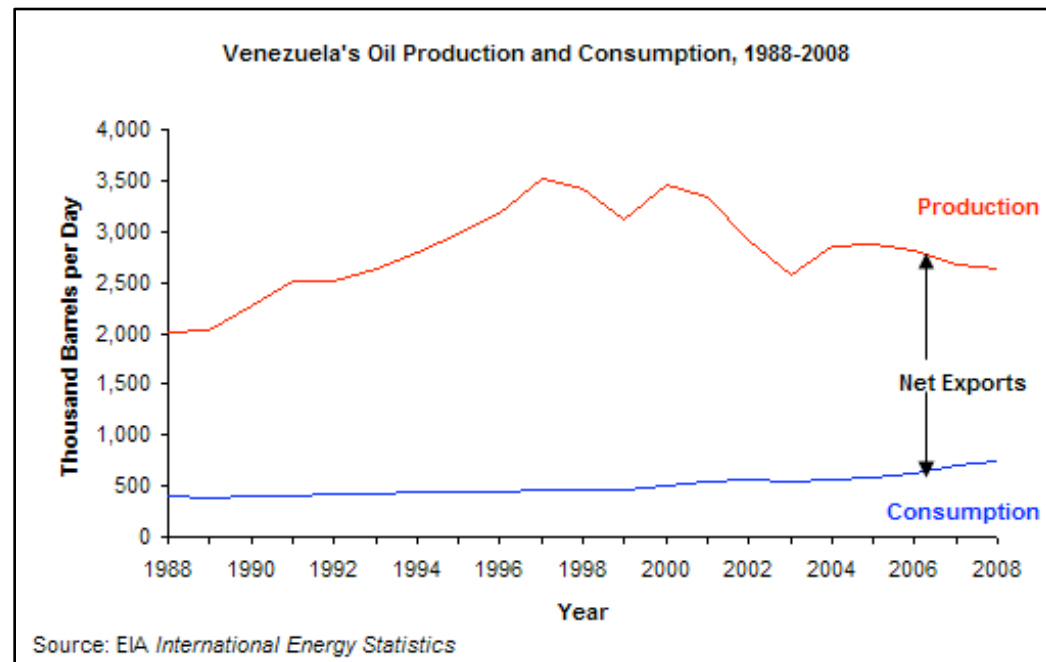
The Iranian Revolution of 1979 led to the re-nationalization of Iranian oil fields and the replacement of Western managers by Khomeini loyalists. A U.S. trade embargo further excluded participation by Western firms. The result: A sharp drop in Iranian oil output.



Venezuela, 2002



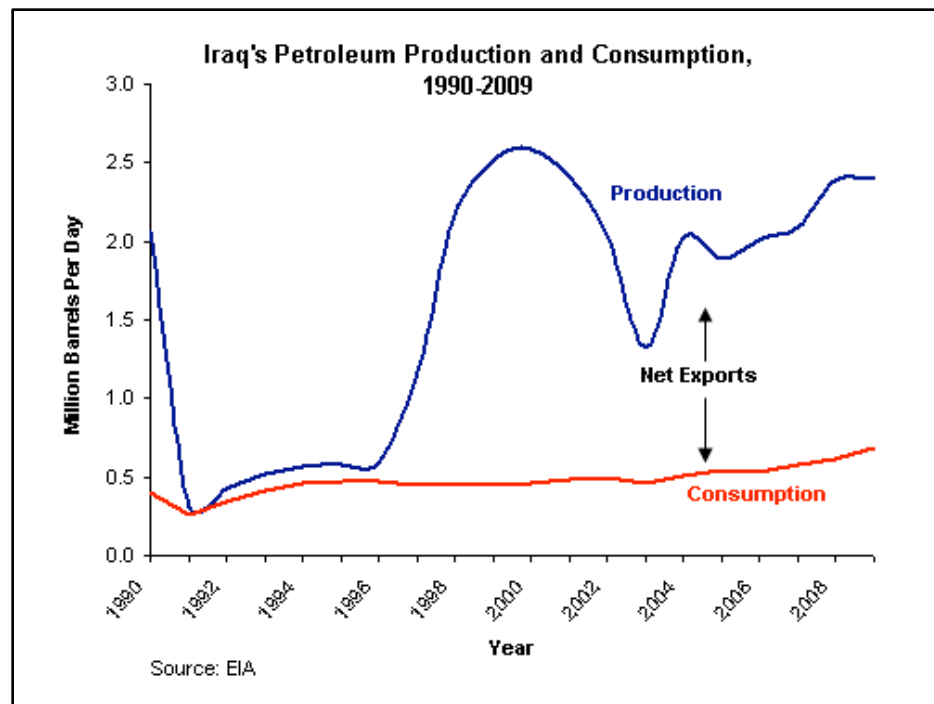
In 2002, nearly half of PdVSA's employees walked off the job in protest against the rule of President Chavez. The strike severely impacted PdVSA, largely bringing the company's operations to a halt. PdVSA fired 18,000 workers following the strike. Industry analysts speculate that the strike did permanent damage to PdVSA's production capacity and human capital and remains the contributing factor to continued declines in production in recent years. ~US Dept. of Energy, "Venezuela," Feb. 2010.



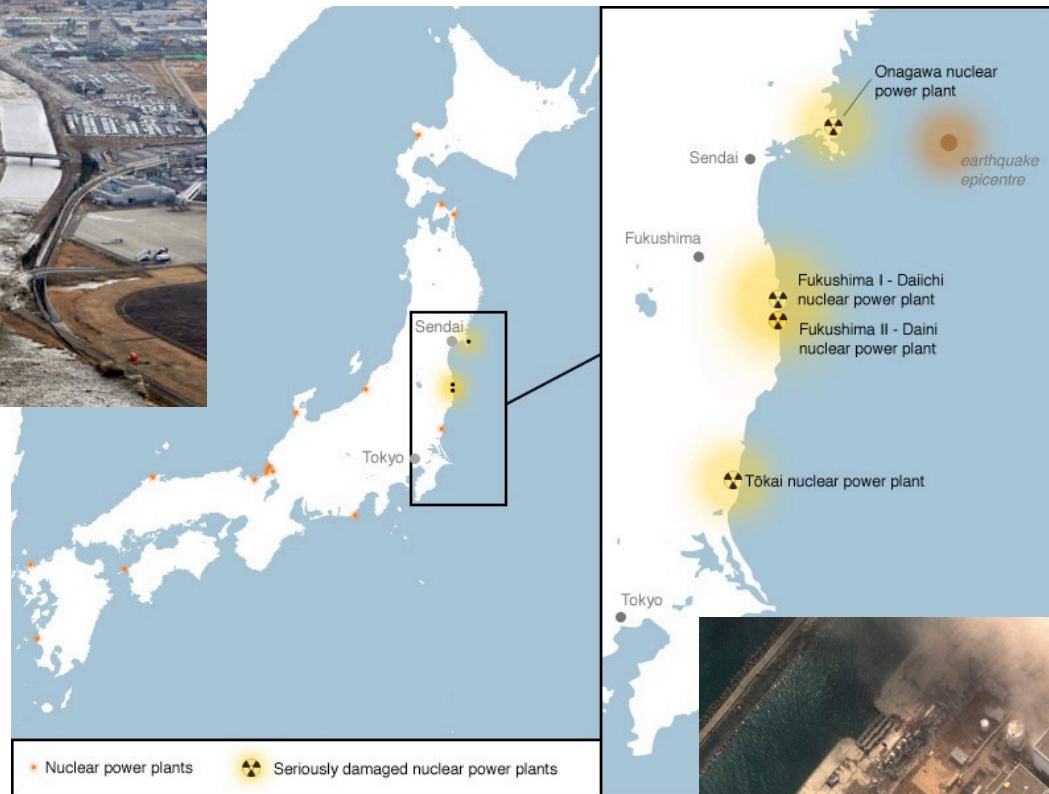
Iraq, 2003



Many U.S. officials assumed that “regime change” in Iraq, leading to the installation of a U.S.-friendly regime with a permissive stance on participation by Western firms in Iraqi oil production, would result in a significant boost in Iraqi oil output. This has not occurred.



Earthquake, Tsunami, and Nuclear Crisis in Japan, March 2011



A powerful earthquake and accompanying tsunami strike the northeast coast of Japan, Mar. 11, 2011, damaging the Fukushima Daiichi nuclear power plant (right) and releasing radiation into the atmosphere.

Japan's Current Energy Situation

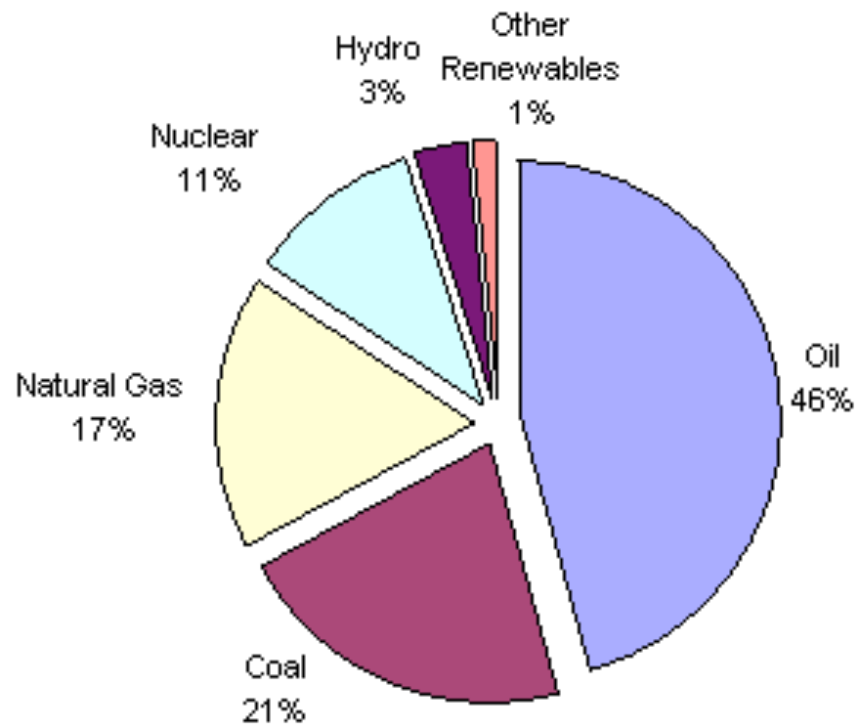
- Japan is the third largest oil consumer in the world behind the United States and China and the third-largest net importer of crude oil.
- On Friday, March 11, a 9.0 magnitude earthquake struck off the coast of Sendai, triggering a large tsunami. The earthquake and ensuing damage resulted in a shutdown of 6,800 MW of electric generating capacity at four nuclear power stations....
- Japan likely will require additional natural gas and oil to provide electricity.... According to some industry estimates, fuel oil and natural gas consumption could increase by up to 238,000 bbl/d and 1.2 Bcf/d, respectively...

~US Dept. of Energy, "Japan," Country Analysis Brief, March 2011



Japan's Energy Portfolio

Japan Total Energy Consumption, 2008



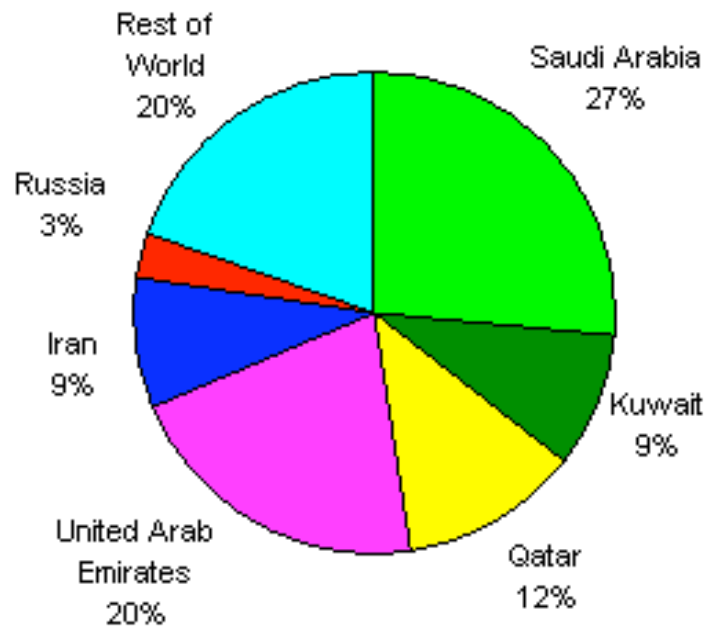
Primary Energy Consumption: 22.3 Quadrillion Btu

Source: EIA

Source: US Dept. of Energy, EIA, "Japan," Country Analysis Brief, March 2011.

Japan's Energy Dilemma

Japan's Crude Oil Imports by Major Sources
2009



Sources: EIA, Global Trade Atlas, Japanese Government Sources

Source: US Dept. of Energy, EIA, "Japan," Country Analysis Brief, March 2011.

- Japan was the third-largest net importer of oil in the world after the United States and China in 2009, having imported 4.3 million bbl/d.
- The country is primarily dependent on the Middle East for its oil imports, as roughly 80 percent of Japanese crude oil imports originate in the region, up from 70 percent in the mid-1980s.
- Japan is currently looking towards Russia, South East Asia, and Africa to geographically diversify its oil imports.

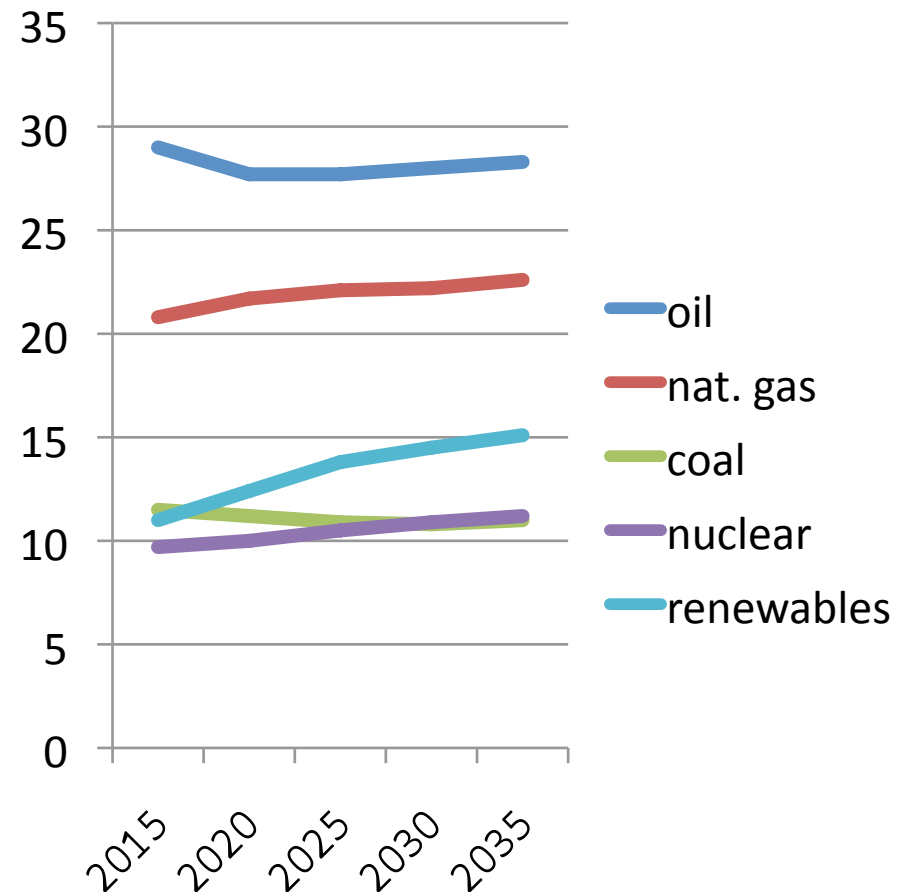
The Global Energy Dilemma

- The turmoil in the Middle East and the nuclear crisis in Japan will have multiple ramifications for countries around the world.
- Countries that rely on oil from the Middle East may have to seek more oil from other sources – forcing them into increased competition with other oil-importing nations.
- Countries that were planning to build new nuclear reactors or extend the life of existing reactors may place less reliance on nuclear power and seek other sources of fuel to generate electricity.

Europe's Energy Dilemma

- Europe continues to rely on oil – much of it derived from the Middle East – for a large share of its energy.
- Europe also relies on nuclear power for much of its energy (especially in France).

Projected energy consumption in quadrillion BTUs. Source: US Dept. of Energy, EIA, *International Energy Outlook 2010*, Table F6.



Europe's Energy Dilemma



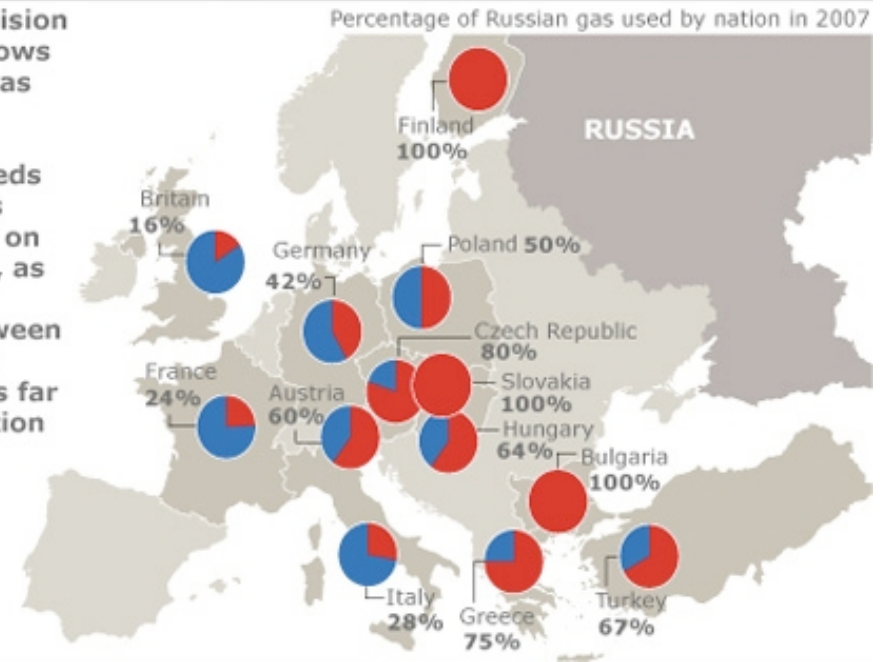
- On March 15, German Chancellor Angela Merkel closed seven older nuclear power plants that she had planned to keep running as a “bridge” to the development of renewable energy.
- French authorities have reaffirmed their commitment to nuclear power, but events in Japan are likely to ignite anti-nuclear protests throughout Europe (like this one in Paris).

Europe's Energy Dilemma

- Europe has a strong commitment to renewable energy, and this will help.
- But a reduction in oil and nuclear power could force it to rely more on coal, raising CO₂ emissions, or on natural gas, increasing its dependence on Russian supplies.

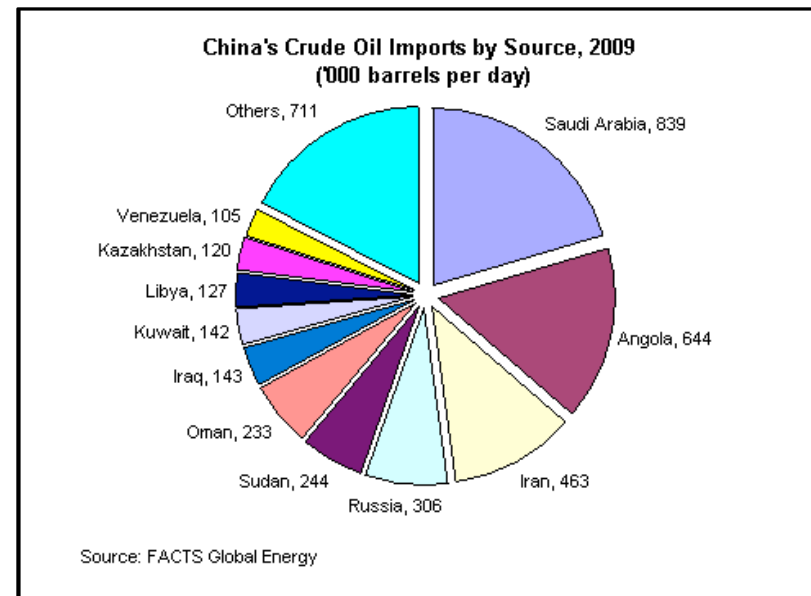
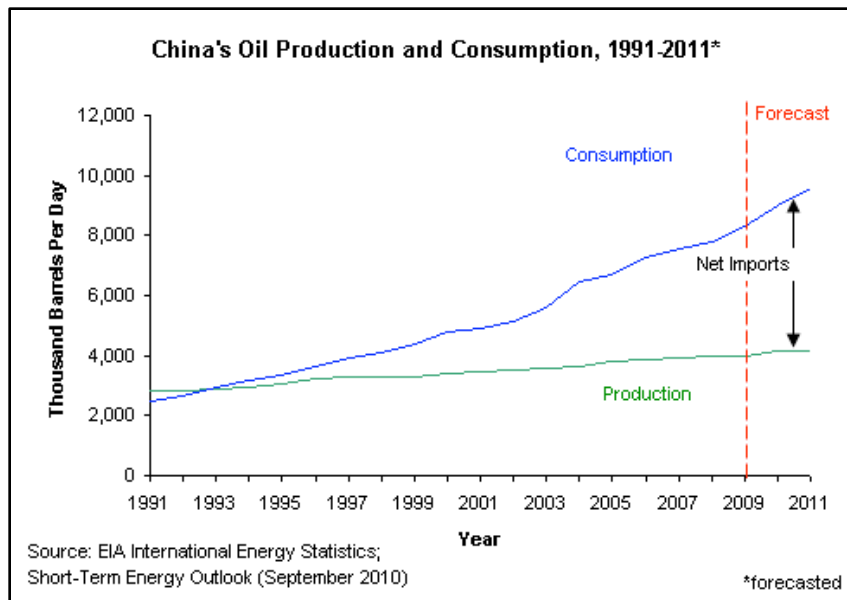
Dependence on Russian gas

Russia's decision to cut gas flows to Ukraine has once again highlighted Europe's needs to reduce its dependence on Russian gas, as the pricing dispute between Moscow and Kiev appears far from resolution



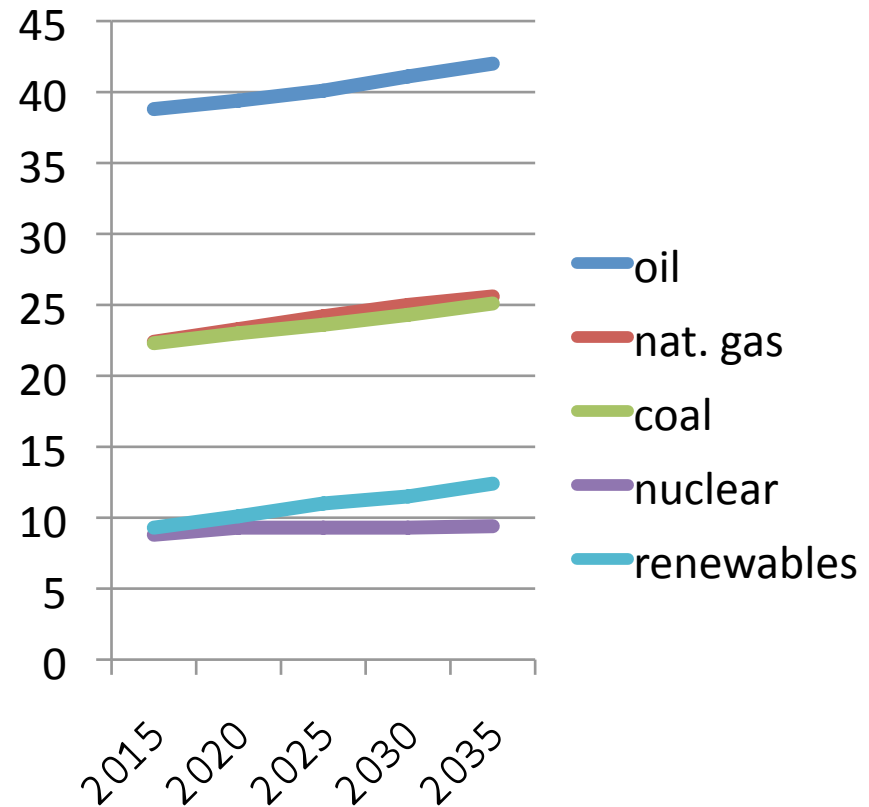
China's Energy Dilemma

- China is becoming increasingly dependent on imported oil to meet its petroleum requirements
- A large share of China's oil imports come from the Middle East.
- A decline in Middle Eastern output will force China to seek oil elsewhere, putting it into competition with the USA and other states for a diminished supply of exportable oil.



The USA's Energy Dilemma

- A large share of the USA's energy supply comes from oil, about 60% of which is imported.
- The USA does not rely on the Middle East for a large share of its imported oil, but a decline in Middle Eastern production will force other oil-importing countries to compete with the USA for what's available elsewhere.
- The USA was planning an increase in nuclear power, but that could now be in jeopardy.

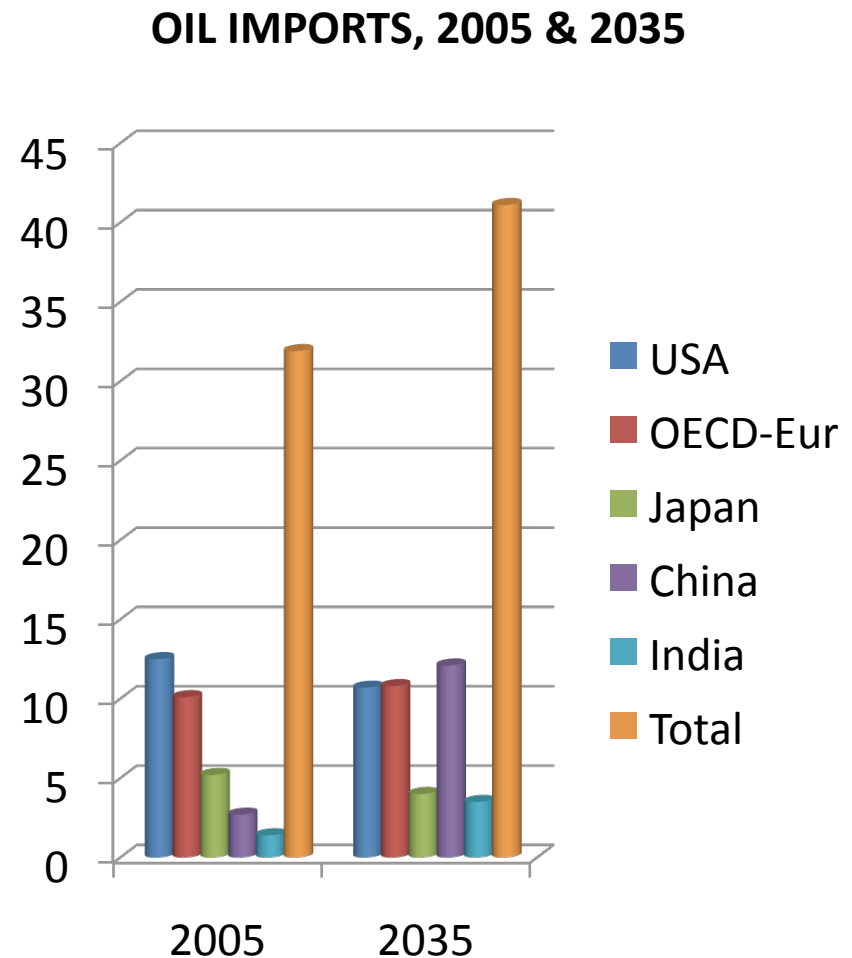


Source: US Dept. of Energy, EIA, *International Energy Outlook 2010*, Table F3. Projected energy consumption in quadrillion BTUs.

Rising World Oil Imports

		2005	2035
USA	Consumption	20.8	22.1
	Imports	12.5	10.7
OECD Europe	Consumption	15.7	13.7
	Imports	10.1	10.8
Japan	Consumption	5.3	4.1
	Imports	5.2	4.0
China	Consumption	6.7	16.9
	Imports	2.7	12.1
Total of all above	Consumption	48.5	56.8
	Imports	30.5	37.6

World oil consumption and imports in million barrels per day. Source: US Dept. of Energy, *International Energy Outlook 2010*, Tables A5, G1.



Responses to Insufficient Oil to Satisfy Global Import Requirements: Adaptation, Efficiency, Innovation



The Geopolitical Response To Insufficient Exportable Oil

- In pursuit of adequate supplies of energy to meet rising national requirements, both China and the United States rely on diplomatic and military as well as economic means to secure access to overseas reserves in areas of interest to both.
- In some cases, this entails the competitive supply of arms, military advisers, and military support to nations suffering from internal or territorial strife.
- Both the U.S. and China are also increasing their military presence in the major oil-producing areas.

Diplomatic Courtship of Major Oil Providers



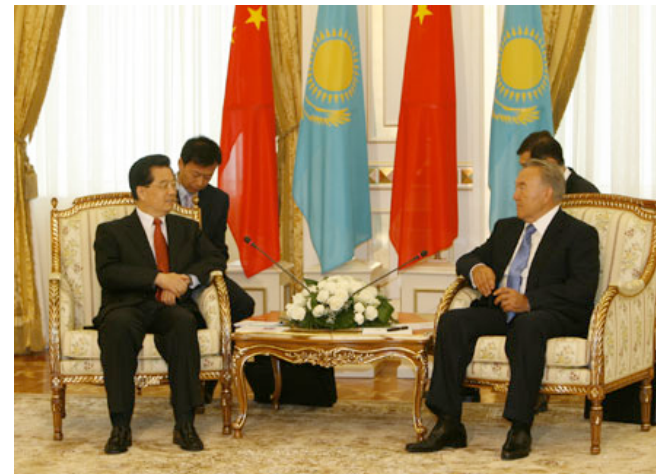
Presidents Obama with Dilma Rousseff of Brazil, March 2011.



President Hu Jintao with President Hugo Chavez of Venezuela, April 2009



Vice President Dick Cheney with President Nazarbayev of Kazakhstan, May 2006

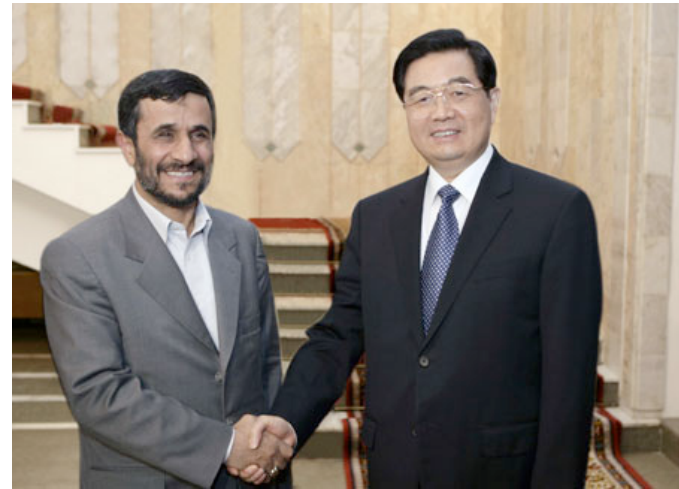


President Hu Jintao with President Nazarbayev of Kazakhstan, August 2007

U.S. and Chinese Arms Diplomacy In Major Oil-Producing Regions



Secretary of State Rice and Secretary of Defense Gates meet with King Abdullah to discuss \$60 billion arms package to Saudi Arabia, August 2007



President Hu Jintao meets with President Ahmadinejad at SCO summit in Kyrgyzstan in August 2007; below, Chinese C-802 anti-ship missile of type believed sold to Iran



AM-9X missile of type included in \$60 billion arms package



The Extended Carter Doctrine: Africa & the Gulf of Guinea

In Feb. 2007, President George Bush created the US Africa Command (Africom). Although its creation was not explicitly tied to the protection of oil (as was Centcom's), Africom places heavy emphasis on internal security in countries like Nigeria and maritime security in the oil-rich Gulf of Guinea.



Above: Africom commander Gen. William Ward discusses regional security matters with African military leaders, Dakar, Feb. 2007. Left: USS *Fort McHenry* sails for West Africa, Oct. 2007, to oversee maritime security in the Gulf of Guinea under Africom auspices.

China's Geopolitical Reach



China would prefer to obtain its imported oil from Kazakhstan via overland routes (above) than rely entirely on supplies coming from the Persian Gulf and Africa, where the US Navy (under Centcom auspices) dominates.

China and the S.C.O.

- But China does worry about instability in Central Asia and the presence of U.S. forces at bases in Kyrgyzstan and Uzbekistan.
- Hence, it has been beefing up the Shanghai Cooperation Organization as a regional security arm to assert its geopolitical influence in the area.



President Hu Jintao arrives in Bishkek, Kyrgyzstan for Shanghai Cooperation Organization (SCO) Summit, August 2007. Declares: “The SCO nations have a clear understanding of the threats faced by the region and thus must ensure their security themselves.” (Meaning: USA stay away!)

Risk of Unintended Escalation: Clashes at Sea

- Increased reliance on deep-offshore oil can lead to territorial disputes in contested waters, such as the East China Sea and the South China Sea.
- The United States has mutual defense treaties with Japan and the Philippines, and so could become embroiled in such clashes.



Upper right: Chinese naval maneuvers in the East China Sea, the site of an offshore territorial dispute with Japan (map, right). Left: Chinese warship in the South China Sea, site of offshore territorial disputes with Vietnam, the Philippines, and Malaysia.



Disputes in the South China Sea: Implications for U.S. Security



Left: US Secretary of State Hillary Clinton, at meeting of the Assn. Of Southeast Asian Nations (ASEAN), July 22, 2010, pledges to support ASEAN states in their struggle with China over disputed territory in the South China Sea.

In response, China's Foreign Minister, Yang Jiechi, warned the U.S. against wading into the conflict, saying it would increase regional tensions.

"What will be the consequences if this issue is turned into an international or multilateral one?" he declared. "It will only make matters worse and the resolution more difficult."



Potential for Cooperation

- At a meeting in Beijing on November 19, 2009, Presidents Barack Obama and Hu Jintao signed four cooperative energy agreements:
- U.S.-China Renewable Energy Partnership
- U.S.-China Energy Efficiency Action Plan
- U.S.-China Electric Vehicles Initiative
- U.S.-China Cooperation on 21st Century Coal (focusing on carbon capture and storage)

