

## SAUDI ARAMCO

Saudi Aramco's President and Chief Executive Officer, Khalid A. Al-Falih, was returning to Saudi Arabia following a speech in Washington, D.C., where he outlined for the first time in public, the company's new Accelerated Transformation Program (ATP). The objective of this initiative is to transform the company into a fully integrated global energy and chemicals enterprise that is an industry leader in terms of international physical presence, technological innovation and impact on the Kingdom's economy. Many of the discussions while in Washington revolved on the rapid growth of the gas and oil production in the United States. The prospects of the U.S. becoming a gas exporter and independent of oil imports had many policy makers wondering about the impact on the global oil industry. In view of the dramatic changes and uncertainties facing the petroleum market there was much discussion on what transformational changes need to be implemented to position Aramco for further success in the decade to come.

Prior to the 1990s, Aramco, the Saudi Arabian state-owned oil company, was essentially an exploration and production company. Today, it has grown into an integrated global petroleum enterprise and is the world's largest oil company, measured both by proven reserves and production. Although the company's core strength lies in its upstream activities, it has also diversified into downstream areas by shipping crude oil worldwide through an affiliated company, participating in refining and petrochemical joint ventures at home and abroad, and marketing its own products.

Following the economic boom of the late 1990s, oil demand was weak, but starting in 2004, the demand for petroleum increased rapidly as the growth of several emerging economies accelerated the global economy. These events, combined with tensions in the Middle East and a tightening regulatory environment, have produced a challenging environment for Aramco. To help manage these swings in global oil demand, Aramco maintains sizeable spare capacity.

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According to Saudi officials, Aramco is the only national oil company (NOC) with any significant spare crude oil capacity, an amount of some 3-4 million barrels per day (bpd)<sup>1</sup>.

Between 2004 and 2008, the Organization of Petroleum Exporting Countries (OPEC) and its member National Oil Companies (NOCs) had successfully produced and marketed crude oil in sufficient quantities to ease a tense oil market unsettled by the war in Iraq. This feat was made more remarkable given regular political flare-ups in Venezuela and Nigeria, which significantly reduced exports from both of these major oil producers. Aramco played a major role in overcoming these disruptions to meet global demand.

While the rise in oil prices was a boon to oil exporting economies, by the 3<sup>rd</sup> quarter of 2008 the U.S. economy, in the face of a dramatic drop in real estate prices, experienced the worst financial crisis since the Great Depression. A number of large financial institutions collapsed, investment banks went bankrupt, insurance companies became insolvent, and banks experienced a dramatic liquidity crisis. The crisis quickly spread to European and Asian markets. Despite the injection of over a trillion dollars into the global financial system by impacted governments, the fear of a major economic slowdown, or worse a global recession, persisted. In anticipation of a global economic slowdown, oil prices fell below \$100 per barrel in September 2008. By December of 2008 the price of oil plummeted to \$32.41 per barrel (a five-year low) due to decreased consumer spending attributed to the fear of a future financial meltdown. Despite international pressure on OPEC to increase oil production in the first half of 2008, the ensuing global economic recession forced OPEC to shelve 35 oil drilling projects as the price of oil could not support the additional investment necessary to increase production. This ended OPEC's earlier promises that it would increase its production capacity by 5 million bpd by 2012.<sup>2</sup> History repeated itself once again as high oil prices were followed by a decline in oil consumption, a sharp reduction in oil prices, and limited investment in production.

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<sup>1</sup> "Saudi Aramco: Has 4 Million B/D Spare Crude, Output 12 million B/D", February 16, 2010, <http://www.foxbusiness.com/story/markets/commodities/update-saudi-aramco--million-bd-spare-crude-output--million-bd/>

<sup>2</sup> "OPEC Adding to Capacity; Concerned Supply Will Dampen Prices", Seeking Alpha, April 1, 2010. <http://seekingalpha.com/article/196568-opec-adding-to-capacity-concerned-supply-will-dampen-oil-prices>

As the economy slowly recovered from the recession, oil prices firmed up, and with the “Arab Awakening” and Iran oil sanctions, oil prices shot up to \$120 per barrel. The “Arab Awakening” sparked an alarming rise in global oil prices that has had a ripple effect through the market and the worldwide economy. The focus of Aramco in 2012 will be to manage the impact of any disruptions of oil supply on oil prices, and attempt to compensate for shortages from exogenous events, such as stricter sanctions on Iran.

In the wake of these and other political, economic, and operational hurdles, the challenge to ensure that prices remain stable and do not further encumber global economic growth remains of paramount concern. If prices continue their erratic fluctuations, a difficult scenario for OPEC’s long-term interests may unfold. Oil demand could diminish as alternative sources of energy become comparatively more cost-competitive. Should this shift in consumer behavior become structural, it would severely threaten Aramco’s future revenues.

The task facing the management team is colossal. Aramco must navigate a global oil market filled with uncertainty. Oil demand declined during the recession, and while it is slowly rising, US demand peaked in 2005, Japans oil imports are at the level of 1979, and Europe has slowed significantly. The global geography of oil demand has also altered from its former high concentration in the U.S. and Europe, as emerging giants China and India consistently require more energy to maintain their economic growth. Thus, Aramco must simultaneously execute a strategy of globalization, diversification and domestic economic development. Aramco’s ATP strategy must juggle multiple (and sometimes conflicting) interests in a volatile and uncertain world.

## **INDUSTRY BACKGROUND**

Because of its influence on various aspects of business, economics, and geopolitics, the oil industry emerged as one of the most strategically significant industries of the twentieth century. Today, 4 of the 20 largest companies – ExxonMobil, Royal Dutch/Shell group, BP Amoco, and Total Fina Elf S.A. – on Fortune Magazine’s Global 500 are oil companies. Access to and control

of the oil supply has been a significant factor in the major international conflicts of the twentieth century. The Japanese attack on Pearl Harbor, Hitler's invasion of the Soviet Union, and Iraq's invasion of Kuwait were all motivated in part by access to, and control over, oil supplies. The emergence of the modern multi-national corporate model is also closely linked to the development of the oil industry.

Crude oil is found in concentrated deposits that are located in unique geological formations. The first steps in the oil exploration process are conducted by geologists and geophysicists who use seismological techniques to identify areas likely to contain reservoirs. Ownership of these formations and their oil reservoirs varies from country to country. For example, in Mexico the government claims ownership of all oil deposits irrespective of who owns the land above. This is in direct contrast to the U.S., where the landowner controls the oil deposits underneath his or her property. However, governments typically own offshore oil deposits. To obtain oil exploration rights, companies must deal with either the public or private entities that control the land containing potential oil deposits.

Following the identification of potential oil reservoirs, drilling is carried out to verify oil's presence. If oil is found, the next step in the process is called "lifting", where crude oil is extracted from the ground. After extraction, crude oil is then refined into a variety of products including heating oil, gasoline, and jet fuel, and can be further processed to create plastics and petrochemicals.

## **OIL INDUSTRY VALUE CHAIN**

The oil industry can be divided into three distinct sectors – upstream, midstream, and downstream. This segmentation is based on the various activities in the oil industry, such as exploration and production (upstream), transportation and refining (midstream), and the distribution and marketing of these outputs (downstream). Some companies operate in both the upstream activities of exploration and production as well as the downstream activities of refining and marketing. Some integrated oil companies also engage in the transportation of crude oil. Oftentimes these companies are also major natural gas producers, since the discovery and

production of gas are often linked (geologically and technologically) to oil. Most integrated oil companies also engage in the manufacturing and sale of petrochemicals. The largest of the multinational integrated companies are referred to as “supermajors.”

The major players in the oil industry include the international oil companies (IOCs), NOCs, exploration and production companies, refining and marketing companies, service and equipment businesses, and drilling companies. Most proven crude oil reserves are owned by NOCs, which traditionally are involved only in extraction and production in their home countries. By contrast, IOCs operate worldwide and in every aspect of the oil business from exploration to marketing of petroleum products. ExxonMobil, Royal Dutch Shell, BP Amoco, Chevron, and Total Fina Elf S.A. are examples of integrated companies.

There are several integrated oil companies with some state-ownership, such as Norsk Hydro ASA of Norway. The world’s largest integrated oil company, Saudi Aramco, is owned by the Kingdom of Saudi Arabia. Major NOCs include the National Iranian Oil Co. (NIOC), Petróleos Mexicanos (PEMEX), Petróleos de Venezuela S.A. (PDVSA), Kuwait Petroleum (KPC), and Iraq National Oil Co. (INOC) (*Exhibit 1*). Russia is once again emerging as a major player in the oil industry. Despite some political uncertainty on the manner in which oil companies can be owned and operated in Russia, Russian oil exports are growing rapidly and its output rivals that of key OPEC producers.

However, the industry is not wholly dominated by integrated companies. A number of the U.S.-based integrated oil companies typically explore and produce oil worldwide but their refining and marketing activities are focused in the U.S. Examples include Amerada Hess, Murphy Oil, Occidental Petroleum, and Marathon Oil Corporation. Oil-exploration and -production companies that are smaller in scope and compete in niche markets are also referred to as independent players. They either grew into independents or were spun off from large companies. Examples include Kerr-McGee, Anadarko Petroleum, Forest Oil Corporation (formerly Houston Exploration), and Devon Energy.

Marketing in the oil industry includes all aspects of selling refined products to customers. Gasoline is the main output of the refining process, but jet fuel, home heating oil, kerosene, and diesel are other common outputs. Petrochemicals are petrol-based products that demand a more complex refining process. Integrated oil companies generally market their gasoline directly to consumers through retail gas stations. Independent marketers, however, purchase gasoline from different sources including integrated oil companies and independent refiners and sell the gasoline through their own retail gas stations. As a result, gasoline may be sold under a certain brand name, the crude oil from which it was produced may or may not have come from a different company given that the integrated companies trade crude oil in the spot and future markets. Other petroleum products such as fuel oil, jet fuel, and lubricants are handled through industrial and other specialized channels.

This industry often operates through alliances and joint ventures in all streams of activity. It is common practice for one company to operate a field and for many to share the output of that field through joint ventures. Pipelines are often jointly planned, constructed, owned, and operated as well. For example, one pipeline running from the North Sea to the United Kingdom has 30 owners.

## **INDUSTRY HISTORY**

The U.S. is considered the birthplace of the modern petroleum industry with the discovery of oil by Colonel Edwin Drake in August 1859 near Titusville, Pennsylvania. Prior to the Titusville discovery oil was obtained through springs and seepages, but Drake was the first to find oil by using well-drilling techniques. At the time, oil was primarily used for lighting and lubricants. However, the American Civil War triggered a surge in demand for oil and kerosene.

By the 1890s several family-run international oil companies emerged to dominate the global demand for petroleum: the Rockefellers with Standard Oil Company, the Rothschilds with the Caspian and Black Sea Oil Company (BNITO), and the Petroleum Production Company Nobel Brothers, Limited (Branobel). Innovations of the Industrial Revolution, such as the electric light bulb and the internal combustion engine, led to a surge in petroleum demand.

New oil discoveries also shaped the growth of the industry. Large crude deposits in Texas gave birth to Texaco, Gulf, and Sun oil companies in 1901. Eventually, lawsuits and government regulations reshaped the burgeoning global oil trade. In 1911, the Supreme Court ordered the breakup of Standard Oil due to antitrust concerns to prevent monopolistic competition. The resultant companies of this split were Standard Oil of New Jersey (later named Exxon), Standard Oil of California (Chevron), Standard Oil of Ohio (Sohio), Standard Oil of Indiana (Amoco), Continental Oil (Conoco), Standard Oil of New York (Socony), Vacuum (merged with Socony and became Mobil), Atlantic Oil (became part of ARCO) and Ohio Oil (Marathon). Many of the Standard Oil offshoots are among today's supermajors.

The Royal Dutch/Shell Group was one of the first major multinational companies. The product of a merger in 1907, ownership was split 60/40 between the Royal Dutch and Shell predecessor companies. In addition, the Anglo-Persian Oil Company was established in 1909 in order to extract the first oil discoveries in Iran, and the British government took a majority ownership in the firm in 1914. It was around this time when the British Navy converted from coal power to fuel oil, spawning a whole new market for petroleum products.

Petroleum revolutionized warfare and civilian life in World War I (1914-1918) and World War II (1939 – 1945). The use of oil-powered machines in warfare presented significant advantages. Petroleum thereafter became an important consideration in devising international and military strategy. The World War I victors ensured their control over the critical oil fields in the Middle East by establishing friendly regimes favorable to British and French interests. Between World War I and II there were major oil discoveries in Texas, Venezuela, Iraq, Bahrain, Saudi Arabia, and Kuwait -- thus widening the geopolitical scope of oil considerations.

### **Post-World War II Period**

After the war, new players emerged on the international scene. By the early 1950s, the "Seven Sisters" – Exxon, Mobil, Texaco, Chevron, Gulf, Shell, and BP – controlled the world's largest and lowest-cost fields in the Middle East. As oil eroded coal's contribution to energy generation,

demand grew enormously. At the time, supply concerns were few as plenty of excess capacity existed. Price wars and gluts were common. Sometimes, governments intervened to support prices, but such attempts were ineffective because independent oil companies, and the Soviet Union in particular, would undercut agreed upon prices. Over time, increasing competition from the Soviet Union and other international oil companies depressed market prices and threatened the dominance of the Seven Sisters. In response to this threat, the seven major oil firms cut posted prices and, subsequently, the payments to oil-producing states in the Middle East and elsewhere.

To counteract oil price erosion, the major oil exporters formed the Organization of Petroleum Exporting Countries (OPEC) in 1960 in order to manage the global supply of crude (*Exhibit 2*). In 1973, OPEC's global influence was made extremely clear after oil ministers agreed to limit the sale of crude during the fourth Arab-Israeli War. Employing the "oil weapon," the ministers issued a mandate cutting exports and recommended an embargo against certain states, which sent economic shockwaves around the world. Within four months the price of crude shot up from \$2.90 a barrel to \$11.96 a barrel. Thus was triggered the first oil crisis, which many believe was a major cause of a subsequent recession and decline in world gross national product (GNP) in the early 1970s (*Exhibit 3*).

Oil-producing countries, however, fared well. On the other hand oil consumers, especially the poorest oil importing nations, struggled with significant financial repercussions. In the direst cases, nations paid over 25 percent of their export earnings for petroleum imports. This resulted in massive price increases for heating, cooking, and basic transportation, which was a heavy burden on the less affluent. The second oil crisis began after the Iranian revolution ousted the ruling Shah in 1979. One year later, Iraq invaded Iran, which started a bloody war that would last eight years. This significantly reduced Iran's oil exports and created supply disruptions that sent prices as high as \$35 a barrel (*Exhibit 4*).

New market structures were developed by the mid-1980s replacing long-term supply arrangements and offering some relief to oil consumers. In 1986 Saudi Arabia abandoned efforts to support prices, linked its crude prices to the spot market price, and raised output to preserve its



market share. Oil prices then began a sharp period of decline and reached \$10 per barrel. Furthermore, joint efforts by both oil-consuming and -producing nations were disrupted when Iraq invaded Kuwait in 1990 and oil prices rose again. A U.S.-led coalition conducted air strikes against Iraq in 1991 to repulse the invasion and protect existing oil interests. Following the Gulf war, oil prices stabilized in the \$15-\$20 a barrel range.

Following the downturn between 1982 and 1995, the oil industry experienced a brief recovery during the global economic boom of the mid-1990s. World energy demand grew by 3 percent in 1996 (the highest since 1988) while world oil consumption grew by 2.4 percent (*Exhibit 5*). During the same period, oil production grew by 2.9 percent, keeping prices in check at about \$21 a barrel. The recovery was interrupted by the Southeast Asian financial crisis in 1998, which precipitated an oil price retreat to \$10 a barrel by early 1999. Many major oil companies desperately sought to cut costs to remain profitable. Eventually, consolidation swept the industry, which led to several sizeable mergers.

Many mergers were intended to capitalize on synergies and replace aging oil fields to meet future demand. In a strange historical twist, several mergers included former Standard Oil offshoots, reversing portions of the famous 1911 breakup of the oil industry giant. In 1998, British Petroleum acquired Amoco (formerly Standard Oil of Indiana). BP Amoco, the newly merged company, acquired ARCO in 1999 — another former member of Standard Oil Trust. In order to gain U.S. Federal Trade Commission approval of the deal, BP Amoco had to sell ARCO's Alaskan assets to Phillips Petroleum Company. Exxon and Mobil announced their merger in 1999, creating the world's largest publicly owned oil company. The merger of Chevron and Texaco soon followed. The merger trend quickly became global. Today's French oil giant, Total Fina Elf S.A., is the product of three merged companies – France-based Total, Belgium-based Petro Fina, and Elf Aquitaine (also of France). Repsol of Spain acquired the Argentine firm YPF to form Repsol-YPF S.A. in 1999.

With the discovery of oil in more than 80 countries in the last three decades, the landscape of the oil industry has changed significantly. Once a dominant producer, the U.S.'s share of global oil

production has decreased from 20 to less than 8 percent (*Exhibits 6A-6D*). In 2011, world oil demand was 87 million barrels, and while this was similar to 2007's high of 86 million barrels, rising economic powers, namely China and India, have perpetually increasing appetites for energy that are expected to erode spare global production capacity and inventory levels in the future.

## **RECENT TRENDS AND FUTURE OUTLOOK**

As the global economy recovers, the U.S. Energy Information Administration (EIA) predicts that oil consumption will increase, with the bulk of the demand to be in the global industrial and transportation sectors (*Exhibit 7*). Growth in global oil demand will also be driven by developing countries as oil demand in developed countries has dropped by over 8 percent since 2006.<sup>3</sup> The EIA forecasts that world oil demand will again outstrip non-OPEC oil supply growth and require further intervention by OPEC to offset upward pressure on prices.

Given this, several new regions have emerged as potentially large hydrocarbon suppliers. The Caspian Sea region, including Azerbaijan, Kazakhstan, Turkmenistan and Uzbekistan, is poised for development. This region holds vast undeveloped oil and gas reserves, possibly equaling those of the U.S. and the North Sea. However, companies seeking to tap these subterranean assets have been hamstrung by the region's lack of infrastructure necessary for transporting oil overseas, as well as political instability. Russia has begun to modernize its oil facilities and is rapidly growing as a producer and exporter of oil. Furthermore, the U.S. is making small moves to develop its untapped oil reserves, with the Obama Administration opening up portions of the U.S. Outer Continental Shelf to offshore drilling. Other low-cost reserves in Brazil and West Africa are gaining the attention of major oil companies. As exploration and extraction costs continue to increase, the industry is likely to see more mergers and joint ventures with a view of moving into these as-yet-untapped regions.

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<sup>3</sup>"Saudis Tighten China Energy Ties to Reduce U.S. Dependence", Bloomberg, April 19, 2010, <http://www.bloomberg.com/apps/news?pid=20601109&sid=afA7qKyLK44s&pos=10>

In the downstream sector, as the demand for petroleum products had grown so rapidly that refining capacity constraints appeared in a number of markets, several mergers in the refining sector were predicated on the long-term expectation that the growth in oil demand will exceed supply. Some notable mergers in the refining sector are Chevron and Texaco in October of 2001, and Phillips Petroleum with Conoco in November 2001 creating the largest refiner in the U.S., ConocoPhillips. Consolidation within the refining and marketing sectors will probably continue in the coming years as companies seek to gain economies of scale and technology leadership to compete more effectively. However, there are several issues that may constrain expansion in the refining sector. Environmental concerns and uncertainty over future regulations are likely to limit construction or upgrades of refineries in many developed markets. Yet until very recently, demand for refined products was very robust. In 2007, outages of refinery operations caused declines in output and supply shortages. The integrated oil industry experienced bottlenecks by 2007 contributing to oil prices breaking through the \$90 threshold for the first time (in nominal terms).

China, the second largest energy consumer in the world after the U.S., is another country that has become more attractive after its induction into the World Trade Organization (WTO) and with the gradual elimination of a number of trade barriers. China's oil industry has undergone major changes in recent years with most of its state-owned oil and gas assets reorganized into two vertically integrated companies, China National Petroleum Corporation (CNPC) and China Petrochemical Corporation (Sinopec). Petrochina, a separate company set up by CNPC, held its initial public offering in April 2000 on the New York and Hong Kong stock exchanges. CNPC has been very open to foreign partners in an effort to improve its oil recovery rates from existing fields. In a 2005 joint venture worth \$3.5 billion, Saudi Aramco and ExxonMobil agreed to work with Sinopec to refurbish a Fujian oil refinery and triple its output to 240,000 bpd, which was completed in 2009. The three companies are also working together to market petroleum at several hundred local service stations. Generally, as long as the Chinese partner holds a controlling interest, China encourages foreign investment in oil exploration and infrastructure development. Other foreign majors such as BP, Shell, Eni, ConocoPhillips, Chevron, and Mitsubishi all have a presence in the region.

Aramco has made several recent moves into downstream activities. For example, in 2007 Dow Chemical Co., the largest U.S. chemical company, signed a record \$20 billion joint venture deal with Aramco to build a petrochemical complex. This deal will provide Dow with access to Aramco's low-cost feedstock for Dow's plastic products and provide Dow with a foothold in the Saudi market. From the Saudi perspective, this deal would enable the Kingdom to bring foreign expertise into its chemical industry<sup>4</sup>. Despite a confluence of factors, namely the global recession, a subsequent drop in chemical prices, and the collapse in 2008 of Dow's tentative petrochemical project in Kuwait, Dow and Aramco are moving forward with the project.

Another recent development that could impact the oil industry is the question of how OPEC will manage oil allocation agreements and price stabilization with regards to two distinct issues. On one hand, with the war in Iraq drawing to a close, Iraq, which has the world's fourth largest oil reserves, is planning to increase oil output in order to improve and resuscitate its economy. At the end of 2010, Iraq had approved deals with foreign energy firms that could usher in over \$100 billion of investment in the coming years. These investments are part of Iraq's ambitious goal to boost its production capacity from 2.5 million bpd to 12 million bpd within seven years.<sup>5</sup> China, in particular, has been a major player in Iraq, and over the next two decades, it is estimated that China will invest \$20 billion in three Iraqi oil fields. This could potentially give China access to 3.5 million bpd of production if the fields meet production targets.<sup>6</sup> While many consider this optimistic and ambitious, Iraqi oil will eventually enter the global market and create challenges for OPEC oil allocation agreements. Now on the other hand, due to U.S. led oil sanctions on Iran, the International Monetary Fund (IMF) has warned that oil prices will gain 30 percent on average in 2012, putting further pressure on oil allocation agreements and more importantly, make it more difficult for OPEC to stabilize prices in the near future.

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<sup>4</sup> "Dow Chemical close to signing record \$20 billion plant deal with Aramco", by MarketWatch, May 10, 2007 [www.marketwatch.com/news/story/dow-chemical-close-signing-record/story.aspx?guide=%7BBBD899252-D642-407B-9DDE-3AFD6B04F37D%7D](http://www.marketwatch.com/news/story/dow-chemical-close-signing-record/story.aspx?guide=%7BBBD899252-D642-407B-9DDE-3AFD6B04F37D%7D)

<sup>5</sup> "Iraq Approves Oil Deals with Foreign Firms", AFP, January 6, 2010, <http://www.google.com/hostednews/afp/article/ALeqM5hCNavlaL6tOWm5qId8CgTGVRsiDQ>

<sup>6</sup> "Red Star Over Iraq: China's Ambitions in the Iraqi Oil Fields Could Change the Landsalpe", BusinessWeek, January 21, 2010, [http://www.businessweek.com/magazine/content/10\\_05/b4165044386657.htm](http://www.businessweek.com/magazine/content/10_05/b4165044386657.htm)

Environmental considerations, as well as several political and regulatory issues, could have a significant impact on the oil industry's future profitability. Taxation, often greater than 100 percent of crude oil value in many consuming countries, royalties and regulations associated with oil and gas exploration, regulations governing refinery, transportation, and industrial greenhouse gas emissions, and requirements for cleaner gasoline are all factors that oil companies will have to weigh when developing competitive strategies. Additionally, technological advancements that enable the production of fuel-efficient automobiles as well as the development of cost-competitive alternative energy sources will have an impact on oil demand.

However, costs and technology are not the only factors affecting consumer behavior. Concern for the environment has grown markedly in recent years, and sizeable numbers of consumers are changing their consumptive habits to lower their greenhouse emissions and impact on the environment. Consumers have become more conscious of global warming, air pollution, and waste. As a result of these concerns and shifting habits, renewable energy production through conventional hydroelectric power, biomass, geothermal, solar, and wind are expected to increase in the coming years, and, on a small scale, become a substitute for some oil usage.

Despite all these factors, oil consumption between 2003 and 2011 grew rapidly while production capacity growth lagged (*Exhibits 3 and 5*). The future of oil demand however remains uncertain as no one can predict the rate at which the global economy will recover, or the implications of geopolitical instability that may arise due to regional conflicts, or the effect of new technologies in energy production and conservation.

#### **SAUDI ARAMCO'S STRATEGIC ISSUES:**

- *Aramco's Demand-Side and Supply-Side Challenges:*

Several demand-side and supply-side challenges might negatively impact oil demand in the future. These challenges include increasing fuel efficiency, pollution regulations, focus on developing domestic oil, gas and renewable energy sources, and global economic slowdown.

In the US, there are many factors that could lead to a decline in the rate of growth of U.S. oil imports. Following the energy crisis in 1973, the U.S. Congress enacted the Energy Policy and Conservation Act in 1975, establishing a regulatory program for automotive fuel economy standards (Corporate Average Fuel Economy Standard – CAFÉ) on passenger automobiles and light trucks. The Obama Administration announced a tougher set of CAFÉ standards that requires all cars and light trucks manufactured between 2012 and 2016 to ramp up to a combined average fuel-economy standard of 35.5 miles per gallon (mpg) (39 mpg for cars and 30 mpg for trucks) by 2016 - an average increase of 8 mpg per vehicle.<sup>7</sup> This standard is set considering four factors: technological feasibility; economic practicability; effect of other standards on fuel economy; and the need of the nation to conserve energy. In part due to the CAFÉ standards, automobiles today are twice as fuel-efficient as they were in 1973.

It is estimated that these new standards will save 1.8 billion barrels of oil over the life of the cars manufactured between 2012 and 2016.<sup>8</sup> This is more oil than the U.S. imported from Saudi Arabia, Venezuela, and Nigeria combined in 2008.<sup>9</sup> Roughly 20 percent of the U.S.'s human-produced carbon dioxide is emitted by cars and light trucks. In addition to conserving fuel, the new CAFÉ standard is estimated to reduce vehicle tailpipe CO<sub>2</sub> emissions by over 900 million metric tons over the life of the program. To put this in perspective, this is equivalent to taking 157 million cars off the road or shutting down 194 coal-fired power plants.<sup>10</sup>

Due to the economic slowdown as well as oil price increases in 2008, the auto industry experienced a sharp drop in car and truck sales, and a witnessed a rapid shift by consumers to smaller cars with significantly better fuel economy. When the recession proved to be much more serious than anticipated, all large global auto companies (with a few exceptions) were in serious financial difficulty. In order to keep the auto industry operational, governments around the world had to financially bailout their respective companies. Demand for automobiles in the U.S.

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<sup>7</sup> "Obama Announces New Fuel Standards", May 19, 2009, Politico, <http://www.politico.com/news/stories/0509/22650.html>

<sup>8</sup> "Obama Announces New Fuel Standards", May 19, 2009, Politico, <http://www.politico.com/news/stories/0509/22650.html>

<sup>9</sup> "The Obama Administration's CAFÉ Standards", About.com, <http://environment.about.com/od/environmentallawpolicy/a/obama-sets-new-fuel-efficiency-standards.htm>

<sup>10</sup> "The Obama Administration's CAFÉ Standards", About.com, <http://environment.about.com/od/environmentallawpolicy/a/obama-sets-new-fuel-efficiency-standards.htm>

dropped from 16 million units per year to fewer than 10 million. This was the main reason why General Motors (GM), the world's largest auto manufacturer, was pushed into bankruptcy. Subsequently, the U.S. government has insisted, and incentivized, the auto industry produce more fuel-efficient vehicles. For instance, in 2009 the U.S. government instituted the "Cash for Clunkers" program, which provided government rebates to customers that traded in their older, less fuel-efficient cars for new fuel-efficient vehicles. The program was able to replace nearly 680,000 gas-guzzling vehicles with new fuel-efficient ones.<sup>11</sup> This has helped spur the auto industry to develop better fuel-efficient vehicles, as well as hybrid and electric cars.

Globally, there is an increasing focus on developing domestic oil and gas and renewable energy sources due to national security concerns, desire for domestic economic development, alarm over climate change, environmental concerns, and an apparent consumer preference for renewable and domestic sources of energy. In order to reduce U.S. dependence on foreign oil, President Obama is pursuing policies similar to the Bush Administration by pushing for the development of domestic oil and gas reserves, as well as renewable energy. While reliance on domestic energy had a set back with the BP oil spill in the Gulf of Mexico in 2010, the Obama administration continues to promote the need for safe domestic oil and gas development. In addition, U.S. utilities are replacing oil with natural gas for electricity generation (*Exhibit 8*). This trend is growing due to the low price of natural gas and the high increase in shale gas production which is expected to exceed consumptions in the near future (*Exhibit 9*). Similarly, the use of oil for heating in houses has fallen 50 percent since 1973. The efficiency of household appliances has increased markedly over the years, and the Obama Administration is currently pushing a \$296 million economic stimulus incentive program titled "Cash for Appliances" that provides government rebate incentives to people that purchase energy efficient home appliances.

The use of renewable energy, such as solar, wind, hydro, photovoltaic, geothermal and biofuels is increasing due to technological advancements that improve efficiency and lower costs. According to the EIA, world renewable energy production is projected to increase from 33 quadrillion Btus to 50 quadrillion Btus by 2020. In the U.S. alone, renewable energy production

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<sup>11</sup> Cars Allowance Rebate System: <http://www.cars.gov/>

is projected to increase from 6.5 quadrillion Btus (7 percent of its total energy production) to 8.9 quadrillion Btus by 2020 (or 8 percent of forecasted total energy production). Conventional hydroelectric power generation will soon account for about 45 percent of total U.S. renewable energy production.

Similarly, Asia is undertaking large-scale hydroelectric projects and other renewable energy investments. In 2010 China became the world's largest wind producer in terms of installed capacity by doubling its installed base from 12.1 GW in 2009 to 25.1 GW. These massive investments in renewable energy generation are matched by China's status as the world's largest manufacturer of wind turbines and solar panels.<sup>12</sup> The European Union (EU) is also committed to developing renewable energy sources and has set a goal of meeting 20 percent of its energy demands using renewable energy by 2020. In response, European oil and gas companies, such as The Royal Dutch/Shell Group and BP, are making investments into renewable energy sources.

Technology advancements have, and will continue to, reduce the cost of producing substitutes for hydrocarbons. In addition to developing renewable energy sources, there is also a strong focus on increasing energy efficiency. All these factors may reduce demand for oil, but the developing world continues to demand increasing amounts of oil to fuel its economic growth. It is unlikely that the current popularity of renewable energy and gains in energy efficiency will surpass the ever increasing demand for petroleum – particularly considering China's and India's near-double-digit growth rates.

The global economic outlook, while increasingly optimistic, still remains fragile. According to the IMF, the global economy will grow slightly over 3 percent in 2012. Much of this growth will be fueled by developing nations, which, collectively, are expected to grow by 6 percent versus

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<sup>12</sup>“Report: China Now World's Largest Wind Market”, Cleantech.com, February 3, 2010, <http://cleantech.com/news/5595/report-china-holds-world-largest> “China Leading Global Race to Make Clean Energy”, New York Times, January 30, 2010, <http://www.nytimes.com/2010/01/31/business/energy-environment/31renew.html>



some 2 percent for developed nations.<sup>13</sup> Despite these positive expectations, the IMF claims that this growth is primarily policy-driven and “that countries risk a return to recession if anti-crisis measures are withdrawn too soon.”<sup>14</sup> This level of accelerated global growth, if it continues, would likely lead to increased oil consumption and an increase in prices in the long-term.

As has been discussed, the rapid upswings and downswings in the price of oil, along with future economic and demand uncertainty, continue to put pressure on Aramco’s long-term goals and strategies. Bottlenecks that were once caused by weather-related supply disruptions and terror attacks, have been replaced by a drastic jump in global spare production capacity. For instance, during the recession in 2010 it was noted that “OPEC member states are sitting on more than 6 million barrels per day of spare production capacity.”<sup>15</sup> This is on top of the 5 million barrels of production capacity that may be added by member OPEC states in 2012.

Furthermore, the refining constraints that were prevalent before the economic crisis have vanished. Approximately 1 million bpd of refining capacity has come online in India and China since 2008, with continued investment in large projects. India’s Essar Group is seeking \$2.5 billion in financing to help upgrade capacity for its refinery in Gujarat from 14 million tons per year to 36 million tons per year by 2013<sup>16</sup>. The Gulf States are increasing their refinery capacity as well with Abu Dhabi seeking to expand capacity at its refinery in Ruwais by 817,000 bpd by the middle of this decade.<sup>17</sup> Saudi Arabia is also engaging in a similarly sized project with China’s Sinopec Group to be built in Yunbu, Saudi Arabia which is expected to be up and running by 2014. During the signing ceremony, Aramco’s CEO Al-Falih, stated that “Over the next decade our total global refining capacity is expected to approach 8 million barrels per day”.

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<sup>13</sup>“IMF Revises Up Global Forecast to Near 4% for 1010”, IMF Survey Online, January 26, 2010, <http://www.imf.org/external/pubs/ft/survey/so/2010/NEW012610B.htm>

<sup>14</sup>“IMF Revises Up Global Forecast to Near 4% for 1010”, IMF Survey Online, January 26, 2010, <http://www.imf.org/external/pubs/ft/survey/so/2010/NEW012610B.htm>

<sup>15</sup>“Oil Rises 3% but OPEC May Open Spigot”, Wall Street Journal, March 30, 2010, [http://online.wsj.com/article/SB10001424052702303410404575152020277769274.html?mod=WSJ\\_Markets\\_section\\_WorldMarkets](http://online.wsj.com/article/SB10001424052702303410404575152020277769274.html?mod=WSJ_Markets_section_WorldMarkets)

<sup>16</sup>“Essar Energy to Raise \$2.5 Billion in London Offering”, BusinessWeek, April 8, 2010, <http://www.businessweek.com/news/2010-04-08/essar-energy-plans-to-raise-2-5-billion-in-offer-of-25-stake.html>

<sup>17</sup>“Glut of Refining Capacity has Big Oil Sputtering”, The National, February 2, 2010, <http://www.thenational.ae/apps/pbcs.dll/article?AID=/20100202/BUSINESS/702029950/1005>

As refining capacity continues to increase in the fast-growing non-OECD countries, refinery utilization in the OECD countries has dropped to approximately 80 percent, leaving over 10 million bpd of capacity unutilized.<sup>18</sup> Due to these and other supply boosts, crude inventories also started to grow (*Exhibit 10*).

However, the short-term cushion in refining capacity could decrease markedly as private refineries, who have been suffering from negative margins and sharp decreases in profitability, shutdown portions of their refinery operations. Refineries generate profits off of the difference between the price of inputs (the crude oil they purchase) and the price the refiners charge for their outputs (the slew of petroleum products produced from it). This is known as the “crack spread”, and it has been deeply impacted by the simultaneous increase in global refining capacity and underutilization and the drop in petroleum demand. This is a primary reason why private oil companies in Europe and North American closed just over 1 million bpd of refining capacity in 2009 and an additional 1.32 million bpd in 2010.<sup>19</sup>.

How will price fluctuations and uncertainty in the global oil market impact explorations for new sources of crude as well as investments in alternative energy sources? These considerations further complicate Aramco’s projections and goals.

- *Geopolitical Challenges*

With oil consumption in Japan lower than in 1979, and in the U.S. 10 percent lower than its peak in 2005 (from 20.8 million bpd to 18.84 million bpd), China has become Saudi Arabia’s primary export market. The International Energy Agency (IEA) predicts that Chinese oil demand will increase to over 10 million bpd in 2011. Currently, Saudi Arabia supplies China with roughly 20 percent of its oil consumption. Since 2005, Saudi Arabian oil exports to China have more than doubled from 455,000 bpd to well over 1 million bpd today. Overall, the Asian region is

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<sup>18</sup> “Global Oil Demand in 2010 Moving to Pre-Financial Crisis Era”, Global Arab Network, March 24, 2010, <http://www.english.globalarabnetwork.com/201003245266/Energy/global-oil-demand-in-2010-moving-to-pre-financial-crisis-era.html>

<sup>19</sup> “Glut of Refining Capacity has Big Oil Sputtering”, The National, February 2, 2010, <http://www.thenational.ae/apps/pbcs.dll/article?AID=/20100202/BUSINESS/702029950/1005>

enjoying faster economic growth than the rest of the world but in the event of political instability, Asia may prove risky in the absence of strong relationships between Aramco and Asian governments. In addition, by expanding in the Asian region Aramco may be competing against firms in developed countries, with the risk of exposure like that of other multinational oil companies. Partnering with established integrated companies, however, may avail Aramco with their political experiences in the Asian region. These are some of the dilemmas that the board and Aramco's management team will have to take into account.

The Iran oil sanctions have also added a new geopolitical challenge. To fill in the gap, Saudi Arabia has increased production to 10 million barrels a day, its highest level in three decades. This led Iran to protest against Saudi Arabia's overproduction,<sup>20</sup> and this issue could potentially escalate tensions between the two countries.

The vast amounts of oil reserves in the Caspian and Russian region could threaten to become alternate supply sources for consuming countries. According to a study by Dallas-based energy reserve auditors DeGolyer & MacNaughton, which work with leading Russian energy companies such as Gazprom and Yukos, technological advances in exploration and production have increased Russia's true recoverable reserves to 150 billion - 200 billion barrels, much higher than the previous industry assessment of 100 billion barrels.<sup>21</sup> In addition, companies such as ExxonMobil and BP Amoco are integrating both upstream and downstream in positions to enhance their market weight, putting additional pressure on Aramco to solidify its position in this competitive industry.

Since Saudi Aramco is a state-owned enterprise of the Kingdom of Saudi Arabia, this imposes additional global political constraints on the company that could hinder its new strategy. For instance, many consuming countries are presently concerned that dependence on energy imports from only one region poses too great of a risk on security of supplies. Hence, many are taking steps to meet their oil needs by sourcing from multiple regions of the world. Some also perceive

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<sup>20</sup>Iran Accuses Saudi Arabia Of Breaching OPEC Ceiling, Fox business, April 19, 2012  
<http://www.foxbusiness.com/news/2012/04/19/iran-accuses-saudi-arabia-breaching-opec-ceiling/>

<sup>21</sup> "Oil: What's Russia Really Sitting on?", BusinessWeek, November 22, 2004,  
[http://www.businessweek.com/magazine/content/04\\_47/b3909079\\_mz054.htm](http://www.businessweek.com/magazine/content/04_47/b3909079_mz054.htm)

the Middle East to be innately unstable where oil facilities are the primary casualty of terrorist violence. An attempted terrorist attack on a large Saudi export facility in February 2006, along with the ramp up of Somali pirate attacks on Middle Eastern tankers, reinforces this view.

Oil has historically been used as a diplomatic weapon by Middle Eastern NOCs, as happened during the oil embargo in 1973. Within the last two years, Iranian leaders, including Ayatollah Ali Khamenei, have publicly made references to the “oil weapon.” Other regional leaders have called on Islamic oil-producing countries to halt exports to “pro-Israel” countries. Against these politically-motivated acts the Saudi Arabian government has refused to suspend oil exports and staunchly stated that it will not use oil as a political weapon.

Despite supply overcapacity in OPEC and a glut in global refining capacity, there are alleged outside forces that have disrupted oil supply and demand fundamentals. For instance in addition to concern that speculators could once again inflate global oil markets like they allegedly did in 2008, there is the potential of political instability and violence, terrorism, and weather-related events. The rapid growth of gas and oil production in the U.S. will also alter oil supply and demand fundamentals (*Exhibit 11*). The U.S. has the potential of becoming a gas exporter and independent of oil imports. How would Aramco manage these geopolitical issues moving forward in their ATP initiative?

- *Aramco’s Dual National and Business Role*

As a state-owned enterprise, Aramco also has several domestic responsibilities which are uncommon amongst global integrated oil companies. Since it generates such a large portion of government revenues, Aramco is instrumental in marshalling resources for national socioeconomic development, such as investments in other sectors, creation of research institutes, think tanks, and even universities. The company is responsible for a significant portion of Saudi’s infrastructure and employs many of Saudi Arabia’s top managers and experts. Where Aramco’s national responsibilities begin and end is not always clear. It is not uncommon for governments to demand their NOCs to assist with, and fund, developmental activities that are not directly related to the oil industry. However, these obligations could conflict with corporate plans and

profitability, especially in the event of declining extraction rates and capital that will be required to move into other hydrocarbon sub-sectors.

In order for Aramco to become a competitive global entity, it requires first-rate global human resources which place strong emphasis on the development of human resources in technical and managerial fields. Aramco, like other global competitors, needs to acquire motivated, dedicated, and capable employees and managers. This is critical to not only ensure enhanced efficiency, but also to become an effective organization that can contribute and draw from strategic alliances and joint ventures with other players in the global economy. The aging of oil industry personnel presents a challenge for all oil companies, but particularly for national oil companies that need to recruit for volatile regions.

#### **WHAT WILL ARAMCO'S STRATEGY BE?**

The future of the oil industry seems to be one of considerable uncertainties and challenges. Historically, periods of high oil prices have been followed by reduced consumption and price declines. Despite the fact that the U.S. and OECD countries seem to be recovering from the economic recession and Asian countries continue to grow at close to historical rates, financial problems in select European nations, U.S. budget problems, and political instability in North Africa and the Middle East, all create uncertainty over world wide economic recovery. How will these uncertainties affect Aramco? How will they impact the Saudi's government revenue? How will they affect Aramco's transformational strategy? What about OPEC?

Or, will the global economy recover and repeat the high oil demand and price scenario that was witnessed in 2008? Will Asia's fast growth put it on the path of its oil demand once again outstripping production? Might political uncertainty or instability, along with other external forces, hamper major oil-producing regions and cause a much higher demand on Aramco's production?

Given Aramco's strength in upstream activities, should it explore other midstream and downstream opportunities overseas? Should it hedge its risks by forming additional global partnerships and joint ventures with other big players? If so, should Aramco focus such alliances in the developing or developed world? How can it deal with environmental concerns and regulations? How can Aramco improve its competitive positioning in the oil industry and what should it do to prepare itself for future challenges? What is required to make sure Aramco has the human resources necessary to continue being successful in the decades to come? In the increasingly tight global job market, how can Aramco remain the employer of choice?

As discussed, the U.S. and European countries are focusing on developing domestic oil, gas and renewable energy sources. However, the Asian region is enjoying faster economic growth than the rest of the world. Should Aramco continue to diversify and expand operations into the fast-growing emerging economies of Asia? If so, what political, cultural and economic implications should Aramco take into account? Or should it partner with established and technologically superior companies in the developed world to better ensure growth?

Since Aramco is a national oil company, how should it balance its traditional business interests with the likely demand put upon it by the government to help the nation's development? What is the role of this national oil company in developing the Saudi economy? Is Aramco responsible for overall economic, social, and human resource development for a nation that has provided it preferential access to its petroleum reserves?

These concerns were among the many issues discussed at the most recent management meeting, and Aramco's CEO and senior managers, in view of the dramatic changes and uncertainties facing the global economy, wanted to make sure the transformational changes required to position Aramco for further success in the decade to come be identified, articulated and implemented.