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CORPORATE STRATEGIES OF SAUDI ARAMCO

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ABOUT THE POLICY REPORT

THE CHANGING ROLE OF NATIONAL OIL COMPANIES

IN INTERNATIONAL ENERGY MARKETS

Of world proven oil reserves of 1,148 billion barrels, approximately 77% of these resources are under the control of national oil companies (NOCs) with no equity participation by foreign, international oil companies. The Western international oil companies now control less than 10% of the world's oil and gas resource base. In terms of current world oil production, NOCs also dominate. Of the top 20 oil producing companies in the world, 14 are NOCs or newly privatized NOCs. However, many of the Western major oil companies continue to achieve a dramatically higher return on capital than NOCs of similar size and operations.

Many NOCs are in the process of reevaluating and adjusting business strategies, with substantial consequences for international oil and gas markets. Several NOCs have increasingly been jockeying for strategic resources in the Middle East, Eurasia, and Africa, in some cases knocking the Western majors out of important resource development plays. Often these emerging NOCs have close and interlocking relationships with their national governments, with geopolitical and strategic aims factored into foreign investments rather than purely commercial considerations. At home, these emerging NOCs fulfill important social and economic functions that compete for capital budgets that might otherwise be spent on more commercial reserve replacement and production activities.

The Baker Institute Policy Report on NOCs focuses on the changing strategies and behavior of NOCs and the impact NOC activities will have on the future supply, security, and pricing of oil. The goals, strategies, and behaviors of NOCs have changed over time. Understanding this transformation is important to understanding the future organization and operation of the international energy industry.

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CORPORATE STRATEGIES OF SAUDI ARAMCO

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INTRODUCTION

Even experts within the international oil and gas industry can learn a thing or two by studying the corporate workings of the Saudi Arabian Oil Company, or Saudi Aramco. Saudi Aramco is the national oil company (NOC) that is fully-owned by the government of Saudi Arabia and is the largest oil producer and holder of oil reserves in the world. The company has maintained the top position in the *Petroleum Intelligence Weekly's* annual world oil company ranking since the ranking began in 1988, and is widely perceived as the most powerful and influential oil company globally.

The significance of Saudi Aramco for Japan cannot be overemphasized. Having surpassed the United Arab Emirates (UAE) in supplies, Saudi Arabia has been the largest oil exporter to Japan for two years in a row. Saudi Aramco has also continued to strengthen ties to Japanese firms. In 2004 and 2005, it acquired shares totaling 14.96 percent in Showa Shell Sekiyu, a Japanese downstream company, and in August 2005, the Saudi state firm formed a joint venture with Sumitomo Chemical to construct and operate a large refining and petrochemical complex in Rabigh, an industrial city along the Red Sea coast in Saudi Arabia. Saudi Aramco is now a crucial business partner for the Japanese energy industry.

This paper will first examine the managerial environment within Saudi Aramco by identifying the company’s strengths, weaknesses, opportunities, and threats (SWOT). The SWOT analysis is a useful and effective method for analyzing corporate strategies when sufficient quantitative information is not available. This paper will then review how the company behaves under the given managerial environment, and, in the last section, will highlight several implications for the Japanese oil industry and policy planners.

I. MANAGEMENT ENVIRONMENT OF SAUDI ARAMCO:

A SWOT ANALYSIS

This section examines Saudi Aramco’s managerial structure through SWOT analysis. SWOT analysis is one of the methodologies used to capture a broad picture of the company’s managerial environment by using the following SWOT matrix. In this matrix, a company’s internal resource that produces a favorable impact on the firm is categorized as a “strength,” while an internal resource that generates an adverse impact is labeled a “weakness.” In the lower line of the matrix, an external factor that creates a favorable effect on the company is an “opportunity,” while an external factor that causes an adverse effect is a “threat” (Table 1).

TABLE 1. SWOT MATRIX

	Favorable effect	Adverse effect
Internal resources (Value-chain)	Strengths	Weaknesses
External environment (Political, Economic, Social, and Technological)	Opportunities	Threats

After preparing this matrix, several questions are raised in examining corporate strategies, including the following:

- How can the company increase its strengths?
- How can the company overcome its weaknesses?
- How can the company minimize threats by taking advantage of its opportunities?

TABLE 2. SWOT MATRIX OF SAUDI ARAMCO

Strength	Weakness
<ul style="list-style-type: none"> ✓ The world's largest spare production capacity ✓ Access to low cost oil and gas production assets ✓ Advanced upstream technologies and highly motivated employees ✓ Good relationship with the government 	<ul style="list-style-type: none"> ✓ Sour crude oil ✓ Heavy dependence on sales of a single commodity (crude oil) ✓ Relatively small downstream capacity
Opportunity	Threat
<ul style="list-style-type: none"> ✓ High crude oil price and sufficient investment capital ✓ Strong oil demand growth, especially in Asia ✓ Saudi Arabia's accession to WTO 	<ul style="list-style-type: none"> ✓ Rising domestic gas demand growth and potential gas supply crunch ✓ Potential slow down of world oil demand growth caused by the recent high oil prices

Table 2 is Saudi Aramco's SWOT matrix. To make a list of the company's strengths is an easy task. Endowed with the world's largest oil reserves and having inherited technological expertise from the former Arabian American Oil Company (Aramco), Saudi Aramco has enjoyed a number of advantages, including low-cost production oil reserves, advanced technological knowledge, a well-organized and efficient decision-making system, and highly-motivated employees. In particular, the oil

production cost in Saudi Arabia is quite low compared to that of other oil producing countries around the world. This is because a large portion of the Saudi Arabian oil fields are free-flowing from reservoir pressure alone and do not require pumps to extract oil from the ground. While there are several assumptions regarding Saudi Arabia's oil production cost, one estimate assumes the country's all-inclusive cost (i.e. exploration and production) is \$3.00/a barrel, the lowest of all major oil producers in the world.¹

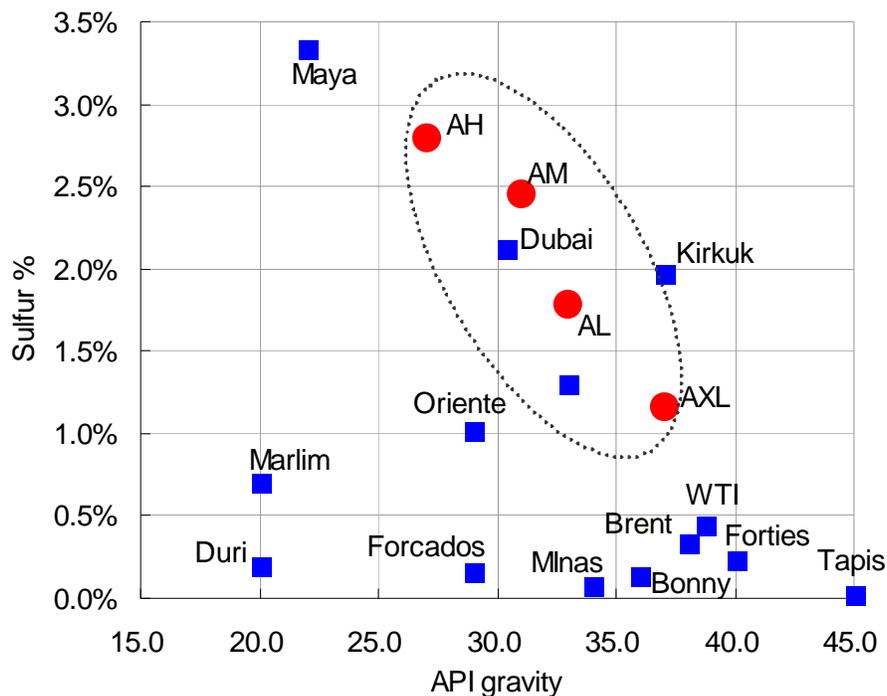
Although it is not precisely an internal resource of Saudi Aramco's, the company's good relationship with the Saudi Arabian government should be also mentioned as a strength. As a fully state-owned entity, Saudi Aramco is under strong national control and is essentially an instrument of the government. Unlike other NOCs, however, there is a clear demarcation between the responsibilities of the Saudi Arabian government and Saudi Aramco. The government -- or more precisely, senior al-Saud family members -- has the authority to decide the country's OPEC policy, oil production level and capacity targets, and domestic petroleum product prices. On the other hand, Saudi Aramco can make decisions regarding the company's expenditures, investment projects, and other operational issues. This clear demarcation makes the company's relationship with the government uniquely amicable, ensures the company's operational autonomy, and minimizes political interventions in the company's operational activities.

The sources behind this good relationship are Saudi Aramco's extensive expertise in the oil and gas businesses and its impressive performances in the past. Saudi Aramco has continued to meet the demands and targets set by the government, and, because of the state's strong trust in the company's performance and capabilities, Saudi Aramco has been allowed to have a certain level of operational autonomy. In fact, while Saudi Aramco's five-year plan requires a final approval from the Supreme Council for Petroleum and Minerals (SCPM) -- the most prominent decision-making organization

¹ Abdulaziz Al Attar and Osamah Alomair, "Evaluation of upstream petroleum agreements and exploration and production costs," *OPEC Review*, December 2005, 250.

concerning the country's energy resources that is chaired by King Abdullah -- the council has never rejected a proposed plan from the company. Such an intervention in the operational matters of Saudi Aramco is considered "taboo" within the Saudi Arabia's government,² clearly illustrating the mutual trust between the state and the NOC. Having a clear distinction between government affairs and the NOC's activities in Saudi Arabia's oil and gas sectors avoids inefficiencies caused by inappropriate political interventions, and thus promotes the continuity of Saudi Aramco's stellar business performance and its operational autonomy.

FIGURE 1. QUALITY MAP OF SELECTED CRUDE OIL GRADES



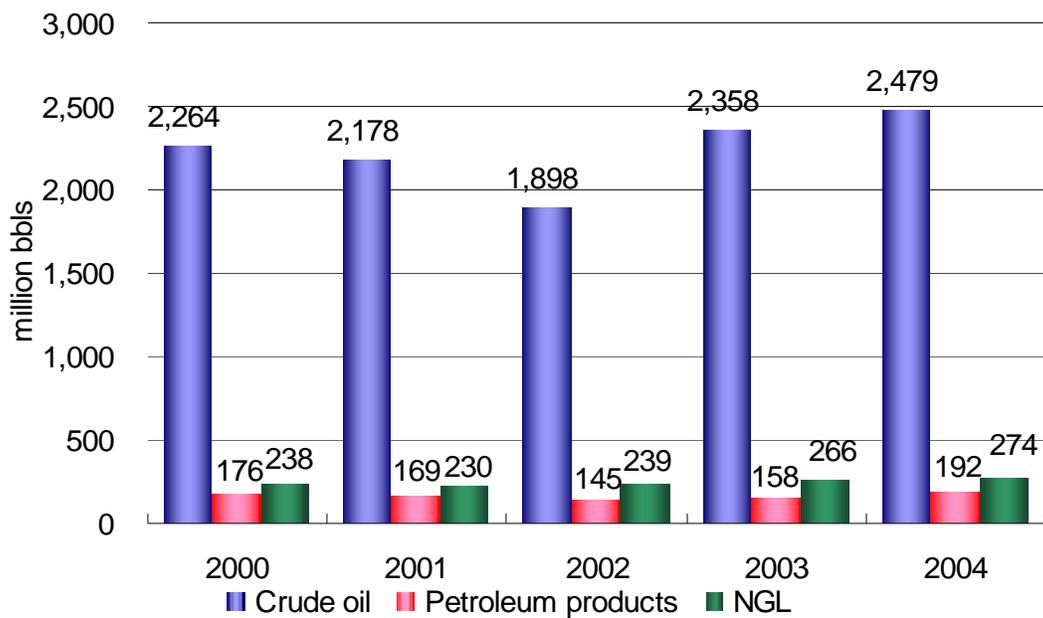
Data source: Energy Intelligence Group, *International Crude Oil Market Handbook 2006*.

Although Saudi Aramco has few perceived weaknesses as an oil company, one of these is its sour (high-sulfur) grade crude. Saudi Arabia produces five different grades of

² Valerie Marcel, *Oil Titans: National Oil Companies in the Middle East* (London: Chatham House, 2006), pp84-85.

crude oil,³ and most of the grades are categorized as a sour grade whose sulfur component is above one percent (Figure 1). A sour crude oil grade in general is sold at discount compared to those with low sulfur components. Given the global trend of tightening petroleum product specifications, there will be less demand for these sour grades in the coming years, thus making the sour nature of Saudi Aramco’s produced crude oil a matter of concern in the state energy firm’s marketing strategies.

FIGURE 2. SAUDI ARAMCO’S EXPORT VOLUME



Data source: Saudi Aramco, *Annual Review 2005*.

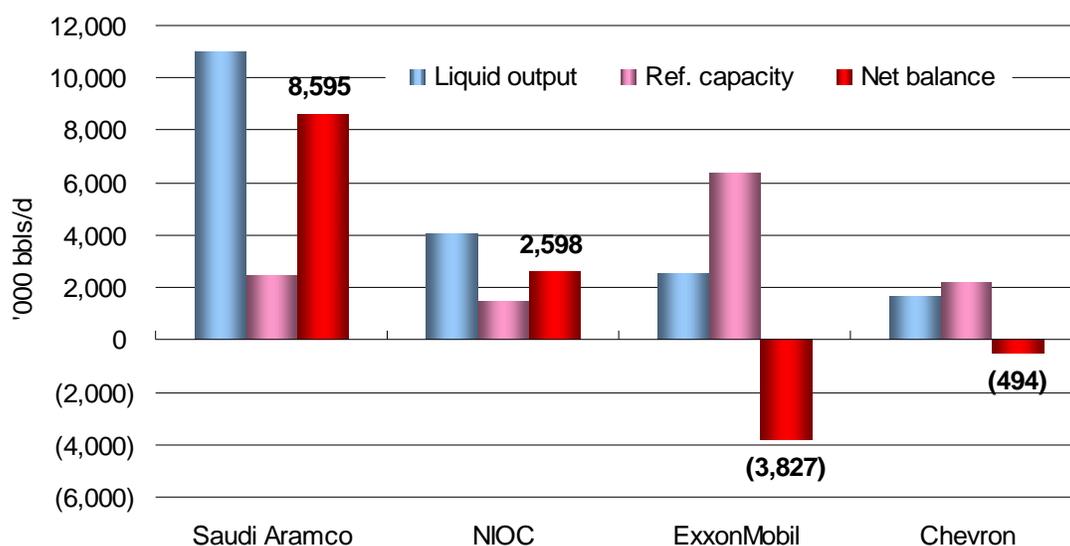
Saudi Aramco’s heavy dependence on a single commodity (i.e. crude oil) is also considered one of its weaknesses. As shown in Figure 2, crude oil is dominant in the company’s export portfolio. The lack of diversification in its revenue sources has resulted

³ Those grades are Arabian Extra Light (AXL), Arabian Super Light (ASL), Arabian Light (AL), Arabian Medium (AM), Arabian Heavy (AH)

in very volatile revenue flows in the past, and the company is in need of revenue source diversification in order to stabilize its annual income.

For a similar reason, the company's "long" position in upstream capacity over downstream capacity may be pointed out as another weakness. As Figure 3 reveals, the company has the largest refining deficit among its NOC and IOC (international oil company) rivals. Indeed, securing outlets for its crude and increasing the company's vertical integration are in the company's long-standing interests.

**FIGURE 3. LIQUID OUTPUT AND REFINING CAPACITIES
OF SELECTED COMPANIES**



Data source: *Petroleum Intelligence Weekly*, 18 December 2006.

Regarding the company's prospects, the world's growing oil demand and its unexpectedly low price elasticity undoubtedly provide great opportunities for a company like Saudi Aramco, which possesses large oil reserves. According to a forecast made by the International Energy Agency, the world oil demand growth rate for the next quarter

century is faster than that of the past quarter century.⁴ It is a widely accepted consensus that oil will continue to be the world's most important energy source, as it maintains the largest share of the world's total primary energy supply. This, combined with the forecasted demand growth, promises a future market for Saudi Aramco's vast crude oil resources.

Thanks to recent high oil prices, Saudi Aramco could secure sufficient funds for capital investments, thereby providing more opportunities for the state energy firm. Backed by the recent cash flow windfall, Saudi Aramco has launched a number of investment projects covering its entire value chain, from exploration to refining and shipbuilding, as discussed in a later section of this paper.

Saudi Arabia's admittance into the World Trade Organization (WTO) in December 2005 also creates a rosy opportunity for Saudi Aramco, especially in the petrochemical business. The biggest achievement for Saudi Arabia in its negotiations during the WTO admissions process was that it succeeded in persuading the other member countries to allow the Kingdom to maintain its low domestic natural gas price. The country's current domestic natural gas price of \$0.75/MM BTU is exceeding low compared to international market prices,⁵ in effect, providing significant cost competitiveness for Saudi natural gas-based industries, such as petrochemicals manufacturing. The European Union, which feared that market entry of these low-cost Saudi petrochemical products would harm European petrochemical industries, strongly resisted Saudi Arabia's approval into the WTO ranks without it first adjusting its domestic natural gas price. Then Crown Prince Abdullah's visit to the U.S. in April 2005 was decisive in obtaining Washington's support and persuading the Europeans to follow suit. Accession to the WTO provides access to lucrative overseas petrochemical markets, particularly China's, which could serve as

⁴ While annual growth rate from 1980 to 2005 is 1.0 percent, the growth rate from 2005 to 2030 is forecasted at 1.3 percent. International Energy Agency, *World Energy Outlook 2006* (Paris: Organization for Economic Cooperation and Development, 2006), 86.

⁵ The average natural gas price in the U.S. (Henry Hub futures price) was \$6.98/mm btu in 2006.

prospective areas in which Saudi Aramco could diversify its oil-oriented revenue sources with non-oil commodities.

Although there seems to be no imminent threat for Saudi Aramco at this moment, the rapid growth of its domestic gas demand may lead to a potential gas supply shortage in the Kingdom. Recent high economic growth has inflated domestic power and desalination demand, and a number of natural gas-based petrochemical projects will likely upset the already tight balance in the country's gas supply. Exports of liquefied petroleum gas (LPG) from Saudi Aramco are expected to cease in a few years as LPG will be used as a substitute for natural gas in the country. The risk of a potential gas supply crunch is now looming. Saudi Aramco is at this moment the sole entity in charge of securing and providing a sufficient amount of natural gas for domestic users, so the state energy firm is under strong pressure to enhance its existing gas supply capacity.

II. STRATEGIES UNDERTAKEN BY SAUDI ARAMCO

Saudi Aramco's changes in corporate strategies are interpreted in this paper under the context of the aforementioned SWOT matrix; some strategies are pursued to take advantage of opportunities while some are intended to minimize threats.

In the 1990s, Saudi Aramco's corporate strategies tended to focus on improvements in profitability and cost reductions in its existing businesses. In the last two to three years, however, the company has moved towards cultivating extensive capacity expansions in all of its businesses.

II-1 Revitalizing Exploration

Saudi Aramco has become more aggressive in its exploration activities over the last few years. This is a strategy to solidify the company's strengths with opportunities as they arise, namely, a tactic to discover additional low-cost oil and gas reserves with a sufficient amount of investment. Although the number of rigs Saudi Aramco had used for exploration was very small until a few years ago, the state firm is now rapidly increasing

the number of rigs it is operating.

Table 3 shows the company's recent exploration results. It is notable that most of the recent findings are gas fields. These gas-oriented results imply that the company is placing a higher priority on gas field findings in an effort to expand the domestic gas supply capacity.

Saudi Aramco's most impressive achievement in recent exploration activities was the discovery of the offshore Karan gas field in April 2006. A Saudi Aramco official suggests that the field has "hydrocarbon bearing reservoirs of excellent quality,"⁶ and its production will be ultimately raised to 1 billion cubic feet a day.⁷ Given the current intensive exploration program, a similar giant gas field finding may follow the Karan discovery; however, factors such as growing domestic gas demand and Saudi Arabia's traditional policy of restraining natural gas exports will effectively suppress Saudi Aramco's natural gas exports for the foreseeable future, even though the company's gas supply capacity has significantly expanded.

⁶ Saudi Aramco's web-site
(http://www.saudiaramco.com/bvsm/JSP/content/articleDetail.jsp?BV_SessionID=@@@@0208295657.1169601616@@@@&BV_EngineID=cccladdjljmfjhjcefeceefdfnkdfl.0&datetime=01%2F24%2F07+04%3A21%3A38&SA.channelID=-11767&SA.programID=19296&SA.contentOID=1073766148) Accessed on 24 January 2007.

⁷ *Petroleum Intelligence Weekly*, 4 December 2006, p. 7.

TABLE 3. SAUDI ARAMCO'S RECENT DISCOVERIES

Month, Year	Field	Location	Finding (grade, if oil)
Nov, 2006	Nujayman-1	30 km south of Ghawar	Gas / condensate
Sept, 2006	Kassab-1	50 km south of Ghawar	Gas
Jul, 2006	Zamlah-1	50 km south of Ghawar	Gas / condensate
Apr, 2006	Karan-6	160 km north of Dhahran (offshore)	Gas
May, 2005	Halfa-1	320 km south of Dhahran	Oil (AXL)
Apr, 2005	Du'ayban-1,	125 km southeast of Riyadh	Oil (ASL)
Dec, 2004	Midrikah-1	30 km south of the Ghawar	Gas / condensate
Oct, 2004	Abu Sidr-1	480 km southwest of Dhahran	Oil (ASL)

Source: Saudi Aramco's web-site

As a part of the effort to expand the country's gas supply capacity, four consortia led by foreign oil companies were awarded gas exploration contracts in Saudi Arabia in 2003 and 2004. The program, known as the Saudi Gas Initiative, was initiated by the then-Crown Prince Abdullah in 1998, and, after a long negotiation process, consortia led by Royal Dutch/Shell and Total, Eni and Repsol, Sinopec, and Lukoil have begun exploring natural gas reserves in the Rub Al-Khali. Saudi Aramco is a 20 percent joint venture partner in each consortium, and, if commercially viable natural gas fields are found, will purchase produced gas at domestic prices and distribute it through the company's own network.

A Saudi Aramco official admitted that the state energy firm's exploration activities will gradually shift back to oil field findings.⁸ Such a transition may in part be motivated

⁸ *Weekly Petroleum Argus*, 29 May 2006, p. 3

by the so-called “peak oil” thesis. Matthew Simmons, a Houston-based investment banker, raised questions about Saudi Arabia’s ability to continue to increase its production capacity as the country’s biggest oil fields peak in his presentation, “Saudi Arabian Oil Miracle”, in February 2004.⁹ While Saudi Aramco rebutted his thesis by disclosing detailed field-by-field data aiming to quell production peak suspicions, the company’s significant expansion of its reserves through intensive exploration activities will be the most effective way for Saudi Aramco to prove its resource potential.

II-2 Expansion of Oil Production Capacity

The company’s effort to raise production capacity and to secure surplus capacity is also considered a strategy to reinforce its current strengths by taking advantage of this opportunity. Maintaining a sufficient spare capacity has been a primary source of Saudi Arabia’s unrivaled influence over the international oil market. Thanks to strong oil revenues over the past several years backed by solid world demand growth, the Kingdom has plenty of opportunity to pursue upstream development projects. Although recent cost inflation in upstream projects may be regarded as a threat to the ongoing upstream expansions, a Saudi Aramco senior executive rejects speculation that such cost inflation would deter the current upstream expansion activities by citing the company’s supreme cost competitiveness.¹⁰

⁹ Matthew R. Simmons, “Saudi Arabian Oil Miracle,” Presentation material presented at the Center for Strategic & International Studies on 24 February 2004. Available at <http://www.simmonsco-intl.com/Research.aspx?Type=MSSpeechArchives>. Accessed on 24 January 2007.

¹⁰ *Weekly Petroleum Argus*, 4 December 2006, p. 4

TABLE 4. SAUDI ARAMCO'S CAPACITY ADDITION PROJECTS

Field	Addition ('000 b/d)	Grade	On-steam
Khursaniya	500	AL	2007
Shaybah	250	AXL	2008
Nuayyim	100	ASL	2006
Khurais	1,200	AL	2009
Safaniya	200	AH	2010
Manifa	900	AH	2011
Total	3,150		

Source: *Weekly Petroleum Argus*, 8 January, 2007

Table 4 summarizes Saudi Aramco's current capacity expansion projects. All of the projects are reported as proceeding on schedule, and there appear to be no delays so far. Indeed, the Haradh-3 projects, which came onstream in March 2006, were completed ahead of schedule. This is a very rare event in the current international upstream scene, where many Western major oil companies have reported start-up delays in the U.S. Gulf of Mexico or Caspian Sea. The achievement of the Haradh projects under deadline is often cited to illustrate Saudi Aramco's excellence in its technological and project management capabilities.

While Table 4 shows only capacity additions, the net production growth, of course, becomes smaller than the total additions because of the depletion of existing fields. Although there are varying estimates for Saudi Aramco's net oil production growth, the real number is not publicly disclosed, thus the amount of annual field depletion is unknown. If it is higher than the widely perceived level of 2-3 percent, the company's

production capacity target of 12.5 million barrels a day (b/d) by 2009 will become more difficult to achieve.

It is, however, expected that Saudi Aramco has other candidates for development projects beside those mentioned in Table 4. Those candidates include an expansion of Neutral Zone production, the boosting of Shaybah field production to one million b/d, and additional development of the Manifa field above the scheduled 900,000 b/d. All of these candidate projects may be considered and implemented if depletion of existing fields accelerates.

Moreover, what is most important for Saudi Aramco in its upstream strategies is not to achieve a specific numerical target in production but to maintain a certain level of spare capacity. This is because the essence of Saudi Aramco's leverage against oil consumers and other oil producers originates from its spare capacity. Saudi Aramco has repeatedly stated that the company is committed to keeping its spare production capacity at 1.5-2 million b/d at minimum. The company held 2 million b/d in spare capacity in December 2006¹¹, and, in order to defend the source of its unique influence, it will surely continue to maintain this target for the foreseeable future.

Vertical integration

Saudi Aramco has accelerated its investment in the refining sector in recent years. These expenditures are an effort to make up for its large refining deficit and to minimize the adverse effect a potential widening of the light-heavy spread would have on the crude oil market by securing sophisticated refining capacity able to process Saudi Aramco's heavier crude oil.

Vertical integration, in fact, has been one of Saudi Aramco's consistent strategies. While Saudi Aramco's refining capacity is small *relative to* its upstream capacity, its total refining capacity is sizable; in fact, Saudi Aramco is the ninth largest refiner in the

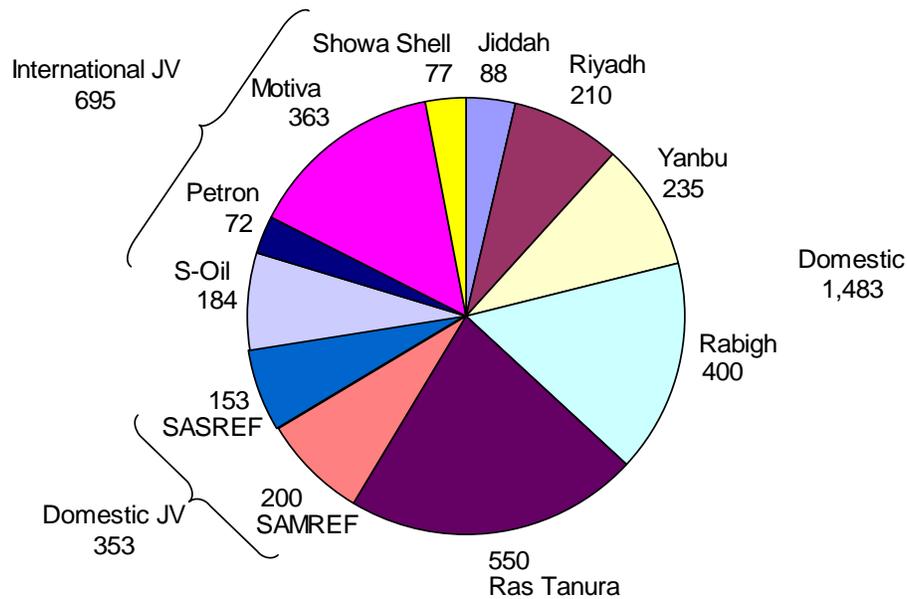
¹¹ International Energy Agency, *Oil Market Report*, 18 January 2007, 13

world.¹² Saudi Aramco has expanded its downstream network in foreign countries as well, through downstream equity acquisitions in the U.S. in 1988, South Korea in 1991, the Philippines in 1993, and Greece in 1996. Saudi Aramco has been long interested in the Japanese downstream sector, and it held talks with Japanese oil companies about a potential equity investment in their refineries at least twice in the 1990s. Although these talks failed to produce anything concrete, Saudi Aramco did acquire equity in the Japanese refiner Showa Shell in 2004 and 2005 and is currently supplying it with 300,000 b/d of crude oil.

Saudi Aramco's drive for vertical integration stalled in the latter half of the 1990s when oil prices were low and the company could not secure sufficient investment funds. Now, however, Saudi Aramco is actively pursuing downstream investments, bolstered by the large amount of available cash and the sobering fact that the bottlenecks in global refining capacity are an increasing cause of concern. Having acquired a 14.96% share in Showa Shell, Saudi Aramco currently holds 695,000 b/d of refining capacity outside Saudi Arabia, more than a quarter (27.5 percent) of the company's total refining capacity (Figure 3).

¹² "PIW's Top 50," *Petroleum Intelligence Weekly*, 18 December 2006, Special Supplement 2. Saudi Aramco's refining capacity is even larger than that of Chevron.

FIGURE 4. SAUDI ARAMCO'S REFINING CAPACITY



Source: Saudi Aramco, *Annual Review 2005*. Refining capacities of JVs are equity-based.

Historically, Saudi Aramco has adopted two principles when pursuing downstream investments. These are as follows:

1. To secure the refining capacity equivalent to half of the upstream (oil production capacity)
2. To prioritize securing the outlet for Saudi Arabian crude oil rather than taking management control with more than a 50 percent share

Table 5 shows Saudi Aramco's recent investment projects in the refining sector, both in the Kingdom and abroad. Total capacity addition will be 2.67 million b/d, if all projects are realized, thereby propelling Saudi Aramco into world-class downstream status.

TABLE 5. SAUDI ARAMCO'S REFINERY EXPANSION PLAN

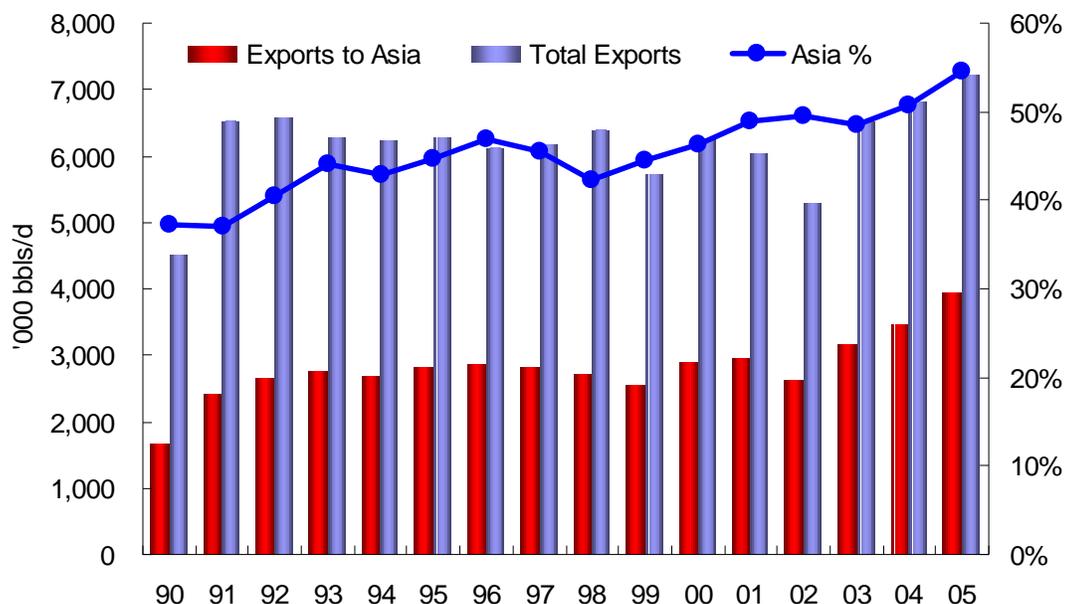
Project	JV Partner	Addition (b/d)	Start-up	Status
Fujian (China)	ExxonMobil, Sinopec	160,000	2008	Under construction
Seosan (Korea)	S-Oil (Subsidiary)	480,000	2010	Board of Directors approved.
Port Arthur (US)	Shell (Motiva)	325,000	2010	Construction begins in 2007.
Jubail	Total	400,000	2011	Confirmed. Final investment decision pending
Yanbu	ConocoPhillips	400,000	2011	Planned
Qingdao (China)	Sinopec, Local government	200,000	2007	Under negotiation
Ras Tanura	-	300,000	-	Planned
Jubail	Shell (SASREF)	305,000	-	Possible expansion
Yanbu	-	100,000	-	Possible expansion
Total		2,670,000		

Source: *Weekly Petroleum Argus*, 1 January 2007, and other media reports. Total capacity does not count equity ratio.

Two new refineries in Jubail and Yanbu are to be constructed and operated by joint ventures with foreign companies, and Saudi Aramco has already chosen France's Total for the Jubail project and U.S. major ConocoPhillips for the Yanbu project as its partners. These refineries are designed as export facilities and will produce high-quality petroleum products that meet the quality specifications in developed countries. These joint ventures are still being evaluated for economic viability, and the involved parties are expected to make final investment decisions in early 2007.

Regarding the overseas expansion projects, most of the efforts are devoted to the Asian market. This is understandable since it is the region on which Saudi Aramco relies most (Figure 4), and it is a region that will continue to see expansion in oil consumption in the coming years. The board of S-Oil, a subsidiary owned 35 percent by Saudi Aramco, has recently approved construction of a new refinery in Seosan, South Korea. Seosan is located on the west coast of South Korea, and the new refinery will have a geographical advantage for exporting products to China. An upgrade project at the Fujian refinery in China is now under construction with Saudi Aramco partnered with China's state energy firm Sinopec and U.S. major ExxonMobil. Motiva, a refining joint venture between Saudi Aramco subsidiary, Saudi Refining Inc., and Shell Oil in the U.S., has obtained an environmental approval and plans to begin construction in 2007 to increase throughput at its 285,000 b/d capacity Port Arthur, Texas refinery by 325,000 b/d. If the plans are successful, the plant, which is slated for completion in 2010, would be the largest in the U.S.. As for proposed Saudi-Chinese downstream projects in Qindao, China, negotiations have not proceeded smoothly because of profitability concerns arising from the slow liberalization process in the Chinese domestic market.

FIGURE 5. SAUDI ARAMCO'S EXPORTS TO ASIA AND ITS SHARE



Source: OPEC, *Annual Statistical Bulletin 2005*

In addition to the domestic export refinery construction led by Saudi Aramco, another export refinery is currently being planned for Jizan, an industrial city near the border with Yemen. While this refinery was announced as a part of King Abdallah's November 2006 announcement of plans to establish an economic city in Jizan at a cost of U.S. \$30 billion,, international investors have not responded eagerly to the Kingdom's first private sector refinery project and it is unclear at this time whether Saudi Aramco will take responsibility for building the refinery.

Most of the refinery projects are designed to process heavy and sour grades, such as Arabian Heavy or Arabian Medium, as part of Saudi Aramco's strategy to overcome its weakness in crude oil quality. Having sophisticated refining capacities within its own network, Saudi Aramco will be able to turn unpopular low-quality crude oil grades into

more value-added petroleum products and to avoid offering deep discounts for those heavy sour grades. In fact, Total and ConocoPhillips were selected as partners in new export refinery projects in the Kingdom specifically because these two majors have extensive expertise and experience in processing heavy oil in Canada and Venezuela, respectively.¹³

Saudi Aramco's Focus on Petrochemicals

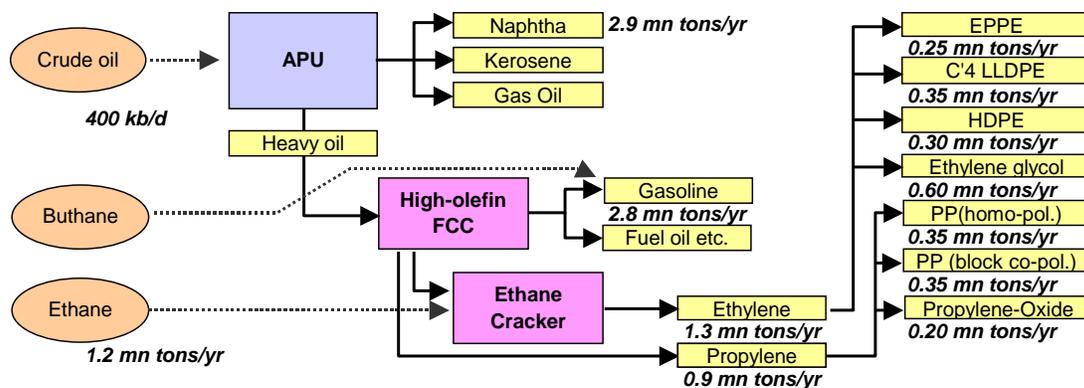
Saudi Aramco's latest strategy has been to pursue opportunities in the petrochemicals sector in an attempt to benefit from the Kingdom's acceptance into the WTO as well as to diversify the company's crude oil-oriented revenue structure.

In Saudi Arabia, Saudi Basic Industries Corporation (SABIC) has been the dominant player in the domestic petrochemicals industry, while Saudi Aramco has stayed on the sidelines. However, this situation changed when Saudi Aramco launched a U.S. \$4.3 billion mega project to upgrade the existing refinery in Rabigh on the Kingdom's west coast into a refining and petrochemical complex.

Japan's Sumitomo Chemical was selected as Saudi Aramco's joint venture partner in the Rabigh project in August 2005. This agreement was greatly appreciated and welcomed in Japanese industrial circles, as the bilateral business relationships between Japan and Saudi Arabia had been rather "dry" for some time, consisting mainly of buy-sell crude oil transactions since Japan's Arabian Oil Company lost its longstanding upstream stake in the Khafji field of the Neutral Zone in 2000. The Rabigh refinery and petrochemicals project is strongly expected to help restore and solidify the bilateral business relationships between Japanese and Saudi firms in the energy sector.

¹³ *Petroleum Intelligence Weekly*, 29 May 2006, p. 7.

FIGURE 6. THE RABIGH REFINERY'S UPGRADING PLANS



Source: Sumitomo Chemical web-site

The Rabigh project, known as PETRORabigh, is essentially an upgrading of the existing Rabigh refinery, which was originally built by a joint venture with a Greek oil company, Petrola, in 1985. The refinery is equipped with a 400,000 b/d topping capacity without any upgrading unit¹⁴ and is utilized as a swing facility, from which its production shifts are subject to export demand.¹⁵ The project plans to turn this simple skimming-type refinery into a mega refining and petrochemical complex by adding a high-olefin fluid catalytic conversion (HOFCC) plant, ethane cracker, and other related downstream facilities (Figure 5).

This project boasts a number of advantages. The newly constructed FCC complex in Rabigh has a very high propylene yield at 20 percent, undoubtedly a plus over other domestic petrochemical plants by being able to produce more profitable olefin products. Added FCC conversion capacity will also enable the existing refinery to process cheaper and heavier grades, thus improving its refining margin.

¹⁴ *Oil and Gas Journal*, 18 December 2006, p. 29.

¹⁵ Jareer Elass, *The World's Key National Oil Companies: Saudi Aramco* (New York: Energy Intelligence Group, 1999), p. 31.

The biggest advantage of this project will be its access to very cheap feed gas. In general, an ethane cracker's margin to produce ethylene is said to be better than a naphtha cracker's margin by 10 percent.¹⁶ This evaluation, however, assumes feed natural gas is priced at U.S. \$4.50/mm btu and naphtha priced at U.S. \$225/ton. If we refer to the facts that naphtha is currently traded at more than U.S. \$500/ton as of the writing of this paper (January 2007) and the domestic natural gas price in Saudi Arabia is \$0.75/mm btu, it is obvious how profitable a petrochemical project in Saudi Arabia can be. There is therefore nothing unusual about a number of domestic and foreign firms rushing into Saudi Arabia to invest in natural gas-based petrochemical projects like PETRORabigh. While there is speculation that the Saudi domestic natural gas price will be gradually increased sometime in the future, the price is still very competitive relative to the international market, and it guarantees a solid profitability for these petrochemical projects in the Kingdom.

Another factor driving Saudi Aramco's pursuit of petrochemical projects is that they may create more local jobs in Saudi Arabia. As the company expands its value chain further downstream to more labor-intensive plastic products or textiles manufacturing, a larger number of jobs can be created.¹⁷ The population in Saudi Arabia grew significantly at a 2.7 percent annual average from 2000 to 2005,¹⁸ and unemployment among the younger generation is causing a serious problem in Saudi Arabia, not only economically, but politically, as well. By developing these downstream operations, Saudi Aramco aims to address a critical national challenge as well as diversify its business portfolio.

¹⁶ Hideki Sugiyama, "Natural gas-based petrochemicals: Ethane cracker," *Petrotech*, September 2005, 69 (in Japanese)

¹⁷ Azzam Y. Shalabi, "Saudi Aramco's Initiatives in Export Refining & Integrated Petrochemical Projects," *Presentation to MEED Conference*, March 2006, 10-11.

¹⁸ International Monetary Fund, *International Financial Statistics*, November 2006, p. 854.

III. IMPLICATIONS TO JAPANESE POLICY MAKERS

AND OIL INDUSTRY

Based on the above analysis, this section provides several implications for the Japanese oil industry and policy planners.

III-1 Effects of export refineries

A spate of export refinery construction draws significant attention in the Japanese oil community because the new units may drastically change the product market balance in Asia. The impact of the new Saudi Aramco export refineries, on the Asian markets is limited, however, since most of the products from these export refineries will be exported to Western markets.

In general, constructing a refinery quite a distance from large consumption areas is not an optimal investment. This is because transportation of petroleum products from the refinery requires smaller tankers than those used in crude oil transportation and demands a higher freight cost. Exported refined products, therefore, have a handicap relative to products refined near the consuming markets themselves. Asian refineries have a chronic problem of low utilization, and this is an additional disadvantage for product exports dedicated to Asia from new export refineries.

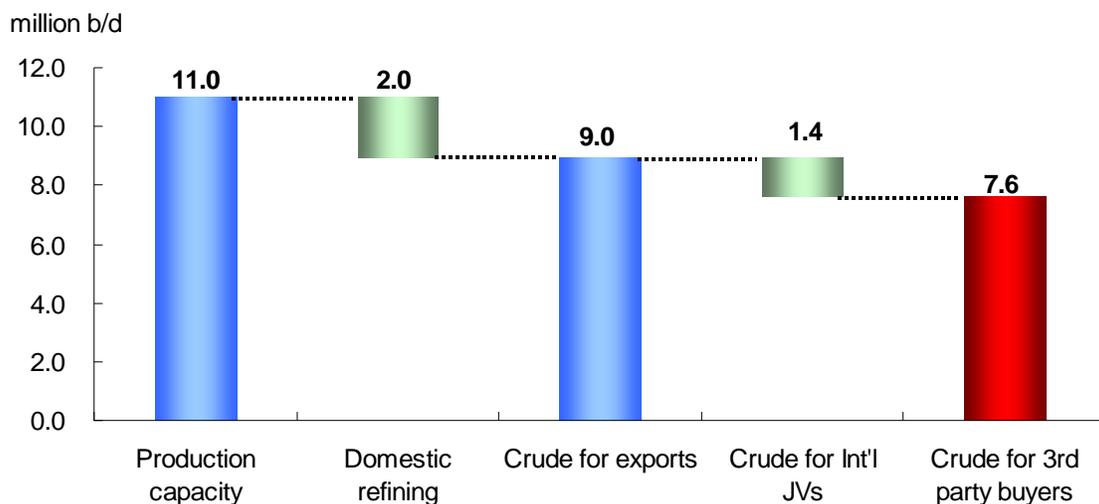
All of the crude oil that is to be fed to the planned export refineries is Arabian Heavy, and the designed middle distillates' yield from the Saudi Aramco export refineries is high at 55 percent. Because the Asian markets are saturated with middle distillates and European markets are facing a shortage of diesel oil, middle distillates produced from the Saudi Aramco export refineries will be directed to Europe. The yield of motor gasoline from these refineries is designed at 20 percent. Domestic oil demand has been increasing in Saudi Arabia recently, and Iran currently imports motor gasoline, thus the motor gasoline generated from the new Saudi Aramco refineries is likely to be consumed within

the region rather than exported outside of the area. With their small naphtha yield of 5 percent, these refineries -- should they decide to export naphtha at all -- will not have a significant impact on the Asian naphtha market.

III-2 Quantity and Quality of Saudi Arabian Exported Crude Oil

As a crude oil importer, The Japanese oil industry keeps a close eye on the quality and quantity of exported crude oil from Saudi Arabia. In terms of the quantity, Figure 6 shows an estimate of export availability from Saudi Arabia at the end of 2006. Thanks to the current projects designed to boost Saudi Aramco’s production capacity, the export volume is expected to increase by 1.5 million b/d, from the current 7.6 million b/d to 9.1 million b/d by 2009. Although this increased export availability will be partially offset by the capacities of the new export refineries in Saudi Arabia after they come onstream in 2011 Saudi Aramco still needs to secure additional outlets. This, as mentioned earlier, will make the Saudi state energy firm focus greater attention on purchasing Asian downstream equity.

FIGURE 7. SAUDI ARAMCO’S EXPORT AVAILABILITY



Source: Author’s estimate

As for the quality of exported crude oil from Saudi Arabia, it is difficult to achieve a firm forecast as each field's depletion data is not available. It is, however, strongly expected that the average quality of Saudi Aramco's exported crude will not significantly change in the next five years. The average quality of the company's *produced barrels* will become lighter toward 2009 but then heavier toward 2011 because of the significant additional Arabian Light production capacity expected by 2009 and additional Arabian Heavy capacity expected in 2011. The average quality of *exported barrels*, on the other hand, will not become heavier from the current level, as a large portion of the incrementally heavier oil will be processed within Saudi Aramco's own refining system.

III-3 Developing a Tight Relationship with Saudi Aramco

Saudi Aramco increasingly has become a key company in Japan's equation to secure a stable energy supply. The Japanese oil industry must cultivate a deeper business relationship with Saudi Aramco in order to enhance Japanese energy security and meet Japan's national interests. The issue then is how to establish that deeper relationship with the company.

The SWOT matrix provides a guide to the Japanese oil industry on how to approach Saudi Aramco. In particular, Japanese companies will have an opportunity in the downstream sector, where the company continues to show weakness. Japanese firms will have a relative competitiveness in providing downstream engineering and operational expertise, especially in processing heavier grades.

In addition, although it was not mentioned in the SWOT matrix, one area in which Japanese firms could strengthen ties with Saudi Aramco is in providing enhanced oil recovery (EOR) technological services. Until very recently, Saudi Aramco had not shown much interest in this area because it perceived that consuming nations would misunderstand and interpret the application of EOR as indicative of a production peak in the Saudi oil fields. In 2006, however, Saudi Aramco launched a steam injection project

with Chevron at the Wafra field in the Neutral Zone. As older fields approach their peak, Saudi Aramco might find EOR technology increasingly helpful. Several Japanese companies have established advanced expertise in this area, particularly in CO₂ injection, so their services might be the first step in developing favorable business partnerships with Saudi Aramco.

Japanese firms may find that forming a “Hinomaru alliance,” or a cross-industrial alliance between Japanese companies, will make their efforts more effective in securing deals with the Saudi state energy firm. One of the reasons to form such an alliance is that the size of a company is becoming a very important factor in conducting business with Saudi Aramco these days. The size of projects recently undertaken by Saudi Aramco tends to be substantial, requiring multi-billion dollars in initial investment, and the scope of these schemes tends to be wide-ranging. Compared to Western major players, Japanese firms are small in size and the capacity of each company to absorb related investment risk is limited. By forming an alliance, the Japanese partners can share investment risks and because each may bring different strengths to the table, the alliance members can offer multi-discipline services. In fact, as Table 5 shows, most of Saudi Aramco’s current partners are mega-companies, even in the downstream sector. This suggests that the size of the company and the size of the deal are becoming a more critical factor as competition among firms for doing business with Saudi Aramco has become fierce.

In this aspect, the Japanese government is able to play a major role in promoting alliance-building by providing an arena for such dialogue or other types of policy measures. Of course, the Japanese oil industry will undertake actual business development, but the government can play an important role in the process. South Korea has done very well in this aspect. The country’s state oil firm, the Korean National Oil Corporation (KNOC), led a “Hinomaru” alliance that was able to secure an upstream asset in Nigeria by offering a package deal that included non-energy infrastructure

investments.

Besides promotion of business development under the proposed “Hinomaru” alliance, a comprehensive approach toward Saudi Arabia will also greatly contribute to a closer business relationship between Japan and Saudi Arabia, another area in which government initiative and support are necessary. One option for such an approach will be to continue the current multi-layered efforts through state-supported organizations such as the Japan Petroleum Energy Center (JPEC), THE Japan External Trade Organization (JETRO), the Japan Cooperation Center for the Middle East (JCCME), and the Information Center for Petroleum Exploration & Production (ICEP). Another option is to “lock-in” a comprehensive economic relationship with Saudi Arabia through Japan’s Economic Planning Agency (EPA), or preferably a free trade agreement, if it is feasible.

CONCLUSION

Having reviewed Saudi Aramco’s strategies, it is clear that the company’s implementation of its corporate strategies is motivated by efforts to reinforce its strengths, overcome its weaknesses, take advantage of opportunities, and minimize the impact of threats. All of the observed strategies by Saudi Aramco have clear missions and targets and are well-developed, thanks to the state energy firm’s extensive expertise and experience in the oil and gas business. There is, therefore, no doubt that Saudi Aramco is and will continue to be a very reliable global oil supplier.

In fact, a stable and relatively cheap oil supply from Middle East, particularly from Saudi Arabia, has been a foundation for Japan’s miraculous economic recovery after its defeat in the Second World War. While Saudi Arabia has not been always the largest crude oil supplier during the entire post-war period, its role as a swing supplier did minimize the impact of past oil crises. In this sense, Saudi Arabia has been the most important oil supplier for Japan, just as it has been to many other countries.

Within the current high oil price environment, concerns for future energy supply have

been mounting, and Japan is now revisiting the concept of energy security. There is no doubt that supply-source diversification is a fundamental principle of energy supply security. It is, however, also true that such a supply source diversification can be economically and geologically difficult to pursue. Given the geological distribution of world oil reserves and the geographical distance between Japan and Saudi Arabia, Japan's heavy reliance on Saudi Arabian oil will never be diminished. Japan needs to redesign and implement its energy strategies in such ways that will fortify the economic and political relationships with Saudi Arabia and its core oil company, Saudi Aramco.

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