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APEC Oil and Gas Security Studies

Impact of Low Oil Price on Energy Security

Energy Working Group

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Foreword

During the 11th APEC Energy Ministers' Meeting (EMM11) held in Beijing, China on 2nd September 2014, the Ministers issued instructions to the Energy Working Group (EWG). This includes an instruction to Asia Pacific Energy Research Centre (APERC) to continue its cooperation on emergency response so as to improve the capacity building in oil and gas emergency response in APEC region.

Following this instruction, APERC has started implementing the Oil and Gas Security Initiative (OGSI) in November 2014. One of the three overarching pillars of the OGSI is the publication of the Oil and Gas Security Studies (OGSS).

The OGSS serves as a useful publication to APEC economies by having access to developments and issues on oil and gas security, and information on individual economy's policies related to oil and gas security including responses to emergency situation. The research studies included in OGSS will help encourage the APEC economies to review and revisit their respective policies, plans, programmes and measures on oil and gas security, and may probably help them adopt appropriate approaches to handling possible supply shortage or supply emergencies in the future.

I would like to thank the contributors to the OGSS for the time they have spent doing research works. May I however highlight that the independent research project contents herein reflect only the respective authors' view and not necessarily APERC's and might change in the future depending on unexpected external events or changes in the oil and gas and policy agendas of particular economies or countries.

I do hope that the OGSS will serve its purpose especially to the policy makers in APEC in addressing the oil and gas security issues in the region.

Takato OJIMI
President
Asia Pacific Energy Research Centre

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Executive Summary

Although oil-consuming countries are reaping certain benefits from the long-running slump in the price of oil, it is delivering a major blow to oil-producing countries where oil revenue forms the basis of national finances, and to international oil majors. To counter the impact of the low oil price, oil-producing countries are looking to secure revenue by drawing down the assets of their sovereign wealth funds (SWFs), holding initial-public offerings (IPOs) of state-owned corporations, borrowing money from banks, issuing government bonds and introducing new tax regimes. At the same time, they are also taking measures to rein in expenditures, including abolishing subsidies and trimming state-owned companies' workforces, and reducing their operating costs through organizational reforms. International oil majors are meanwhile seeking to turn their businesses around by reviewing their asset holdings ("selection and concentration" through asset sales and mergers), reducing their operating costs and curtailing or postponing capital investment.

Nevertheless, there is a danger these measures will become a "double-edged sword" in the future. For oil-producing countries, drawing down SWFs and borrowing money from banks are unlikely to be appropriate long-term measures, and the sudden, excess burden being placed on their citizens brings to mind the Jasmine Revolution seen in the past. For oil-producing countries and international oil majors, reducing capital expenditure hinders the maintenance and expansion of their future oil-producing capacity.

In 2016, a trend began to emerge among Organization of the Petroleum Exporting Countries (OPEC) and non-OPEC countries (Russia, Mexico, Oman, Azerbaijan, Kazakhstan, Malaysia, Equatorial Guinea, Bahrain, South Sudan, Sudan and Brunei) of implementing coordinated production cuts. On the occasion of the OPEC's 171st Meeting it was decided to implement coordinated production cuts for a six-month period. However, even though an organization was set up to monitor this, a monitoring method has not been established. Furthermore, it is unclear what will happen to US shale oil, the chief factor driving the decline in oil prices, in the future. Consequently the outlook for oil prices and market conditions is unclear.

Against this backdrop, there is a possibility that the sluggish appetite for investing in oil development could continue into the future. There are concerns that failing to continue to invest on an ongoing basis will trigger supply shortfalls for a certain period of time in the medium- to long-term through the natural decline of oil fields and annual growth in petroleum demand.

Accordingly, oil-consuming countries may need to make provisions for supply interruptions that may result from this underinvestment in oil exploration and production. To that end, they may need to consider introducing or enhance national and private-sector oil stockpiles, and establish oil-sharing systems with neighbouring countries. They may also need to consider options to increase energy diversification so that their economies' not overly reliant on oil. The actions taken to increase energy

diversification will depend on each country's circumstances but it will be essential to avoid over-dependence on a single type of energy. Lastly, promoting energy conservation, in other words curbing energy consumption itself, will also be an important measure. Up to now, energy conservation has involved calling on consumers to conserve their energy use and/or supporting manufacturers of equipment and devices to improve energy consumption efficiency. In the transportation sector, which accounts for approximately 60% of the world's entire oil consumption, it must not be forgotten that promoting energy conservation through urban planning and the establishment of Mass Rapid Transit (MRT) systems will also generate substantial reductions.

Introduction

1. Background to the Survey

Last year's survey ("The Effect of the Crude Oil Price drop on the Global Energy Market: http://aperc.ieej.or.jp/file/2016/10/12/The_Effect_of_the_Crude_Oil_Price_Drop_on_the_Global_Energy_Market.pdf) was undertaken to examine the impacts the decline in oil prices that began from the middle of 2014 will have on "macroeconomic indicators" and "the supply and demand environment in the energy markets." More specifically, it sought to decipher the sort of future that specialized energy institutions and energy specialists are envisaging in regard to that standpoint, based on the medium- to long-term outlooks they are issuing and via interviews with them.

Although there was subsequently a sense of expectation that oil prices would recover, a palpable recovery remains a long way off, and in the end the global oil-based energy market has descended into a chaotic state. There was even a period during which WTI and Brent fell below US$30/bbl from January to February 2016.

2. Purposes of the Survey

In this year's survey the following points of view will be analyzed on the basis of the longer-than-envisaged low oil price environment.

· What is the extent of the economic/financial harm that oil-producing countries and international oil majors are suffering as a result of the long-running oil price slump?

· What sort of problematic issues are the economic/financial losses causing?

· What sort of response measures are they implementing in order to resolve those issues?

· Is there a possibility those measures will have an effect on the world's energy markets, and if so, what sort of effect?

Specifically, the survey looks at oil-producing countries Saudi Arabia, Iran and the United Arab Emirates (UAE) (particularly the Emirate of Abu Dhabi), and international oil majors BP, Royal Dutch Shell and ExxonMobil. It seeks to sort through their situations and consolidate the latest information and knowledge with regard to how they are attempting to overcome the oil price slump and what sort of impacts their moves will conceivably have on the world's energy markets, on the basis of documents released by specialist organizations, research organizations and other entities domestically and overseas, as well as opinion exchanges.

By way of this consolidation, analysis is carried out that will contribute to the formation of energy policies and the preparation of strategies for the energy industry in the Asia-Pacific Economic Cooperation (APEC) region, along with presenting potential indications of the Asia Pacific Energy Research Centre's (APERC's) long-term energy supply and demand forecasts.

Chapter 1 Political and Economic Situations of Major Oil Producers in Recent Years

1-1 Saudi Arabia 1-1-1 Political Situation and Responses

Crude oil prices started declining in the middle of 2014 and took an even clearer downward turn after the Organization of Petroleum Exporting Countries (OPEC) failed to agree on production cutbacks at its meeting in late November 2014. On 23 January 2015, shortly after that OPEC meeting, King Abdullah bin Abdulaziz Al Saud passed away, and Crown Prince Salman bin Abdulaziz Al Saud, his 79-year-old half-brother, assumed the throne as the seventh king. This prompted significant changes in the political regime of Saudi Arabia. Since these changes in the political regime are strongly related to Saudi Arabia's subsequent energy policy, the key points are outlined below.

(1) As Crown Prince Salman bin Abdulaziz Al Saud assumed the throne, Deputy Crown Prince Muqrin bin Abdulaziz Al Saud, 69, became the new Crown Prince. On the same day, Interior Minister Mohammad bin Naif bin Abdulaziz Al Saud, 55, became Deputy Crown Prince.

(2) On 29 January 2015, King Salman announced a list of Cabinet ministers, with key ministers, including Oil Minister Ali bin Ibrahim Al Naimi, retaining their previous posts. Meanwhile, Mohammad bin Salman Al Saud, the 29-year-old son of King Salman, was appointed as new defense minister. On the same day, King Salman dissolved many government advisory councils, including the National Security Council, the Supreme Council for Petroleum and Minerals, the Supreme Economic Council, and the Supreme Council for Islamic Affairs, while creating the Council of Political and Security Affairs and the Council of Economic and Development Affairs, thereby consolidating the existing councils and committees into two new councils. Interior Minister Muhammad bin Naif was appointed to chair the Council of Political and Security Affairs, while Defense Minister Mohammad bin Salman was named to head the Council of Economic and Development Affairs.

(3) On 29 April 2015, King Salman issued a royal decree to dismiss Crown Prince Muqrin, appointing Deputy Crown Prince and Interior Minister Muhammad bin Naif as Crown Prince, and Defense Minister Mohammad bin Salman, the King's son, as Deputy Crown Prince. The decree also named Khalid A. Al Falih, chief executive officer (CEO) of state oil company Saudi Arabian Oil Co. (better known as Saudi Aramco), as health minister and replaced many Cabinet ministers. Oil Minister Ali Al-Naimi was retained but resigned from the post of Saudi Aramco chairman, and Health Minister Khalid A. Al Falih took over as Saudi Aramco chairman.

(4) On 1 May 2015, in place of the already dissolved Supreme Council for Petroleum and Minerals, a new 10-member Supreme Council for Saudi Aramco was created to oversee Saudi

Aramco's operations, chaired by Deputy Crown Prince and Defense Minister Mohammad bin Salman. This severed Saudi Aramco from the Ministry of Petroleum and Mineral Resources, significantly restricting the powers of Oil Minister Ali Al-Naimi.

(5) On 16 September 2015, Saudi Aramco's acting CEO Amin H. Nasser was promoted to the post of CEO.

(6) On 7 May 2016, King Salman issued a royal decree for a sweeping restructuring of government ministries. The Ministry of Petroleum and Mineral Resources was reorganized into the Ministry of Energy, Industry and Mineral Resources, and given jurisdiction over electric power and industry, and Oil Minister Ali Al-Naimi was dismissed. Health Minister Khalid A. Al Falih was appointed as new Minister of Energy, Industry and Mineral Resources.

Through the abovementioned series of organizational reforms and ministerial appointments, Deputy Crown Prince Mohammad bin Salman became deeply involved in Saudi Arabia's energy policy. The Deputy Crown Prince announced a range of new policies after assuming the post. The next section will examine these policies in detail.

[Subsidies/Taxation]

The government decided to reduce energy and water subsidies for wealthy citizens, and also introduce a value-added tax (VAT) and impose taxes on unhealthy products, such as tobacco and sugar-containing beverages.[1]

[IPO of Saudi Aramco]

The government announced a plan to turn Saudi Aramco into a joint stock corporation and sell less than 5% of shares issued in an initial public offering (IPO). The plan will result in the emergence of the world's largest listed company. The IPO will take place in 2017 if all goes smoothly, and in 2018 at the latest, for the listing of Saudi Aramco shares on the stock exchanges at home and overseas.[2]

[Saudi Arabia's Stance at the Meeting of OPEC and Non-OPEC Oil Producers]

There is the potential for political confrontation due to religious differences between Saudi Arabia, where the majority of the population are Sunnis, and Iran, where the majority of the population are Shia, despite both being Islamic countries. After Saudi Arabia executed four Shiites along with the perpetrators of a series of terrorist attacks on 2 January 2016, the Saudi Arabian Embassy and a consulate in Iran were attacked on the following day, prompting Saudi Arabia to announce the severance of diplomatic relations with Iran.

[1] *Khaleej Times*, 25 November 2015
[2] *Bloomberg*, 1 April 2016

Against this backdrop, as suspicions about Iran's nuclear weapons development were cleared and the sanctions against Tehran were lifted in late January, there was an easing of the balance of supply and demand of crude oil in light of the possibility of Iran being able to produce and sell more crude oil, and Saudi Arabia apparently wanting to avoid a further decline in the already sluggish crude oil prices. Thus, Saudi Arabia discussed the idea of "freezing the upper limit of crude oil production at the actual January level" with other relevant countries in order to restrain Iran's increased production.

Thus, at the meeting of OPEC members and non-OPEC oil producing countries in Qatar on 17 April 2016, Saudi Arabia persisted in its hardline stance, which effectively targeted Iran, of "maintaining the production level only when major oil producing-countries, including Iran, join the freeze on crude oil output. In the event that any country decides to raise production, Saudi Arabia will reject outright any demands to do so."[3] This caused Iran to be absent from the Qatar meeting, resulting in no progress in talks on oil production.

However, at an extraordinary OPEC meeting held in Algiers on 28 September 2016, Saudi Arabia, which had persistently refused to accept production cutbacks by OPEC alone to improve the supply-demand balance, agreed to a coordinated output cut by the 14 OPEC members to 32.5-33 million b/d.[4] Market participants believe that Saudi Arabia was forced to accept a change in its policy to help support crude oil prices as the protracted sluggishness of oil prices would inevitably lead to revenue falls. However, instead of OPEC taking steps to cut production alone, OPEC continued to urge non-OPEC oil producers to reduce production in coordination with OPEC, paving the way for an OPEC meeting at the end of November.

[Joint Refinery Construction Plan by Saudi Aramco and SABIC]

The relationship between Saudi Aramco and Saudi Basic Industries Corp. (SABIC) has been improving, and both companies are considering joint construction of a refinery with a capacity of 400,000b/d in Yanbu.[5]

[Economic Reform Vision 2030]

Saudi Arabia needs to overcome its dependence on oil revenue and must develop investment income as a new source of revenue. By 2020, Saudi Arabia will turn itself into a country that can survive even without crude oil.[6] As an interim goal to realize Vision 2030, the Cabinet approved specific goals that are to be achieved by 2020. In addition to an increase in non-oil revenue, a reduction in compensation

[3] *Bloomberg*, 1 April 2016
[4] *Reuters*, 28 September 2016
[5] *Saudi Gazette*, 4 April 2016
[6] *Reuters*, 25 April 2016

for employees in the public sector, and a higher ratio of public debt to gross domestic production (GDP), the goals for the energy sector include the maintenance of a crude oil production capacity of 12.5 million b/d, boosting of the oil refining capacity, an increase in the ratio of renewable energy to total power generation, and an increase in the ratio of power output with strategic partners.[7]

Deputy Crown Prince Mohammad bin Salman, in a little over one year after he assumed that post in late April 2015, announced these plans, exercising his authority over oil policy as part of the promotion of economic policy measures.

In pushing ahead with his oil policy, Deputy Crown Prince Mohammad bin Salman changed Saudi Arabia's basic stance of decoupling its commercial policy from its politics, which the kingdom had maintained for several decades. At the talks among major oil producers on the freeze on increased production, held in Qatar on 17 April 2016, Saudi Arabia did not consent to the freeze because of Iran's refusal to participate, creating a situation in which the political confrontation within the region would impact the oil market. Furthermore, this ended Saudi Arabia's previous line of thinking that "oil policy and foreign policy should be separate," which former Oil Minister Ali Al-Naimi had maintained for the past 20 years. However, it is said to be Deputy Crown Prince Mohammad bin Salman who has instructed this departure from the hardline stance towards one that is more cooperative, in light of the prolonged slump in crude oil prices.

In Saudi Arabia, Deputy Crown Prince Mohammad bin Salman's appointment and his assumption of a number of important positions as well as the dismissal of Oil Minister Ali Al-Naimi and the appointment of new Minister of Energy, Industry and Mineral Resources Khalid A. Al Falih are evidence of the concentration of power within the Saudi royal family. After former Oil Minister Ali Al-Naimi's departure from the frontlines, the presence of Deputy Crown Prince Mohammad bin Salman and his significant political power, is becoming increasingly important.

1-1-2 Economic Situation and Responses

Declining crude oil prices have directly hit Saudi Arabia. Saudi Arabia unveiled its 2016 state budget on 28 December 2015. Government expenditures totalled US$224 billion against revenues of US$137 billion leaving a deficit budget for two consecutive years.[8] After the kingdom recorded a deficit of US$18 billion in 2014, the fiscal deficit expanded to US$98 billion in 2015 and 2016 saw a budget deficit of US$87 billion.[9]

That being the case, how is Saudi Arabia trying to balance its budget? The Saudi Arabian Ministry of Finance provided the explanation in late 2014 that the deficit would be covered by reserve funds

[7] *JIME News Report*, 7 June 2016
[8] *Platt's*, 30 December 2015
[9] *Gulf Times*, 6 January 2016

held by the Saudi Arabian Monetary Agency (SAMA).[10] Let us look at changes in the reserve funds of SAMA. Comparison of the country-by-country balance of funds as announced by the Sovereign Wealth Fund Institute between the end of March 2015 and the end of March 2016 shows that

SAMA's reserve funds dwindled from US$757.2 billion to US$598.4 billion in the aforementioned period, a decline of US$158.8 billion roughly matching the sum of the actual fiscal deficit for 2015 and the estimated deficit in the 2016 budget.

The Ministry of Finance's announcement of the planned drawdown in late 2014 drew comments from analysts of other countries to the effect that "if crude oil prices stay stagnant, SAMA's reserve funds would be exhausted in less than a decade." The Saudi Arabian government initially expected that crude oil prices would not remain sluggish for long, reasoning that because of the high drilling costs of shale oil, if oil prices were to drop to a certain level, crude oil production in the United States would decrease, thus balancing supply and demand. However, the decline in U.S. crude oil production was limited. Furthermore, as discussed earlier, since the demise of Saudi Arabian King Abdullah bin Abdulaziz Al Saud in early 2015, Saudi Arabia has established a new regime, alongside which it has formulated a host of new economic policies.

(1) Reduction in Subsidies

According to investment company Jadwa Investment, energy-related subsidies disbursed by Saudi Arabia in 2015 are estimated to have amounted to US$61 billion. In December 2015, therefore, the Saudi Arabian government raised prices of gasoline, gas oil, crude oil, ethane, natural gas, heavy fuel oil, and electric power by nearly 80%. Jadwa Investment says that Saudi Arabia can save up to some US$7 billion annually in subsidies by the price hikes of gasoline, gas oil, natural gas, heavy fuel oil and propane.[11]

The Saudi Arabian government also announced by royal decree on 26 September 2016 a 20% cut in compensation for Cabinet ministers, a 15% cut in compensation for members of advisory councils and a temporary suspension of allowances for high government officials.[12]

(2) New Taxes

While the initial plan was to impose a 100% tax on tobacco, because of its adverse health effects, tobacco prices were actually increased by 20% from the previous prices in March 2016.[13] The price hikes were designed for the double effect of cutting treatment costs by reducing the amount of harm

[10] *Gulf Times*, 25 December 2014
[11] *Gulf Times*, 6 January 2016
[12] *JIME News Report*, 27 September 2016
[13] *Arab News*, 13 March 2016

caused by smoking, in light of the fact that Saudi Arabia expends massive subsidies on medical expenses.

In addition, the government is considering the introduction of a VAT. Deputy Crown Prince Mohammad bin Salman unveiled a plan to introduce a VAT either at the end of 2016 or in 2017.[14] However, there are potential problems with the introduction of a VAT. Unless consultations are first held among the member states the Gulf Cooperation Council (GCC) on the timing of the introduction and products subject to VAT, some countries could end up introducing a VAT later than others and thus certain products could be purchased in other countries where they are not yet subject to VAT. The GCC countries' consultations over these matters are still ongoing. The Samba Financial Group estimates that based on its own sales data, the introduction of a VAT at a rate of 5% could raise additional revenue of SAR35 billion or some US$9.3 billion which would be roughly equivalent to 1.2% of GDP in 2018.[15]

(3) IPO of Saudi Aramco

On 8 January 2016, Deputy Crown Prince Mohammad bin Salman mentioned the possibility of Saudi Aramco's IPO for the first time.[16] In April 2016, it was disclosed that J.P. Morgan Chase & Co. and Michael Klein were selected as IPO advisers, and on 25 April 2016, the Saudi Arabian government officially announced the IPO of Saudi Aramco as part of Vision 2030, the country's comprehensive economic reform program.[17] As for the method of listing, it was made known that the government was considering cross listing, sole listing on the U.S. market, or the establishment of a fund that invests only in Saudi Aramco, similar to funds investing in gold or oil.[18]

The IPO is set to be carried out in two stages. The current plan calls for an offering of up to 5% of Saudi Aramco shares for sale, to be followed by the consideration of the listing of oil refining and petrochemical companies operated as joint ventures between Saudi Aramco and oil majors. The listing will come in 2017-2018 if everything goes smoothly.[19]

The government estimates Saudi Aramco's market capitalization through the IPO to be US$2,000 billion and plans for the Public Investment Fund (PIF) to hold government assets, including Saudi Aramco shares, in an effort to make PIF one of the world's largest funds, with assets close to US$3,000 billion.[20] PIF is reportedly designed to invest funds acquired through the share listings in revenue-

[14] *Economist*, 6 January 2016
[15] *Arab News*, 31 January 2016
[16] *Bloomberg*, 8 January 2016
[17] *Nihon Keizai Shimbun*, 25 April 2016
[18] *Bloomberg*, 22 April 2016
[19] *Toyo Keizai*, 28 May 2016
[20] *Harbor Business Online*, 1 May 2016

generating growth sectors and proactively invest financial assets, thereby improving the country's fiscal balance while lowering its dependence on oil revenues. On 14 October 2016, SoftBank Group Corp. announced that it will establish a new fund, SoftBank Vision Fund, with a potential size of up to US$100 billion jointly with PIF to invest mainly in the technology sector, concluding a memorandum of understanding (MOU) with PIF to make the fund one of the largest in the world in that sector.[21]

Going forward, the problem is whether Saudi Aramco's IPO can be managed by the domestic securities exchange alone. If it cannot, a listing in Western markets must be considered, in which case rigorous disclosure of information is required. The hurdles to be cleared are said to be high, such as whether the flows of funds from Saudi Aramco to the national treasury and the Saudi Rotal family can be fully disclosed and whether such disclosure can be kept from provoking dissatisfaction among the public or backlash against the Saudi Royal family.

(4) Post-Petroleum Policy (Vision 2030)

In a cabinet meeting on 25 April 2016, the Saudi Arabian government approved Vision 2030, an economic reform program through 2030 prepared by the Council of Economic and Development Affairs. The reform plan underscores Saudi Arabia's intended departure from having a petroleum-dependent economy and the building of a state based on investment income.

As the means to achieve these objectives, the following measures were announced:

i. With the proceeds of the IPO of state-owned oil company Saudi Aramco as the seed money, increase the assets of PIF from SAR600billion (US$160 billion) to over SAR7,000 billion (US$2,000 billion). The corporate value of Saudi Aramco is estimated at over US$2,000 billion in view of the crude oil reserves it owns. The plan also calls for the listing of companies under the aegis of Saudi Aramco and other publicly-owned companies;
ii. Improve transparency through privatization and curbing corruption; iii. Increase the ratio of domestic procurement of military equipment to 50% by developing the domestic military industry; and
iv. Aim to promote women's participation in the workforce, and introduce within five years the green card system to enable foreigners to work and stay in the country on a long-term basis.

Figure 1 Goals by 2030 under the Vision 2030

A Vibrant Society	With Strong Roots	To increase our capacity to welcome Umrah visitors from 8 million to 30 million every year
		To more than double the number of Saudi heritage sites registered with UNESCO ※Four sites as of 2016

[21] *JIME News Report*, 14 October 2016

	With Fulfilling Lives	To increase household spending on cultural and entertainment activities inside the Kingdom from the current level of 2.9% to 6%
		To increase the ratio of individuals exercising at least once a week from 13% of population to 40%
		To have three Saudi cities be recognized in the top-ranked 100 cities in the world
	With Strong Foundations	To raise our position from 26 to 10 in the Social Capital index
		To increase the average life expectancy from 74 years to 80 years
A Thriving	Rewarding Opportunities	To raise our global ranking in the Logistics Performance Index (LPI) from 49 to 25 and ensure the Kingdom is a regional leader
Economy		To raise the share of non-oil exports in non-oil GDP from 16% to 50%
	Investing for the Long-term	To move from our current position as the 19th largest economy in the world into the top 15
		To increase the Saudization of oil and gas sectors from 40% to 75%
		To increase the assets of PIF from SAR600 billion (US$160 billion) to over SAR7,000 billion (US$2,000 billion)
	Open for Business	To rise from our current position of 25 to the top 10 countries on the Global Competitiveness Index (GCI)
		To increase foreign direct investment from 3.8% to the international level of 5.7% of GDP
		To increase the private sector's contribution from 40% to 65% of GDP
	Leveraging its Unique Position	To lower the rate of unemployment from 11.6% to 7%
		To increase SME contribution to GDP from 20% to 35%
		To increase women's participation in the workforce from 22% to 30%
An Ambitious Nation	Effectively Governed	To increase non-oil government revenue from SAR163 billion to SAR1,000 billion (some US$270 billion)
		To raise our ranking in the Government Effectiveness Index (WGI) from 80 to 20
		To raise our ranking on the E-Government Survey Index (EGDI) from our current position of 36 to be among the top five nations
	Responsibly Enabled	To increase household savings from 6% to 10% of total household income
		To raise the non-profit sector's contribution to GDP from less than 1% to 5%
		To rally 1,000,000 volunteers per year (compared to 11,000 now)

Source: Excerpt from the official website of Vision 2030

1-2 Iran 1-2-1 Political Situation and Reponses (1) Suspicions of Developing Nuclear Weapons

Under President Mahmoud Ahmadinejad who took office in August 2005, the international community pointed to the risk of Iran having the capacity and facilities to manufacture nuclear weapons. In June 2012, the United States enforced the act on Iranian crude oil sanctions measures, and in the following month, the European Union (EU) invoked an embargo on Iranian crude oil. In August 2013, President Mahmoud Ahmadinejad completed his second and last term in office after serving a total of eight years, and was succeeded by President Hassan Rouhani, a moderate cleric. President Rouhani proceeded to hold consultations on the nuclear issue with the International Atomic Energy Agency (IAEA) and six advanced industrial nations. As a result of these talks, it was decided in January 2014 to allow Iran to receive US$4.2 billion in oil revenue, the remittance of which had been suspended, in installments from February to July.[22]

Subsequently, Iran continued talks with the IAEA and the six Western nations. A tentative agreement was reached in Lausanne, Switzerland, in April 2015, and on 14 July 2015, an agreement was reached on the Joint Comprehensive Plan of Action (JCPOA), under which Iran would strive to clear suspicions about its nuclear development program and the six Western nations would lift part of their sanctions against Iran. Then, following the nuclear deal agreed to between Iran and the six Western nations on 18 October 2015, the Iranian nuclear agreement was implemented on 16 January 2016. The EU lifted economic sanctions against Iran, while the United States also substantially eased its sanctions on the country.[23]

(2) Reconciliation and Tension with Saudi Arabia

On 3 March 2014, Abdulrahman bin Gharman Al-Shihri, Saudi Arabia's new ambassador to Iran, presented his credentials to President Rouhani, who said that Iran and Saudi Arabia would be key to the stability of the Middle East.[24]

However, on 2 January 2016, following Saudi Arabia's execution of prominent Shiite cleric Nimr al-Nimr, the Saudi Arabian Embassy in Tehran and a Saudi Arabian consulate in the Iranian city of Mashhad were attacked by angry protesters. That night, in response to the attack on its embassy and consulate, Saudi Arabia announced the severance of diplomatic relations with Iran and ordered the Iranian diplomatic corps in Saudi Arabia to leave the country "within 48 hours."[25]

In other areas of Iran-Saudi Arabia relations, it was reported that Saudi Arabia was restricting the use of the Suez-Mediterranean pipeline, a joint venture between Saudi Arabia and Egypt operated by

[22] *BBC*, 12 January 2014
[23] *Reuters*, 16 January 2016
[24] *IRNA*, 4 March 2014
[25] *CNN*, 2 January 2016

Arab Petroleum Pipelines Company, for the transport of Iranian crude oil.[26] Iran and Saudi Arabia also clashed in 2016 over the Hajj, the pilgrimage to Mecca by Muslims. The two sides could not reach agreement on the places to issue visas for pilgrims, means to transport pilgrims and measures to ensure their safety (safety measures in the wake of an incident in which more than 700 pilgrims were crushed to death in a stampede in Mina, Saudi Arabia, in September 2015). Subsequently, on 29 May 2016, Iranian Culture Minister Ali Jannati announced the prohibition of Iranians from traveling to Saudi Arabia for the Hajj pilgrimage and from traveling to a third country to obtain Saudi Arabian visas. Saudi Arabia criticized this decision by the Iranian government.

As illustrated above, diplomatic and economic relations between Iran and Saudi Arabia remain strained as of the end of December 2016.

(3) Iran's Relations with Russia

Since June 2012, Russia and Iran have been holding talks on an oil-for-goods agreement. Such an agreement would allow Iran to export its crude oil via the Caspian Sea and import metals and other industrial goods as well as foods. The size of the swap arrangement is estimated to be US$20 billion (up to 500,000b/d of crude oil).[27] However, rather than receiving the crude oil itself, Russia is believed to be intent on finding markets for Iranian crude oil and diverting payments for Iranian oil to pay for Russian products to be exported to Iran.[28] However, an oil-for-goods agreement between the two countries seems to have never been concluded as Iran and the major Western nations subsequently agreed on the JCPOA.

In other areas of the bilateral relations, in November 2014, Russia's State Atomic Energy Corporation, Rosatom, announced that it will build up to eight nuclear power plants in Iran,[29] and in September 2016, decided to construct two 1,057MW plants. Construction work is set to start in 2016, with total construction costs of some US$8.5 billion over a construction period of 10 years.[30]

(4) Revival of the Management and Planning Organization

On 27 December 2014, President Rouhani decided to re-establish the Management and Planning Organization (MPO), which was dissolved and incorporated into the Office of the President under former President Ahmadinejad. The key function of the MPO is the preparation of a government budget plan, and the MPO also oversees the execution of development budgets. Following President

[26] *Reuters*, 4 April 2016
[27] *Reuters*, 2 April 2014
[28] *PIW*, 15 June 2015
[29] *Reuters*, 18 November 2014
[30] *AP*, 10 September 2016

Rouhani's announcement, the planning and strategic supervision office and the management and human resources development office within the Office of the President were merged into the MPO.

(5) Elections of the Islamic Consultative Assembly and the Assembly of Experts

In February 2015, the Ministry of the Interior announced that the elections of the Islamic Consultative Assembly and the Assembly of Experts would be held on the same day, with the candidate dates of the simultaneous elections being 26 February 2016 or 4 March 2016. The Guardian Council of the Constitution subsequently announced that the elections would be held on 26 February 2016.[31]

Acceptance of candidacies began in December 2015. Over 12,000 people filed their candidacies to run in the Islamic Consultative Assembly, or parliament known as *Majlis*, of whom a total of 6,229 candidates were officially approved to run. Of the 795 people who filed for candidacy in the election of the Assembly of Experts, known as *mujtahids*, 161 candidates were determined qualified to run.[32] The Ministry of the Interior gave the total number of eligible voters as 54,915,024.

The 10th parliamentary election and the fifth Assembly of Experts election were held on 26 February 2016.

The results of the Assembly of Experts election were announced on 29 February 2016. For the 88-member assembly, 30 candidates on the lists of the Two Societies (conservatives), 18 candidates on the List of Hope (moderates/reformists), 33 candidates recommended by both conservatives and moderates/reformists, and 7 independents (revolutionary fundamentalists), were elected. Of the successful candidates, former President Akbar Hashemi Rafsanjani garnered the overwhelming number of votes.[33]

In the election of the Islamic Consultative Assembly, a candidate is not reinstated unless he or she collects at least 1/4 of the aggregate votes in a constituency. In the first voting on 26 February, winners of 221 seats of the 290-member assembly were determined, with the remaining 69 seats left to be filled in the runoff election held on 29 April 2016. After the runoff election, supporters of the government of President Rouhani won a total of 121 seats, followed by 83 seats for principalists critical of the government, 81 seats for independents, and 5 seats for religious minorities. Though the government supporters could not gain a majority, they still managed to form the largest bloc in the 10th parliament.[34] While President Rouhani did not have a solid support base in the pre-election ninth parliament dominated by principalists, the camp of government supporters made strong gains in the latest election as moderates among the principalists turned around to support the Rouhani government.

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[31] *IRNA*, 18 February 2015
[32] *IRIB*, 16 February 2016, and *IRNA*, 10 February 2016
[33] *JIME News Report*, 29 February 2016
[34] *JIME News Report*, 2 May 2016

On the other hand, the hardline conservatives among the principalists who were skeptical about the JCPOA nuclear deal lost many seats in the election.

In the election of the chairman of the fifth Assembly of Experts on 24 May 2016, hardline conservative Ahmad Jannati was chosen. Former President Rafsanjani, a supporter of the Rouhani government, was reinstated upon collecting the largest number of votes, but failed to get elected as chairman. The Iranian regime leadership seemingly exercised a good sense of balance to seek an "equilibrium" among the various political forces within the regime amid the fluid "post-sanction" conditions.[35]

1-2-2 Economic Situation and Responses (1) Factors behind the Falling Oil Revenue

According to OPEC statistics released in June 2016, Iran's oil export revenues steadily declined from US$114.75 billion in 2011 to US$101.47 billion in 2012, to US$61.92 billion in 2013, to US$53.65 billion in 2014, and to US$27.31 billion in 2015. The declines in oil revenues are said to stem from a combination of quantitative factors resulting from Western embargoes on Iranian crude oil since the second half of 2012 and price factors traced to the sharp falls in crude oil prices since mid-2014.

In light of such economic developments, Iran took the following economic measures:

(2) Hike in the Value-Added Tax (VAT)

Iran took a variety of measures in response to declining revenues. The first of them relates to the country's VAT. Iran's VAT already stood at 6% as of 2013, and the Iranian parliament approved a bill to raise the VAT to 8% from February 2014.[36]

(3) Reduction in Subsidies

[Abolition of Fuel Subsidy]

On 25 April 2014, National Iranian Oil Products Distribution Company (NIOPDC) raised gasoline and other fuel prices across the board. This raised rationed gasoline prices from IRR4,000 (about US$0.17) to IRR7,000 (about US$0.30).[37] Cheap domestic fuel prices were being funded by subsidies, and on 24 June 2014, Oil Minister Bijan Zanganeh noted that "fuel subsidies have reached US$80 billion, an amount that poses a threat to the Iranian economy," raising an alarm over the existing subsidy structure.[38] Finally in May 2015, Oil Minister Rostam Ghasemi announced that the government was suspending the rationing of gasoline for integration with general sales. This abolished

[35] *JIME News Report*, 24 May 2016
[36] *ISNA*, 2 February 2014
[37] *Aftabnews*, 22 April 2014
[38] *IRNA*, 24 June 2014

the rationed gasoline price of IRR7,000 and gasoline prices were unified with general sales prices of IRR10,000 (about US$0.43). Prices of premium gasoline were uniformly set at IRR12,000 and prices of diesel oil at IRR3,000.[39]

In addition to fuel oil for automobiles, prices of natural gas for household use were also raised on 27 May 2015. As a result, natural gas prices came to IRR1,500 per cubic meter in the summer between April and October and to IRR960 per cubic meter in the winter.[40]

[Review of the Cash Benefit Scheme]

On 17 February 2015, the MPO announced that the government would abolish subsidization for the wealthy population who did not need cash benefits under the cash benefit scheme introduced in 2010, revealing also that payments of cash benefits to residents overseas had been already suspended.[41] The Iranian government stated that as of August 2015, cash benefits would be suspended for 2 million people.[42]

In addition, the Iranian parliament decided to reduce the number of cash benefit recipients by a further 24 million by the Iranian calendar year of 1395 (after late March 2016). More specifically, it was decided that cash benefits to households in the upper 30% portion of the population in terms of income would be suspended.[43]

(4) Preparation and Implementation of the Sixth Five-Year Development Plan

On 30 June 2015, Supreme Leader of the Islamic Revolution Ayatollah Seyyed Ali Hosseini Khamenei, in a letter addressed to President Rouhani, instructed on the general policies of the sixth five-year development plan. The general policies comprised 80 provisions in areas such as the economy, information and communication technology, society, defense and security, foreign policy, judiciary, culture, innovation, and science technology. The development plan is based on the three pillars of the "development of a resistance economy," "progress in science and technology," and "the promotion of cultural excellence," prepared in light of the realities at home and abroad.[44] In line with the general policies, the Rouhani government intends to aim for economic growth of 8% for 2016, and plans to put its efforts into the introduction of foreign capital into such key areas as petrochemicals

[39] *ISNA*, 24 May 2015
[40] *IRINN*, 26 May 2015
[41] *ISNA*, 17 February 2015
[42] *BBC Persian*, 24 August 2015
[43] *Tehran Times*, 28 July 2016
[44] *Iran Japanese Radio*, 1 July 2015

and automobiles. The oil production target under the sixth five-year development plan has been set at 4.7 million b/d.[45]

(5) Promotion of Foreign Capital Introduction for Oil and Natural Gas Development

Iran has thus far developed its crude oil and natural gas resources in line with buyback contracts. In February 2014, however, the Oil Ministry official responsible for the review of oil development contracts, Mehdi Hosseini, chairman of the Oil Contract Restructuring Committee (adviser to Oil Minister Zanganeh), unveiled a plan to introduce a new, more attractive contract, Iran Petroleum Contract (IPC), to secure US$150 billion in investment required by Iran's energy sector over the next five years.[46] According to the general outline of the IPC unveiled so far, the cost recovery period is set at five to seven years and compensation will be paid in accordance with the degree of difficulty in development. Thus higher compensation is to be paid out for higher-risk development, development of offshore oil and natural gas fields, and oil and natural gas fields located along the border that have a common structure with those of neighboring countries. Under the IPC, changes in development master plans, which were not allowed in the previous buyback contracts, can be made through annual consultations between the Iranian government and development companies at the Joint Management Committee.[47]

The announcement of the IPC was initially set for 3 November 2014, but was postponed several times until the embargoes were lifted in connection with negotiations on the nuclear development issue. Domestically, a dispute arose with the group led by Supreme Leader Ayatollah Khamenei, which prizes Islamic ideology. This group believed that unlike the previous buyback contract, Iran's initiative had been eroded under the IPC. Consequently, the round of tenders prioritizing South Azadegan, South Pars and Farzad oil and natural gas fields, initially set for July 2016, had to be postponed.[48] Thus, on 12 June 2016, Oil Minister Zanganeh told international oil companies participating in tenders that "National Iranian Oil Company (NIOC) has no intention to dilute the IPC too much." In addition, Oil Minister Zanganeh appointed Ali Kardor, deputy director of investment and financing, as the new managing director of NIOC, in a move to accelerate the conclusion of concession development contracts under the IPC. His predecessor, Rokneddin Javadi, was appointed as deputy oil minister supervising hydrocarbon resources.[49]

Even after that, while the Cabinet and NIOC sought to conclude development contracts under the IPC as early as possible, a group of 43 parliamentarians, from the group against the IPC, filed a petition

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[45] *IRNA*, 20 February 2016

[46] *Platt's Oilgram News*,11 February 2014

[47] *PIW*, 28 April 2014

[48] *Platt's Oilgram News*, 30 September 2015, 28 June 2016 and 12 July 2016. The postponement of tenders continued in February, September and November 2015, and in February 2016.

[49] *MEES*, 17 June 2016

for the abolition of the IPC on 17 August 2016. Finally, in September 2016, the IPC bill passed through parliament, allowing the government to conclude IPC-based development contracts.

Since the lifting of Western sanctions in January 2016, Iran has been proactively introducing foreign capital for development of existing oil and natural gas fields, together with rounds of international tenders scheduled in the future.

Figure 2 Oil and Natural Gas Development Projects Contracted with Foreign Capital after the Lifting of the Western Sanctions

Iran	Foreign Capital	Date of conclusion (2016)	Details
NIOC	Russia (Lukoil)	25 Jan	Conclusion of a crude oil exploration contract worth US$6 million (shouldered by Lukoil) in Khuzestan Province
NIOC	France (Total)	24 Mar	Conclusion of MOU for Azadegan oil field development
Government	Indian government	09 Apr	Conclusion of MOU for Farzad-B concession development
NIOC	France (Wintershall)	12 Apr	Conclusion of MOU for evaluation work on four oil fields in the western region
Razavi	Italy (Saipem)	12 Apr	Conclusion of MOU for development of Northeastern natural gas fields (60Bcm)
NIGEC	Italy (Enel)	12 Apr	Conclusion of MOU for prioritized joint projects for natural gas, LNG and gas facilities
NIOC	Austria (OMV)	05 May	Conclusion of MOU for evaluation and development of oil and natural gas fields in the western region
NIOC	China (CNPC)	17 May	Conclusion of a buyback contract for North Azadegan oil field development Phase-2
NIOC	China (Sinopec)	17 May	Conclusion of a buyback contract for Yadavaran oil field development Phase-2
Petropars	Italy (Stinnes)	11 Jun	Conclusion of MOU for oil and natural gas field development in the Pars-3 region
NIOC	U.K. (BP)	11 Jun	Consultations on joint research into increased output from aging oil fields
NIOC	Russia (Zarubezhneft)	12 Jul	Conclusion of MOU for enhanced oil recovery (EOR) development research for the onshore West Paydar oil field in the western region

NIOC	Indonesia (Pertamina)	08 Aug	Conclusion of MOU for research into Mansouri-Bangestan, Ab-Teymour oil fields
NIOC	Russia (Transneft)	08 Oct	Conclusion of MOU for jointly carrying out feasibility study (FS) for Dehloran oil field development
NIOC	France (Total)	07 Nov	Conclusion of a contract for South Pars natural gas concession development
NIOC	Norway (DNO)	11 Nov	Conclusion of MOU for Changuleh oil field development
NIOC	India (ONGC Videsh)	Under negotiation	Contract for Farzad B natural gas field development (set to be concluded in early 2017)
NIOC	Thailand (PTTEP)	05 Dec	Conclusion of MOU for preliminary survey on Changuleh, Balal, and Dalamperi oil fields
NIOC	U.K., Netherlands (R/D Shell)	07 Dec	Conclusion of MOU for survey on three oil fields, including Azadegan and Yadavaran

Source: MEES, 15 July 2016 and information from various media organizations

In the energy sector, other than oil and natural gas field development projects, Iran (which is short on foreign currency) is undertaking many projects with the hope of attracting foreign funds and technology. This is in order to achieve the goals announced by President Rouhani on 17 January 2016, shortly before the lifting of the Western sanctions (a call for foreign investment of US$30-50 billion a year for an annual GDP growth of 8%).

Figure 3 Major Projects Planned or in Progress with Foreign Capital in Areas Other than Oil and Natural Gas Development

Business Area	Partner Economy	Details	Source of Information
Refinery construction	Spain	Consultations on joint construction of a new refinery in the Bay of Gibraltar	*Iran Daily*, 18 January 2016
Trade promotion	China	US$600 billion of trade over 10 years	*Asahi Shimbun*, 23 January 2016
Pipeline	Oman	Plan for construction of pipeline for importing natural gas	*Trade Arabia*, 24 January 2016
Refinery modernization	Korea	Consultations on modernization of the Isfahan refinery	*Shana*, 31 January 2016
Refinery construction	Ecuador	Consultations on support for refinery construction in Ecuador	*Shana*, 1 February 2016

Investment agreement	Japan	Conclusion of an agreement on Japanese investment in Iran	Ministry of Foreign Affairs website, 6 February 2016
Refinery interests	India	Consultations on investment in the Vadinar refinery	*PIW*, 8 February 2016
Petrochemical project	Germany (BASF)	Consultations on construction of a petrochemical plant in Iran	*Trade Arabia*, 14 February 2016
Refinery construction	Ghana	Consideration of joint construction of a new refinery in Ghana	*Fars News*, 15 February 2016
Petrochemical project	Denmark (Haldor)	Construction of the Chabahar methanol plant (equipment licensing, implementation management, etc.)	*MEES*, 9 December 2016
Infrastructure	Germany (Siemens)	Agreement on modernization of energy infrastructure	*Trade Arabia*, 2 March 2016
Refinery modernization	China	Consultations on modernization of the Abadan refinery, MOU conclusion (lending of US$1.7 billion)	*Fars News*, 27 March 2016 *MEES*, 20 May 2016
Petrochemical project	France (Total)	Consultations on construction of a petrochemical plant in Iran	*Press TV*, 9 April 2016
GTL project	South Africa (PetroSA)	Agreement on cooperation in the GTL project	*Press TV*, 24 April 2016
Refinery construction	Korea (Daewoo)	Agreement on construction of the Jask refinery (300,000b/d)	*MEES*, 20 May 2016
Refinery construction	(Tender)	Tender plan for construction of the Siraf refinery	*Iran Daily*, 8 June 2016
Refinery modernization	Korea (SK)	Conclusion of MOU for FS on renovation of the Tabriz refinery	*MEES*, 10 June, 2016
Refinery construction	Korea (Daewoo)	Conclusion of MOU for construction of the Hormuz refinery	*MEES*, 10 June 2016
Petrochemical project	Switzerland	Consultations on construction of a joint venture petrochemical plant in Iran	*IRNA*, 12 June 2016
Petrochemical refinery construction	Korean consortium	Construction of a US$1.5 billion refinery in Khuzestan Province	*Farsnews*, 2 August 2016
Coal-fired power generation	Russia (Rostec)	A 1.4GW (US$1.12 billion) power plant in Bandar Abbas	*PEI*, 3 August 2016
Investment in refinery	Italy (Eni)	Investment in the Shiraz Pars refinery (under negotiation)	*Iran Daily*, 29 August 2016

Petrochemical project	Germany (Linde)	Construction of the Assaluyeh olefin plant	*MEES*, 9 December 2016
Refinery modernization	China (Sinopec)	Receipt of an order for renovation of the Abadan refinery (US$1.2 billion)	*MEES*, 16 September 2016
Petrochemical project	U.K., Netherlands (Shell)	Conclusion of MOU for petrochemical project cooperation with NPC	*Reuters*, 9 October 2016
Petrochemical project	Japan (Sojitz)	FS on construction of a plant to produce propylene from methanol	*MEES*, 9 December 2016

Source: Prepared based on information from various media organizations

(6) Reduction in Budgetary Allocation to the National Development Fund

Iran allocates part of its oil export revenues each year to the National Development Fund (NDF) as a source of funding for domestic development projects. In the government budget for the Iranian calendar year of 1394 (roughly equivalent to 2015), 30% of oil export revenues was allocated to the NDF, but the percentage was lowered to 20% under the budget for the Iranian calendar year of 1395.[50]

(7) Reduction in the Deposit Rate

On 20 June 2016, the Central Bank of Iran (CBI) announced that the Money and Credit Council had reduced the deposit interest rate from 18% to 15%. The CBI declared that lower rates may be set for time deposits of less than one year.[51]

(8) Production and Exports of Crude Oil after the Lifting of Western Sanctions

The Western embargoes on Iranian crude oil were lifted in the wake of the nuclear agreement of 16 January 2016. Following this, Iran's crude oil production has been increasing each month from the level of 2.91 million b/d as of the end of 2015. Oil Minister Zanganeh is aiming for the return to the pre-embargo crude oil production level (the average output for 2011 stood at 3.6 million b/d) as early as possible, and has set the production target at a level that reflects an add-on of Iran's market share to the subsequent increased production by OPEC.

From this perspective, Iran's crude oil output reached 3.6 million b/d in May 2016. Going forward, Iran is aiming to add its market share to the level of OPEC's increased output.

On the other hand, as it is difficult to recapture the export markets lost to other suppliers during the embargoes, Iran is trying to boost its exports by setting the prices for crude oil that are of the same grades as Saudi Arabian crude at levels lower than equivalent Saudi Arabian prices, and promoting

[50] *Tehran Times*, 2 July 2016
[51] *BBC*, 20 June 2016

package deals for participation in construction of refineries in other countries that import Iranian crude oil. Iran also began exporting crude oil to an independent Chinese oil-refining company (a so-called "teapot refinery") through global crude oil dealers in July 2016.

Figure 4 Production and Exports of Crude Oil by Iran

Month or Year	Production (b/d)	Crude Oil Exports
2011 average	3.6 million	
2015 average	2.86	
January 2016	3.0	Concluded the first long-term contract since the lifting of the embargoes with Greece
February	3.2	Europe-bound export contracts topped 300,000b/d. The first shipment of 4 million barrels
March	3.26	Started exporting natural gas from Iran to Iraq
April	3.56	Iran announced that exports topped 2 million b/d, 30% of which was to Europe
May	3.6	Exported LPG (liquefied petroleum gas) to Kenya, Tanzania and South Africa
June	3.62	Exports of petrochemical products rose 30% following the lifting of the embargoes
July	3.63	Shell resumed imports of Iranian crude oil. Began exporting crude oil to an independent Chinese refining company. Iran announced exports reached 2.1 million b/d (still down 250,000b/d from the pre-embargo level)
August	3.64	
September	3.7	
October	3.72	* Export figures released by NIOC. Exported 1 million barrels to Hungary
November	3.72	

Source: IEA, Monthly Oil Market Report for production, various journals for exports

Iran, which has been steadily increasing production and exports of crude oil since the lift of embargoes, is on course for collision with OPEC members, such as Saudi Arabia, and non-OPEC oil producers, who are struggling to overcome sluggish crude oil prices. In February 2016, countries such as Russia and Saudi Arabia urged other oil-producing countries to cut their production by a uniform 5% and freeze output at the January 2016 levels to help push up oil prices. Iran, however, which saw the embargoes against its oil lifted only in January 2016, opposed this approach because it would not allow the country to recoup the market share that it had lost during the embargoes. Moreover, Iran did

not participate in a meeting of 18 OPEC and non-OPEC oil producers held in Doha, Qatar, on 17 April 2016, and consequently, the meeting failed to agree on the freeze on increases in output to keep the production levels unchanged. At the OPEC meeting held in June 2016, Iran objected to the setting of a new OPEC production target and called for discussions on production quotas for each member, arguing that Iran, based on historical production levels, is entitled to produce crude oil equivalent to 14.5% of OPEC's entire production. Thus, the June OPEC meeting did not see progress in discussions on production levels. As oil prices have remained stagnant since then, at an official OPEC meeting held in Algiers on 28 September 2016, Iran, for the first time, agreed to the freeze on production increases by OPEC as a whole, and the OPEC members agreed to discuss details of the freeze (country-by-country production quotas) at the meeting in late November 2016.

1-3 United Arab Emirates (UAE) 1-3-1 Political Situation and Reponses

The United Arab Emirates (UAE) was founded as a federation of seven emirates in the early 1970s. The UAE's highest decision-making body is the Federal Supreme Council (FSC), made up of the emirs of the seven emirates. Since any decision requires the consent of five emirates, which must include Abu Dhabi and Dubai among them, it can be said that the Emirate of Abu Dhabi and the Emirate of Dubai form the core of the UAE.

Currently, the President of the UAE is Emir Khalifa bin Zayed Al Nahyan of the Emirate of Abu Dhabi, while Emir Mohammed bin Rashid Al Maktoum of the Emirate of Dubai is serving concurrently as the Vice President and Prime Minister. However, President Khalifa has not been seen in public since he underwent an emergency operation for stroke in January 2014. Under the circumstances, the practical management of the UAE government is being taken care of by Vice President Mohammed, Emir of the Emirate of Dubai, and Deputy Prime Ministers Saif and Mansour, both of whom are brothers of President Khalifa. Meanwhile, Abu Dhabi Crown Prince Mohammed bin Zayed Al Nahyan, another brother of the President and Emir Khalifa of Abu Dhabi, is taking care of the administrative affairs of the Emirate of Abu Dhabi.

Regarding the UAE's energy resources, the Emirate of Abu Dhabi accounts for over 90% of reserves and production of crude oil and natural gas. Similar to the situation in Saudi Arabia, which saw the demise of King Abdullah, UAE President Khalifa fell into poor health just as crude oil prices started declining sharply. Therefore, as was the case in the section on Saudi Arabia, below is a summary of the major political developments in the UAE since 2014, focusing particularly on changes in the political regime that appear to be strongly relevant to the energy policy of the Emirate of Abu Dhabi.

(1) The Energy Authority Established within the Abu Dhabi Executive Council

Under a decree of the Abu Dhabi Emir issued in the name of Emir Khalifa on 16 March 2014, the Energy Authority was established within the Abu Dhabi Executive Council (ADEC), chaired by

Crown Prince Mohammed. Since there are a number of energy-related organizations in the Emirate of Abu Dhabi, including Abu Dhabi National Oil Company (ADNOC), Abu Dhabi National Energy Company (TAQA), Mubadala Development Company and International Petroleum Investment Company (IPIC), the purpose of the establishment of the Energy Authority is said to be to play the roles of developing harmonized energy policies for the Emirate of Abu Dhabi and coordinating efficient investments among these energy-related organizations.

Nasser Ahmad Al Sowaidi was appointed as chairman of the newly created Energy Authority. Sowaidi also served as a board member of Mubadala Development headed by Crown Prince Mohammed, and previously served as chairman of the National Bank of Abu Dhabi, as a board member of IPIC and as a board member of ADNOC responsible for sales and finance.

(2) Change in the Governor of the Central Bank of the UAE

Under a federal law promulgated in the name of President Khalifa on 22 September 2014, the Board of Directors of the Central Bank of the United Arab Emirates was restructured and a new governor was appointed. Governor Sultan bin Nasser Al Sowaidi resigned, and Mubarak Rashid Al Mansouri took over as the new governor. Mansouri previously served as chief executive officer (CEO) of the Emirates Investment Authority, the UAE's only sovereign wealth fund, and also as CEO of the Abu Dhabi Securities Exchange.

(3) Change in the Managing Director of IPIC

Under a decree of the Abu Dhabi Emir issued in the name of Emir Khalifa on 22 April 2015, the board of IPIC was reshuffled. IPIC Managing Director Khalid Al Qubaisi resigned, and Suhail Mohammed Faraj Al Mazroui, UAE minister of energy, took over as new managing director. Mazroui served as ADNOC chairman until November 1994, and as deputy chief executive of Mubadala Petroleum, the petroleum and natural gas division of Mubadala Development Company, until March 2013.

(4) Reorganization of the UAE Federal Government and the Inauguration of the New Cabinet

On 8 February 2016, UAE Prime Minister Mohammed appointed eight new cabinet ministers, including five women, in moves designed to cut the number of government ministries and appoint new ministers capable of reform and management of dynamic strategic portfolios. Minister of Energy Suhail Mohamed Faraj Al Mazroui was retained.

(5) Reshuffling of the Abu Dhabi Executive Council

Under a decree of the Abu Dhabi Emir issued in the name of Emir Khalifa on 15 February 2016, the Abu Dhabi Executive Council (ADEC) was reshuffled for the first time since March 2014. In the

reshuffle, three members left the council, while four members were newly appointed. The three returning members were Hamad Muhammad Hurr Al Sowaidi, head of the Department of Finance, Nasser Ahmad Al Sowaidi, chairman of the Energy Authority, and Amal Abdullah Al Qubaisi, chairman of the Abu Dhabi Council for Economic Development.

The resignation of these three members, all of whom were involved in the energy and economic sectors, was seen as personnel changes designed to turn around the slumping energy sector and Abu Dhabi's finances, which had been hit by declining oil prices.[52]

Riyad Abdulrahman Al Mubarak was appointed as the new head of the Department of Finance, and Sheikh Abdulla bin Mohamed Al Hamed as new chairman of the Energy Authority. Ali Rashid Al Noaimi was newly named as director general of the Abu Dhabi Education Council and Adaidha Murshed Al Marar as chairman of the Department of Municipal Affairs and Transport.

(6) Change in the Director General of ADNOC

Under a decree of the Abu Dhabi Emir issued in the name of Emir Khalifa also on 15 February 2016, the new director general of ADNOC was appointed. Minister of State Sultan Ahmad Al Jabir was named as new ADNOC director general, succeeding Abdullah Nasser Al Sowaidi. Jabir concurrently serves as chairman of Abu Dhabi Future Energy (Masdar) and CEO of Mubadala Energy Co.

(7) Reshuffling of the Supreme Petroleum Council

Under a decree of the Abu Dhabi Emir issued in the name of Emir Khalifa on 29 March 2016, the Supreme Petroleum Council (SPC) was reshuffled to follow the above-described restructuring and personnel changes. While the 5 members left, the reorganization saw the appointment of 10 new members to the SPC, highlighting the introduction of a new generation of rising technocrats.

[52] *JIME News Report*, 16 February 2016

Figure 5 Composition of the Supreme Petroleum Council Members

SPE Post	Name	Other Key Titles
Chairman	Sheikh Khalifa bin Zayed Al Nahyan	Abu Dhabi Emir
Deputy Chairman	Sheikh Mohammed bin Zayed Al Nahyan	Abu Dhabi Crown Prince
Member (New)	Sheikh Hazza bin Zayed Al Nahyan	National Security Advisor, ADEC Vice President
Member	Sheikh Mansour bin Zayed Al Nahyan	UAE Deputy Prime Minister

Member	Sheikh Hamed bin Zayed Al Nahyan	Chairman of the Abu Dhabi Crown Prince's Court
Member	Sheikh Mohammed bin Khalifa bin Zayed Al Nahyan	ADEC member
Member (New)	Sheikh Dhiyab bin Mohamed bin Zayed Al Nahyan	Second son of the Crown Price
Member (New)	Suhail Mohammed Faraj Al Mazroui	UAE Minister of Energy
Secretary-General (New)	Hamad Mubarak Al Shamsi	Chief of the State Security, lieutenant general
Member (New)	Sultan Ahmad Al Jaber	Minister of State and concurrently ADNOC Director General
Member (New)	Ahmed Mubarak Al Mazroui	ADEC Secretary-General
Member (New)	Khaldoon Khalifa Al Mubarak	Chairman of the Abu Dhabi Executive Affairs Authority, Mubadala Development CEO
Member (New)	Riyad Abdulrahman Al Mubarak	Head of the Department of Finance of Abu Dhabi
Member (New)	Sheikh Abdullah bin Mohammed Al Hamed	Chairman of the Energy Authority of Abu Dhabi
Member	Abdullah Nasser Al Sowaidi	Former ADNOC Director General
Member (New)	Suhail Fares Ghanem Al Mazroui	Board member of the Abu Dhabi Securities Exchange

Source: Prepared based on the official website of the Abu Dhabi Supreme Petroleum Council and various journals

Aside from the reorganization and personnel changes in the UAE federation, it can be construed that the reorganization and personnel changes that would have an impact on the oil industry of the Emirate of Abu Dhabi, though they were made under decrees in the name of Emir Khalifa, strongly reflect the intentions of Crown Prince Mohammed. Among those newly appointed as SPC members, UAE Oil Minister Suhail Mohammed Faraj Al Mazroui, who became IPIC managing director, Minister of State Jaber, who became ADNOC director general and Chairman of the Abu Dhabi Executive Affairs Authority Khaldoon Khalifa Al Mubarak are regarded as close confidants of Crown Prince Mohammed as all of them have close ties with Mubadala. Through the personnel changes in recent years, the current lineup of the SPC members appears to allow Crown Prince Mohammed to wield a strong influence.

1-3-2 Economic Situation and Responses

The economic outlook for the UAE, released by the International Monetary Fund (IMF) in November 2014, stated that the UAE has recovered rapidly from the 2009 Dubai debt crisis triggered by the Global Financial Crisis of 2008 and the UAE economy, though still exposed to the threat of declining crude oil prices, is likely to post growth of over 4% in 2014. As evidence of the optimistic outlook, the Emirate of Dubai announced a surplus of US$1 billion in the 2015 budget, the first surplus since the debt crisis. While U.S. rating agency Standard & Poor's Corporation (S&P) downgraded Saudi Arabia, S&P kept the rating outlook for the Emirate of Abu Dhabi unchanged as "stable" as of February 2015.

(1) Reduction and Abolition of Subsidies

Despite this assessment, the IMF also pointed out in its estimates that the UAE could still reduce its fuel oil subsidy expenditures by AED6.8 billion (about US$1.85 billion) in 2015.[52] Therefore, the UAE and the Emirate of Abu Dhabi have considered the reduction or abolition of subsidies for fuel, electricity and water, and are taking various measures.

[Hikes of Electricity and Water Rates in the Emirate of Abu Dhabi]

In order to contain rapid growth of consumption and wastefulness, the Emirate of Abu Dhabi decided to raise electricity and water rates by 10-40% from 1 January 2015. However, the margins of the rate increase for UAE citizens were kept smaller than the hikes for foreigners.[53]

The Dubai Electricity and Water Authority (DEWA) of the Emirate of Dubai, which had already introduced a new price system incorporating fuel surcharges, announced that it would not reduce electricity and water rates in line with the decline in crude oil prices as Dubai depends on natural gas for 98% of its electric power generation.[54]

[Reduction and Abolition of Fuel Oil Subsidies in the UAE]

The first suggestion was made by UAE Minister of Energy Mazroui on 23 June 2014, before oil prices began declining. On 15 January 2015, the Dubai Supreme Council of Energy (DSCE) also proposed the review and gradual reduction of subsidized fuel oil prices, and submitted its written opinion to the UAE Ministry of Energy.

In response to these developments, the UAE started considering in earnest the reduction of fuel oil subsidies due to a protracted decline in oil prices, and announced in late July 2015 the full abolition

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[52] *The National*, 7 October 2015
[53] *WAM*, 13 November 2014
[54] *Khaleej Times*, 16 January 2015

of subsidies for gasoline and diesel oil as of 1 August 2015. The Emirate of Abu Dhabi is also considering abolishing the subsidization of natural gas for electricity and electric power generation.[55]

(2) Consideration of the Introduction of VAT and Corporation Tax

The UAE is considering the introduction of a VAT, as is the case in Saudi Arabia. The idea of introducing a VAT suddenly emerged among Gulf Cooperation Council (GCC) member states as a new source of revenue. The UAE is also considering the introduction of a corporation tax in tandem with introducing a VAT.[56]

The UAE Ministry of Finance announced in July 2015 that it had completed the preparation of bills for the introduction of a VAT and the corporation tax and was in consultation with the governments of the seven emirates and the UAE federal government. On 17 August 2015, it was reported that the UAE Ministry of Finance failed to reach final accord with the GCC countries in the coordination of tax rates and deductions, causing a delay in the announcement. The UAE Ministry of Finance now expects that a VAT will be introduced in 2018.[57]

In addition to the above, the Emirate of Abu Dhabi decided to impose a tax at a rate of at least 3% each year on rent paid by foreign residents in Abu Dhabi, with the Abu Dhabi Water & Electricity Authority charged with the collection of the tax. Abu Dhabi citizens are exempt from the tax on their rent.[58]

(3) Organizational Reform of ADNOC and Concern over Drop in Abu Dhabi's Crude Oil Production Capacity in the Future

New Director General Sultan Ahmad Al Jabir assumed his post at ADNOC in February 2016, and he notified organizations under the aegis of ADNOC of the organizational reform and the changes in executive officers on 12 May 2016, calling for a shift to a private enterprise-style corporate management structure with a focus on the supply chain as a means to weather the unfavorable business climate caused by declining oil prices in recent years.[59]

[Organizational Reform (1)]

i. Reduced the number of directorates organized in parallel from 10 to 7 through elimination and consolidation, broadly dividing them into business and administration directorates. The business directorates are:

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[55] *The National*, 24 January 2016
[56] *MEED*, 15-28 July 2015
[57] *The National*, 13 January 2016
[58] *The National*, 14 April 2016
[59] ADNOC circular notice, 12 May 2016

・Exploration, Development & Production Directorate, which was previously organized in a management structure by offshore, onshore and operating companies and now organized in a cross-sectional management structure by function and work;

・Sales & Marketing Directorate for crude oil, petroleum products and natural gas, including LNG;

・Refining & Petrochemicals Directorate, which has refineries, and petrochemical and fertilizer subsidiaries under its control; and

・Gas Management Directorate responsible for ga-producing companies.

The administrative directorates have been consolidated into:

・Business & Commercial Support Directorate in charge of health, safety and environment, crisis management, IT, and procurement;

・Human Capital & Administration Directorate responsible for personnel and general affairs; and

・Finance & Planning Directorate in charge of the finance, profit and loss management, and business planning, etc. of ADNOC.

Aside from the above, the following have been established as organizations under the direct control of the Director General:

・Executive Office

・Group Communication

・Internal Audit

・Legal & Compliance

[Personnel Changes at ADNOC and Affiliated Companies] ii. In addition, the appointments of executive officers of ADNOC and affiliated organizations were announced. Overall, the promotion of young executives of affiliated companies stood out.

・ED&P: Abdulmunim Al Kindy (Former ADCO CEO)

・S&M: Abdulla Salem Al dhaheri (Former ADNOC Distribution CEO)

・R&P: Abdulaziz Abdulla Al Hajri (Former Borouge CEO)

・Gas: Omar Suwaina Al Suwaidi (Former Strategy & Coordination Deputy Director)

・B&CS: Rashed Saud Al Shamsi (Former Petrochemical Director)

・HC&A: Mohammed Shelaiweih Al Qubaisi (Retained, former HR Director)

・F&P: Matar Hamdan Al Ameri (Retained, former Finance Director) The

new CEOs of important affiliated companies include:

・ADCO: Saif Ahmed Al Ghafli (Former Al Hosn Gas CEO)

・GASCO: Sal Sultan Al Nasseri (Former ADNOC Gas Director)

・Borouge: Ahmed Omar Abdulla (Former TAKREER COO)

・Al Hosn Gas: Mansour Mohammed Al Mehairibi (Former Senior Vice President)

・ ADMA-OPCO: Yasser Saeed Al Mazrouei (Former ADNOC Engineering Design and Procurement (ED&P) Deputy Director)

・Al Yahsat: Ali Khalifa Al Shamsi (Former ADNOC Strategy & Coordination Director)

[Organizational Reform (2)] iii. On 4 October 2016, ADNOC announced a merger by early 2018 of ADMA-OPCO and ZADCO, two offshore oil field operating companies, for cost reduction and enhanced efficiency of upstream production. The combined crude oil production of the two operating companies stood at 1.4 million b/d in early 2016.

Multiple international oil majors have invested in the two operating companies. ADNOC has stated that the merger will not change the rights of these holders to the oil field concessions, but added that it will continue the process of selecting oil majors that are to be granted the concessions in ADMA-OPCO when the existing concessions expire in 2018. The existing holders of the concessions in ZADCO (the concessions will expire in 2041) are ADNOC with 60%, ExxonMobil with 28%, and INPEX (JODCO) with 12%. The existing holders of the concessions in ADMA-OPCO (the concessions will expire in 2018) are ADNOC with 60%, BP with 14.67%, Total with 13.33%, and INPEX (JODCO) with 12%.[60]

The holders of the concessions in ADMA-OPCO need to pay close attention to developments related to the contract renewal going forward.

Separately, in line with the business restructuring policy of ADNOC, the consolidation of three companies engaged in the business of marine transportation and port service operations has also been announced. The three companies are Abu Dhabi National Tanker Company, Petroleum Services Company, and Abu Dhabi Petroleum Ports Operating Company, which are to be consolidated into a single company, whose name has yet to be decided, by the end of 2017. The three firms have a combined workforce of 4,000.[61]

ADNOC and affiliated companies, which have been undergoing a restructuring process and also appointed young executives, have set the goal of achieving the crude oil production capacity of 3.5 million b/d by the end of 2017. The following have been cited as potential problems related to that goal:

[Introduction of Foreign Capital for Expiring Oil Field Concessions]

Regarding the concessions in ADCO that expired in January 2014, ADNOC planned to proceed with oil field development by introducing the technologies and funds of foreign companies by opening up 40% of the expired concessions to foreign capital. As of the end of December 2016, however, the introduction of foreign capital has been decided for only 18% of the concessions. The Emirate of Abu

[60] *Platts Oilgram News*, 5 October 2016
[61] *The National*, 18 October 2016

Dhabi wants to introduce enhanced oil recovery (EOR) for its oil field development in combination with a carbon dioxide capture and storage scheme as a measure against global warming. To that end, the introduction of capital from foreign entities with technological expertise in these areas is indispensable. Thus, ADNOC is firmly set on introducing foreign capital for its oil field concessions.

Also waiting are the ADMA-OPCO concessions, whose period of validity will expire in 2018. In recent years, international oil majors' appetite for investment in the upstream sector has been weakening as the sluggishness of crude oil prices has tended to erode the value of their assets. They are also under pressure to select and concentrate investment targets in a way that ensures maximum profit with small amounts of investment. Consequently, if the period of relatively low oil prices continues to be drawn out, it will become increasingly difficult to attract international oil majors for the development of the upstream sector, which had been very attractive in the years of high oil prices. Some of the oil-producing countries in the Middle East and North Africa may be in for a difficult period in terms of the development of the upstream sector.

[Reductions in Operating Budgets and the Workforce]

In May 2015, the ADNOC ED&P deputy director announced that he had told companies under the aegis of ADNOC to cut their 2015 operating expenses by 10-15% from the preceding year so as to reduce costs in the face of falling crude oil prices. However, he assured that spending in research and development, and the number of employees would not be reduced. [62] By sticking to the abovementioned policy, ADNOC Director General Sultan Ahmad Al Jabir, who assumed the top post on 15 February 2016, also set the goal of trimming operating expenses to US$3-5/bbl in 2016.[63] Eventually, ADNOC decided to reduce the workforce by 5,000 workers by the end of 2016.[64]

It is difficult to achieve the crude oil production capacity goals while reducing operating expenses and employees. Coupled with difficulties in introducing foreign capital in the oil field concessions, the goal of achieving crude oil production of 3.5 million b/d by 2017 now appears to be very challenging.

(4) Concern over Delay in Abu Dhabi's Natural Gas Development in the Future

The Emirate of Abu Dhabi is pushing ahead with a number of sour gas development projects to accommodate the rapidly increasing domestic demand for natural gas. In the Shah sour gas field development project undertaken jointly with Occidental Petroleum, production commenced in January 2015 and reached the targeted 1 billion cf/d by the autumn of 2015. Abu Dhabi also planned to develop the Bab sour gas field jointly with Shell for the start of production in 2020. In January 2016, however,

[62] *The National*, 24 May 2015
[63] *PIW*, 2 May 2016
[64] *Trade Arabia*, 15 May 2016

Shell suddenly announced its withdrawal from the project.[65] The Shell withdrawal has put the Bab sour gas field development in limbo, making the planned production start date of 2020 extremely difficult.

The Emirate of Abu Dhabi has hurriedly arranged alternative means of importing LNG from overseas to meet domestic demand.[66]

At the same time as the forced change in the natural gas supply outlook, Minister of Energy Mazroui stated that the government has its sights set on increasing the renewable energy introduction goal for electric power generation by 2030 to 30%.[67]

(5) Consolidation of Proliferation of State-Owned Energy Firms and State-Owned Funds The Emirate of Abu Dhabi has too many entities involved in energy development.

[ADNOC]

ADNOC, founded in 1971, exercises control over the exploration, development, production, refining and sales of crude oil and natural gas in the Emirate of Abu Dhabi through its subsidiaries. The subsidiaries include TAKREER (an oil refinery company), ADCO (an onshore oil field operating company), ADMA-OPCO and ZADCO (offshore oil field operating companies), GASCO and ADGAS (oil and natural gas separation and refinement companies), FERTIL (a fertilizer company), and Borouge (a petrochemical company). In addition, ADNOC established ADNOC International, a 100% owned subsidiary, on 8 January 2016, in a move to enable it to participate in energy-related activities outside the Emirate of Abu Dhabi.

[IPIC]

IPIC, founded in 1984, has invested in energy companies around the world, including OMV and Borealis of Australia, Cepsa of Spain, and Cosmo Oil of Japan, and has assets estimated at US$68 billion as of the end of 2015. Not engaged in energy production activities, IPIC is a sovereign wealth fund for the primary purpose of asset management.

[Mubadala Development Company (Commonly Known as “Mubadala”)]

Mubadala was founded by Crown Prince Mohammed in 2002. Mubadala has a diversified business portfolio. It controls Mubadala Petroleum, which is engaged in crude oil and natural gas development and production overseas, Dolphin Energy, which imports natural gas from Qatar into the Emirate of Abu Dhabi via a pipeline, and Masdar, which is engaged in various renewal energy-related operations.

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[65] *The National*, 18 January 2016
[66] *MEES*, 6 May 2016
[67] *The National*, 20 January 2016

It also undertakes business in a host of other sectors, including aerospace, real estate, semiconductors, and health management. In addition, Mubadala is a sovereign wealth fund and has assets estimated at US$6.7 billion as of the end of 2015.

[Abu Dhabi National Energy Company (TAQA)]

TAQA, founded in 2005, is a state-owned company that invests in oil and natural gas development and production overseas, pipelines and natural gas storages, as well as power generation, water desalination and demineralization projects at home and abroad. TAQA has engaged in business activities in Canada, Ghana, India, Iraq, Morocco, the Netherlands, Oman, Saudi Arabia, the United Kingdom, and the United States. The company has said that it holds assets worth US$108.8 billion as of the end of 2015.

These state-owned companies and wealth funds, which hold huge assets, have seen operating deficits or their assets eroded by the slumping crude oil prices, and are therefore required to make more efficient investments. Against this background, IPIC and Mubadala were consolidated at the end of June 2016. There is also the possibility of a further consolidation of funds going forward.[68]

Short Summary

Figure 6 Response by each country

Countermeasure	Saudi Arabia	Iran	UAE
Reduction of subsidies	Fuel, Fringe benefit	Fuel, Cash benefit	Fuel, Water, Electricity
New taxation	Cigarette, VAT	Hike in VAT	Corporation Tax, VAT
Emission of states-owned assets	IPO	-	-
Post petroleum policy	Vision 2030	The 6th five year development plan	Solar power
Introduction of foreign investment	-	Oil & natural gas development	Oil & natural gas development
Organization reform & integration	Saudi Aramco	-	ADNOC group, SWF
Reduction in operating cost	-	NDF	ADNOC group

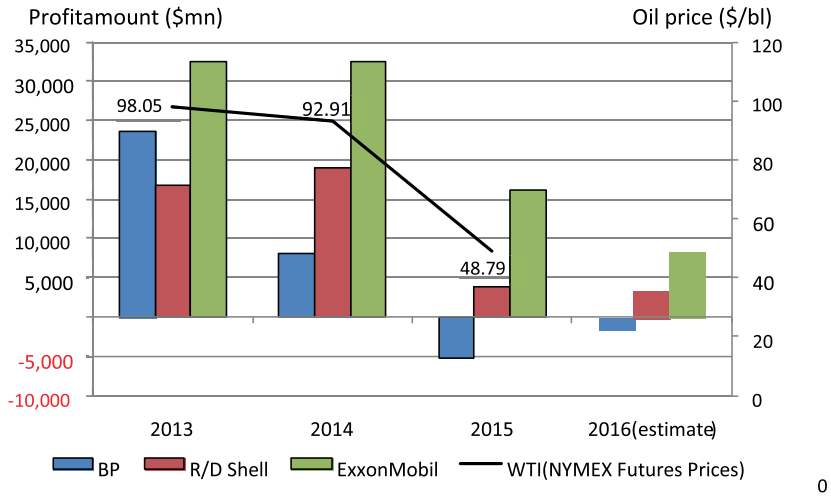
[68] *Petroleum Argus*, 1 July 2016

Chapter 2 The Economic and Business Situations of the Oil Majors in Recent Years

This chapter examines how the major oil companies of BP and Royal Dutch Shell of Europe, and ExxonMobil of the United States have reacted to their situations.

The decline in crude oil prices that began in mid-2014 had a massive impact on the profits of the oil majors, forcing each of them to post significantly lower bottom lines for fiscal 2015.

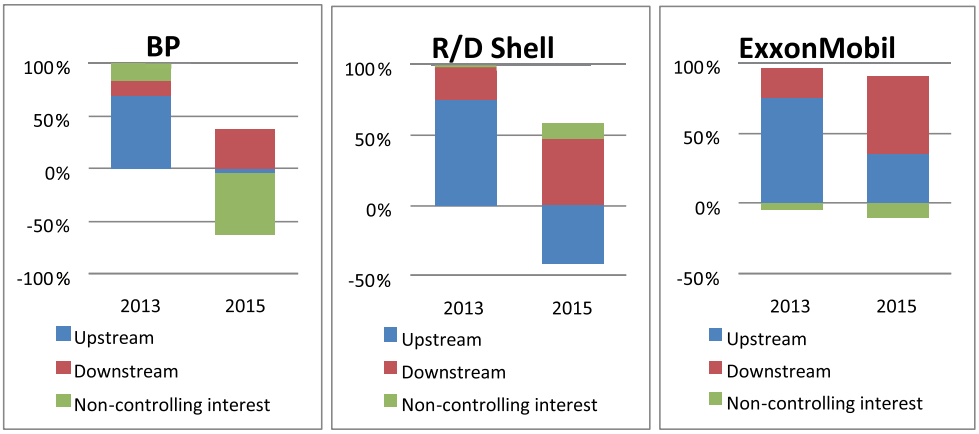
Figure 7 Change in bottom lines of the oil majors



Source: Earnings report of each company (results up to third quarter of FY2016 plus estimates) and other documents

The graphs below show the change in the breakdown of profits for each oil major. In 2013, before the decline in oil prices, the upstream sector generally accounted for a high percentage in each company, leaving them vulnerable to the impact of lower oil prices. However, when prices did fall, they reacted differently in terms of their revenue sources and management policy. This chapter examines the circumstances of each company.

Figure 8 Change in profit breakdown of each company



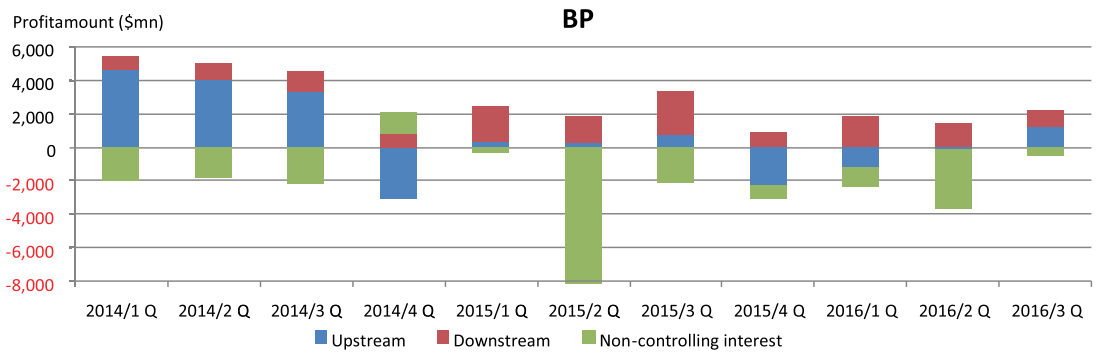
Source: Earnings report of each company and other documents

2-1 BP 2-1-1 Change in Earnings

The graph below shows the quarterly change in BP earnings from 2014, and indicates overall that as declining oil prices gradually ate into upstream profits, BP unsuccessfully tried to compensate those losses with the downstream sector.

The upstream write-down that became a large loss and the oil spill disaster in the Gulf of Mexico came to weigh particularly heavily on earnings as will be discussed later in this chapter.

Figure 9 Change in BP earnings



Source: BP earnings reports

Write-down of Upstream Assets

A direct impact of the decline of the price of oil is first a decrease in income from the sale of oil along with a write-down of upstream assets.

In BP's case, in addition to the amortization costs of cancelling projects in Brazil and the Gulf of Mexico in the fourth quarter of 2014, the large impairment charges due to the downward revision of the forecast price of oil were recorded as upstream losses, and then subsequently calculated as appropriate impairment charges.

The Gulf of Mexico Oil Spill

The oil spill caused by the BP drilling rig Deep Water Horizon in the Gulf of Mexico on 20 April 2010, occurred at a time of high oil prices when offshore oil fields were actively being developed around the world, including the Gulf of Mexico. The spill did massive long-term damage to the operations of BP, who operated and had a 65% share in the rig.

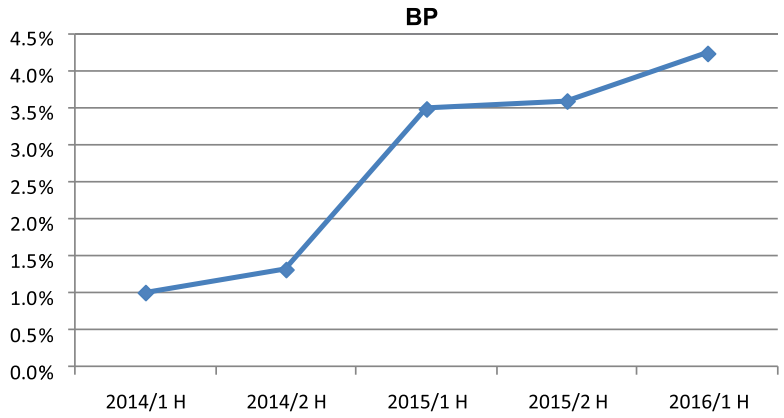
Even after posting US$40.9 billion in the fourth quarter of 2010 for the accident, BP fought damage lawsuits from multiple plaintiffs, but reached a settlement with the US federal government

and 400 other local governments in July 2015, and accounted for it in its earnings from the second quarter of 2015.[69]

2-1-2 Operational Response Improvement of Downstream Profits

The decline in oil prices naturally led to a decline in sales amount along with a deterioration in profit margins, but BP is working to try and improve its profitability and secure profits through efforts such as layoffs, improving refining costs in its fuels business and shifting to premium brands sales in its lubricants business.

Figure 10 Change in BP downstream profitability



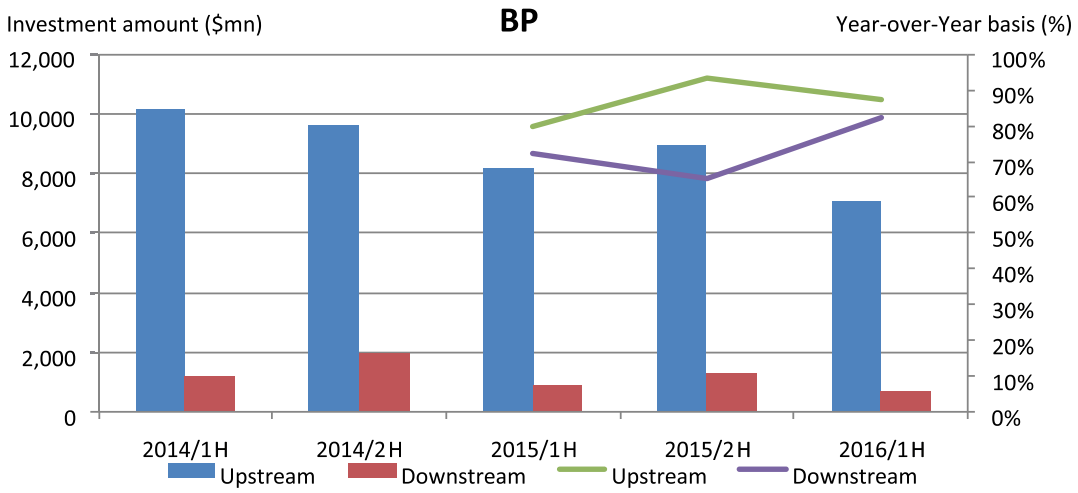
Source: BP earnings reports

Investments

As sales profits decline, even though it is restricting the absolute amount of investment, BP continues to make the minimum investments necessary for the future. While the bar graph in the figure below shows the absolute amount of investment and the line indicates the relative change from the previous year, BP is reducing year-on-year investment amounts for both upstream and downstream sectors.

[69] *Platts Oilgram News*, 7 July 2015

Figure 11 BP change in investments



Source: BP earnings reports

The table below shows current upstream investments and those awaiting decisions.

Figure 12 Main BP upstream investments (April 2015-end of June 2016)

Area	Description	Investment amount	Partner
West Nile Delta (Egypt)	Gas field development (natural gas: 144 billion m^3, condensates: 55 million bbl)	US$12 billion	RWE (Russia)
East Siberia	Comprehensive agreement for new joint venture to develop East Siberian resources	Over US$750 million	Rosneft
Throughout Egypt	Gas field development (natural gas: 31 million bbl, condensates: 15Tcf)	US$229 million	Pharaonic Petroleum Company (a joint venture of EGAS of Egypt and Eni of Italy)
Throughout China	Production sharing contract (PSC) for shale gas exploration, development and production	-	CNPC
Caspian Sea ACG drilling area (Azerbaijan)	Oil field development (crude oil: 644,000b/d, condensates: 55,000b/d)	US$378 million	Chevron, Statoil, Inpex, and others

Source: Corporate information materials

Figure 13 Main BP upstream investments awaiting decisions (as of the end of June 2016)

Project Name	Type	Economy
Mad Dog 2	Deepwater Oil	US
Thangguh Train 3	LNG	Indonesia
Khazzan Phase 3	Tight Gas	Oman
Angelin	LNG	Trinidad Tobago
Trinidad Compression	LNG	Trinidad Tobago
Snadd	Conventional Gas	Norway
India Gas Projects	Deepwater Gas	India
Platina (Block 18)	Deepwater Oil	Angola

Source: *Petroleum Argus*, 24 June 2016

As shown in the figure below, BP is seeking to create efficiency in its midstream and downstream sectors. The combining of Norway's upstream Det Norske and BP's operations has attracted attention as a promising new attempt to replace asset sales to date.[70]

Figure 14 Main BP mid to downstream investments (as of the end of September 2016)

Area	Description	Investment amount	Partner
Throughout China	"Framework agreement" that covers retailing ventures in China, and oil and LNG trading opportunities globally, including shale gas exploration	-	CNPC
Tangguh LNG	Expansion of processing capabilities to 3.8 million tons/year	US$8 billion	Multiple
Port Adelaide (South Australia)	Laying of pipeline, and upgraded oil supply and safety facilities	US$6.09 million	Flinders Port (South Australia port operator)
Throughout Norway	New initiative that combines upstream sector of external company with BP's operations	-	Det Norske
Throughout Australia	Comprehensive commission of retail site management	-	Cushman & Wakefield

Source: Corporate information materials

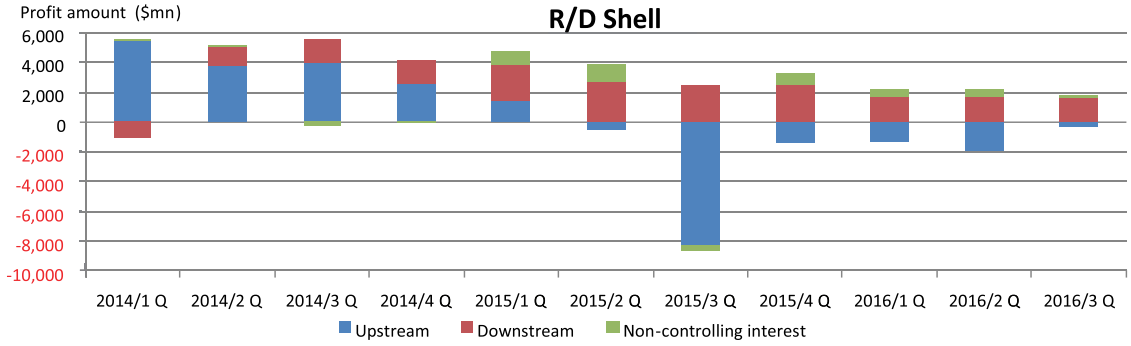
[70] *Petroleum Argus*, 17 June 2016

2-2 Royal Dutch Shell 2-2-1 Change in Earnings

In looking at the quarterly changes in Royal Dutch Shell earnings from 2014, although there is a similarity with BP in terms of using the downstream sector to try and recover upstream profits due to the decline in the price of oil, no other large expenses are apparent.

Like BP, the upstream write-down became a major loss and the major news of Shell's purchase of the BG Group had no major impact on its bottom line during this period, which will be discussed later in this chapter.

Figure 15 Change in Royal Dutch Shell earnings



Source: Royal Dutch Shell earnings reports

Write-down of Upstream Assets

In Shell's case, in addition to the amortization costs of canceling its oil sands operations in Alberta, Canada and scrapping drilling projects in Alaska in the third quarter of 2015, large impairment charges were incurred due to the downward revision of the forecast price of oil. These were recorded as upstream losses and then subsequently listed as appropriate impairment charges.[71]

Purchase of the BG Group

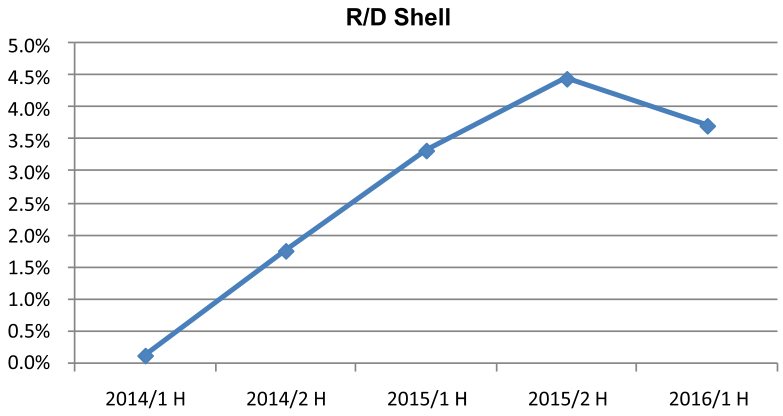
Mergers and acquisition (M&A) and buyouts are promising opportunities to create profitability while being forced to sell oil at low prices. In April 2015, Royal Dutch Shell acquired BG Group, which shook the industry. With the purchase, Shell would acquire Brazil's deepwater drilling assets and LNG assets in Australia that would strengthen its core business. To come up with the purported US$54 billion for the buyout, Shell is planning to sell up to US$30 billion in non-core upstream and downstream assets between 2016 and 2018.[72]

[71] *Bloomberg*, 28 October 2015
[72] *Reuters*, 29 August 2016

2-2-2 Operational Response Improvement of Downstream Profits

In addition to efforts such as downstream job cuts, Royal Dutch Shell is working to improve profitability and secure profits by strengthening the cooperative framework between France's Total, and its own refining and sales businesses, and through a strategic partnership with Russian state-controlled Gazprom that includes an exchange of assets.[73]

Figure 16 Change in Royal Dutch Shell downstream profitability



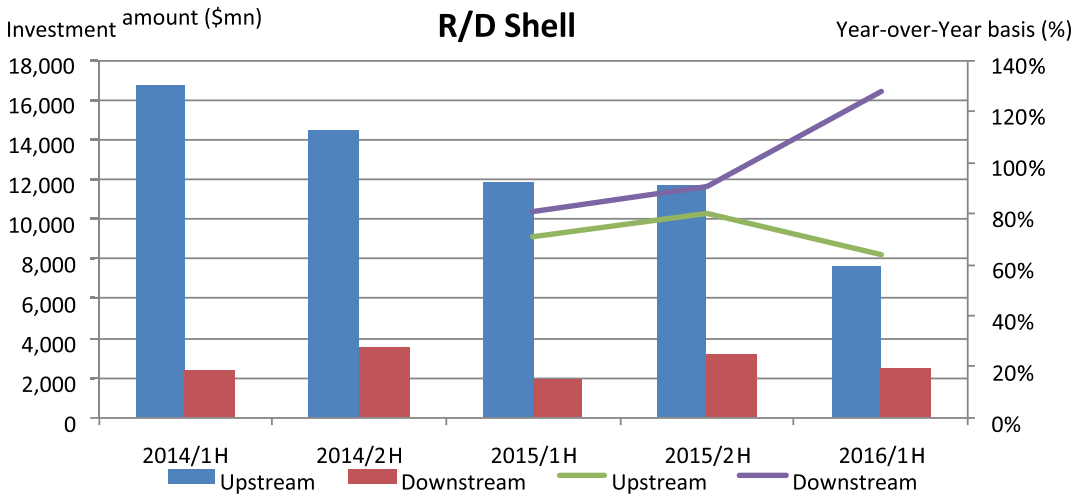
Source: Royal Dutch Shell earnings reports

Investments

With the acquisition of the BG Group, Shell faces a more severe investment environment than that of the other oil companies. It is making minimal investment, as shown by the absolute amount of investment and the year-over-year ratio in the figure below. While still investing both upstream and downstream, Shell continues to invest more in its downstream sector during the first half of 2016 than in preceding years, including the acquisition of BG Group.

[73] *Reuters*, 4 May 2015; *Reuters*, 19 June 2015

Figure 17 Change in Royal Dutch Shell investments



Source: Royal Dutch Shell earnings reports

The table below shows the upstream final investment decisions (FID) Shell is making.

Figure 18 Main Royal Dutch Shell upstream investments (April 2015 - end of June 2016)

Area	Description	Investment amount	Partner
Brazil deepwater	Oil field development (crude oil: 22,000b/d, natural gas: 325,000m^3/d)	-	Petro Rio (Independent Brazilian company)
Around Villafortuna oil field (Italy)	Oil field development	US$8.5 billion	Northern Petroleum
Gulf of Mexico (American deepwater)	Oil field development (crude oil: 650 million bbl)	-	-
Brazil deepwater	Expansion of BC-10 drilling area production (crude oil: +28,000b/d)	-	Qatar Petroleum and others

Source: Corporate information materials

The table below shows planned investments in midstream and downstream sectors, in addition to the aforementioned acquisition of BG Group and cooperation with Total and Gazprom.

Figure 19 Main Royal Dutch Shell midstream and downstream investments (as of the end of September 2016)

Area	Description	Investment amount	Partner
Argentina	Continued upstream and downstream investment until 2020	US$300 million/year	-
Iran	Increase production volume of petrochemical products through collaboration in petrochemical business fields	-	National Petrochemical Co (NPC)

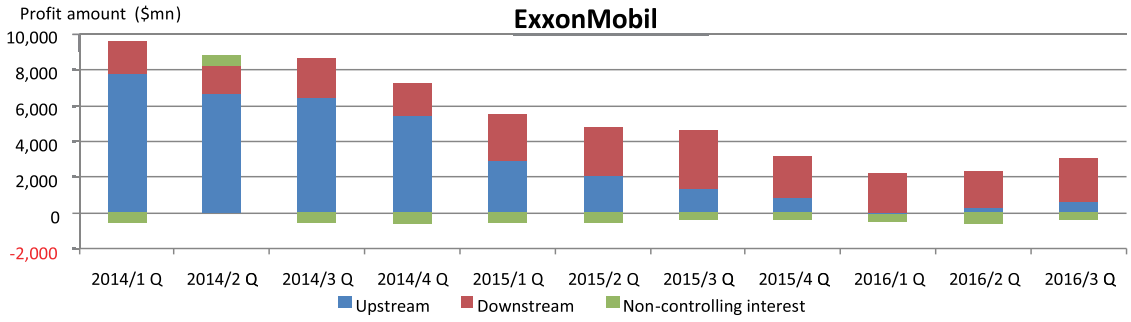
Source: Corporate information materials

2-3 ExxonMobil 2-3-1 Change in Earnings

The figure below shows the quarterly change in ExxonMobil earnings from 2014. As with the other oil companies, overall, ExxonMobil tried to make up for damage to its upstream profits with its downstream sector. However, for a super major such as ExxonMobil that was created in a merger in 1999, it appears that it was, for the time being, waiting for new business opportunities while promoting sound management.

Upstream write-downs similar to those of other oil companies and the acquisition of InterOil in Papua New Guinea, which could serve as ExxonMobil's first new business opportunity, will be discussed later in this chapter.

Figure 20 Change in ExxonMobil earnings



Source: ExxonMobil earnings reports

Write-down of Upstream Assets

In ExxonMobil's case, in addition to the amortization costs of cancelling projects as the other oil companies did, it recorded large impairment charges due to the downward revision of the forecast

price of oil as quarterly upstream losses, and then finally declared the losses in the first quarter of 2016.[74]

Acquisition of InterOil

Profitable low-cost projects became feasible in the spring of 2016 following the cancellation of multiple large-scale LNG projects, including the US$40 billion project planned by Woodside Petroleum of Australia, due to the prolonged decline in the price of oil. Against this background, in July 2016, ExxonMobil won a tender in which France's Total and other companies also participated, and announced an agreement to acquire InterOil of Papua New Guinea for US$3.6 billion.[75]

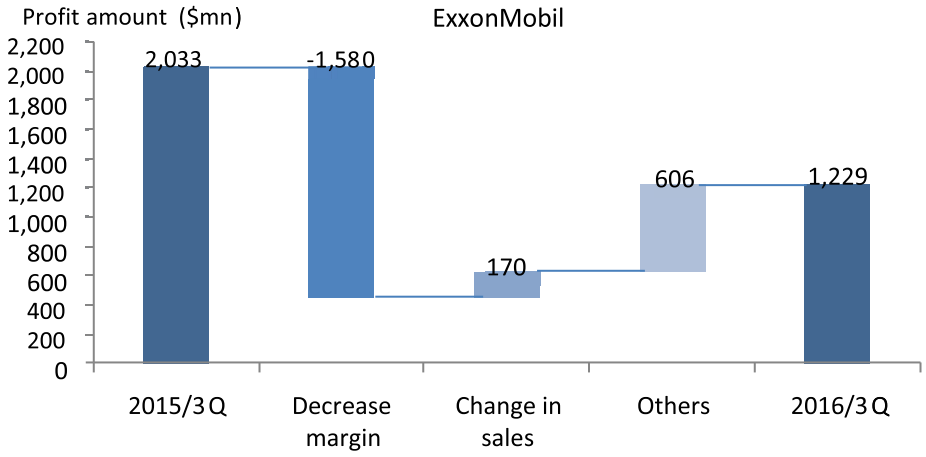
The deal contrasts with Royal Dutch Shell's acquisition of the BG Group in that this was a move aimed at the long-term prospects in LNG.

2-3-2 Operational Response Improvement of Profits

While the other oil companies have been improving operations through layoffs, ExxonMobil has not implemented large-scale job cuts, and there has been no significant improvement in profitability.

The figure below shows the breakdown of profits during the one-year period from the third quarter of 2015 to the third quarter of 2016. With sluggish oil prices and declining margins, ExxonMobil is working to improve profits through sales efforts and investment reductions that will be discussed in the next section.

Figure 21 Change in ExxonMobil profits



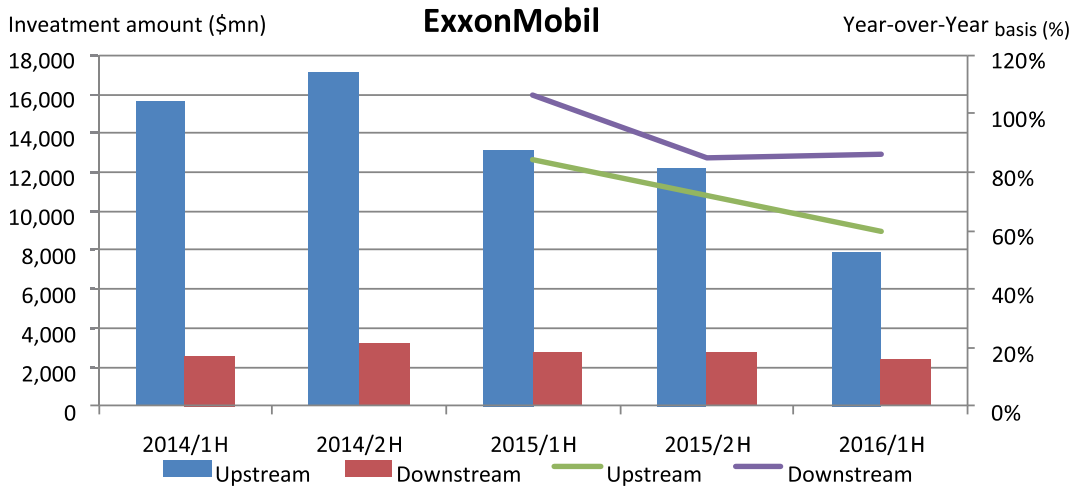
Source: ExxonMobil earnings reports

[74] *Bloomberg*, 23 March 2016
[75] *Reuters*, 21 July 2016

Investments

In quarterly earnings reports from 2014 to the first half of 2016, it appears that the cash flow of ExxonMobil, which has never recorded a loss, has a relatively large margin. However, the absolute amount of the investments and the year-on-year comparison in the figure below show that it is being forced to manage investments very strictly. This is demonstrated by the year-on-year upstream investment ratio of 60% in the first half of 2016, which is the lowest ratio among the three companies discussed here.

Figure 22 Change in ExxonMobil investments



Source: ExxonMobil earnings reports

Because of such investment control, ExxonMobil is making the FID for upstream projects shown in the table below.

Figure 23 Main ExxonMobil upstream investments (April 2015-end of June 2016)

Area	Description	Investment amount	Partner
Sakhalin expansion	Expansion of crude oil production (90,000→200,000b/d)	-	Total, Statoil, and others
Banyu Urip drilling area (Indonesia)	Oil field development (crude oil: 165,000b/d, natural gas: 15Mcf/d)	-	-
Papua New Guinea	Oil field development (crude oil: 30,000b/d, natural gas: 11,000Mcf/d)	-	-

Source: Corporate information materials

The table below shows planned midstream and downstream investments.

Figure 24 Main ExxonMobil midstream and downstream investments (as of the end of September 2016)

Area	Description	Investment amount	Partner
North America	Development investment in cost reductions for shale gas and oil development	-	-
North America	Addition of 20,000b/d of light, low-sulfur and the latest crude oil processing capability by upgrading refineries in Vermont and Texas.	-	-

Source: Corporate information materials

Summary

This chapter has focused on the financial and business situations of the oil majors, and changes in their profits and investments. To summarize, all three companies are faced with adverse impacts on upstream profits brought about by a decline in the price of oil, which they have tried to offset by shifting activities to their downstream segments. The characteristics of each company have also been summarized.

BP is continuing its portfolio review with the aim of recovering from the oil spill in the Gulf of Mexico while keeping expenditures down.

With the acquisition of the BG Group, Royal Dutch Shell has strengthened its position as a leader in deepwater LNG projects in Brazil and other areas.

ExxonMobil will review investments from a long-term perspective and try to further strengthen its financial standing while seeking further investment projects following the acquisition of InterOil.

Figure 25 Countermeasure by each major

Countermeasure	BP	R/D Shell	ExxonMobil
Improvement of downstream profit	Layoffs, Improving refining cost Shifting to premium brand	Layoffs, Strategic partnership, Exchange of assets	Layoffs
Minimum investment	Awaiting decisions	Downstream first	Long-term perspective
Create efficiency by partnership	In midstream & downstream	BG group, Total, Gazprom	Acquisition of Inter oil

Chapter 3 Measures to Counteract the Current Situation and their Problems

3-1 Oil-Producing Countries 3-1-1 Combating Reduced Revenues

The governments of oil-producing countries suffering from lower revenues due to the decline in oil prices are taking emergency and long-term measures given that sluggish oil prices will likely be prolonged. Not all oil-producing countries are implementing a uniform set of measures, as domestic circumstances dictate what they can do. Some countries, such as Libya and Nigeria, cannot maintain domestic security due to terrorist attacks typified by groups such as ISIS, and other countries, such as Venezuela, have weak domestic economies due to hyperinflation in excess of 100% per year.

This chapter analyzes the measures countries are taking to avoid further deterioration in their fiscal conditions, focusing on the three countries mentioned earlier.

1. Securing Revenue Dipping into SWFs and Liquidating Assets

In comparing Saudi Arabia's sovereign wealth fund (SWF) between the end of March 2015 and March 2016, as previously noted, the reserves of the Saudi Arabian Monetary Authority (SAMA) fell from US$757.2 billion to US$598.4 billion, a withdrawal of US$158.8 billion (20%). While not all oil-producing countries in the Middle East have dipped into their SWFs, Algeria's Revenue Regulation reserve decreased by US$27.2 billion (approximately 35%) from US$77.2 billion to US$50 billion during the same period. In the OECD, Norway's Government Pension Fund, built on oil and natural gas income, decreased by US$34.4 billion (about 4%) from US$882 billion to US$847.6 billion.

In Abu Dhabi, where the low oil prices are putting pressure on its finances, the assets of state-owned companies are being reviewed. The government is reviewing the assets held by the International Petroleum Investment Company (IPIC), Mubadala and TAQA, and are weeding out the non-performing assets while keeping the profitable ones. The reviews are to prepare for future strategic partnerships, and as the first step, the Abu Dhabi government announced the merger of IPIC and Mubadala at the end of June in 2016.[76]

Problem: Over the past several years, SWFs have been able to grow significantly, supported by oil prices exceeding US$100/bbl. However, there are no expectations that the total asset value will dramatically increase given the sluggish global economy, uncertainty over when the funds put into the national treasury will be returned and the difficulty of enhancing the profitability of their asset portfolios.

[76] *PIW*, 4 July 2016

Borrowings from Banks and International Financial Markets

In 2015, the Saudi Arabian government made its first of several sovereign bond issues since 2007, issuing a total of SAR115 billion (about US$30.7 billion). The interest rate differs with the bond issue, with 5-year bonds yielding 1.92-1.95%, 7-year bonds at 2.34-2.85% and 10-year bonds at 2.65%.[77]

Even Abu Dhabi, the capital of the United Arab Emirates (UAE), is looking to do the same as Saudi Arabia by turning to the bond market because of the low price of oil. In April 2016, Abu Dhabi's Department of Finance issued five billion dollars of sovereign bonds for the first time since 2009. JP Morgan, Bank of America and Citigroup oversaw the sale of the bonds, in which 5-year bonds were issued at a yield of 2.125% and 10-year bonds a yield of 3.125%. Investors reacted to the US$5 billion issuance with more than US$17 billion of buy orders, confirming their confidence in Abu Dhabi.

The biggest reason Saudi Arabia can borrow from banks at low interest rates is probably because SAMA is a government organization and its assets can be regarded as collateral. Similarly, Abu Dhabi is backed by a solid SWF comprised of energy companies, including the Abu Dhabi National Oil Company (ADNOC). However, not all oil-producing countries in the world can borrow from banks and the private sector at low interest rates.

Figure 26 Sovereign bonds and borrowings of oil-producing countries in the Middle East

Oil producer	Date	Amount (US$bn)	Redemption/repayment	Interest rate
Saudi Arabia	2015	30.7	5-10 years	1.92-2.65%
Bahrain	Nov 2015	1.5	5-10 years	5.875-7.0%
Qatar (Loan)	Jan 2016	5.5	5 years	Libor+1.1%
Oman (Loan)	Jan 2016	1.0	5 years	Libor+1.2%
Abu Dhabi	Apr 2016	5.0	5-10 years	2.125-3.125%
Qatar	May 2016	8.0	5-30 years	US Treasury Bills+1.2-2.1%
Oman	Jun 2016	2.5	5-10 years	3.625-4.75%
Saudi Arabia	Oct 2016	17.5	5-30 years	US Treasury Bills+1.35-2.1%
Saudi Arabia (Loan)	2016 (Plan)	10.0	5 years?	Undetermined

Source: Created from *Mees*, 17 June 2016; *Saudi Gazette*, 21 April 2016; *Gulf Times*, 1 June 2016; *Reuters*, 19 October 2016 *Sovereign bonds issued where Loan is not indicated beside country name

Problem: Sovereign bonds have redemption dates and loans have repayment dates. Currently, relatively low interest rates apply based on international creditworthiness ratings. However, with oil

[77] *Reuters*, 18 July 2015; *Gulf Times*, 18 July 2015; *Arab News*, 12 October 2015; *Gulf Times*, 14 December 2015.

prices forecast to be sluggish over the long-term and fundamental economic reforms unable to be carried out, creditworthiness could fall, along with growing and prolonged deficits. This would be the worst-case scenario that debt can bring about and needs to be kept in mind.

Introduction of New Taxes

The six countries of the GCC are studying the introduction of a value-added tax (VAT) from a medium-term perspective. Iran already has a VAT, which was increased to 8% in 2014. Saudi Arabia and other GCC countries are aiming to implement the tax as soon as possible while coordinating within the GCC.

Although the UAE is considering introducing a corporate tax in addition to a VAT, Middle Eastern countries until now have had a sponsorship system that amounted to a corporate tax on foreign companies operating in their countries, where a certain amount of money is paid to influential citizens. Hence, it will be necessary to clarify the relationship between the sponsorship system and corporate tax when trying to attract foreign companies in the future.

Moreover, former Saudi Arabian Finance Minister Ibrahim bin Abdulaziz bin Abdullah Al-Assaf introduced a VAT on 4 May 2016, to avoid creating other taxes, declaring that there were no plans to introduce an income tax. Saudi Arabia also announced that it would raise the fee for obtaining six-month visas for foreigners to US$800 starting from October 2016, which was a six-fold increase. It also announced stiff fines for traffic violations.[78]

In addition, the Emirate of Dubai, UAE acts as a hub for Middle East business to implement a new airport tax on 30 March 2016. With the new tax, all passengers who reserved flights after 1 March and fly out of Dubai from 30 June, including passengers transiting through Dubai, will pay an airport usage fee of AED35 (about US$9.5).

Problem: The introduction of new taxes for citizens could lead to an economic downturn and public outcry. It is essential to disclose for what and how these new tax revenues will be used.

Inviting Foreign Investment into the Domestic Stock Market

Saudi Arabia has many restrictions on foreign investment, but the Saudi Arabian Capital Markets Authority (CMA) established a regulation on 4 September 2016 that lowered the minimum capital required for foreign investors to directly invest in the Saudi stock market from SAR18.75billion to SAR375,000 (about US$100,000). The CMA also announced that it relaxed the number of shares that

[78] *Wall Street Journal*, 10 August 2016

overseas investors could hold in Saudi businesses from 5% of all issued shares to 10% of issued shares.[79]

Problem: Saudi Arabia's domestic economy is more likely to be influenced by overseas economic circumstances, and there is also the possibility of it being isolated unless it participates in a framework of international cooperation. Because its currency is 100% linked to the dollar, it is possible that it may be exposed to extreme withdrawals of investment and investment pressure due to superiority of the dollar.

To Increase Crude Oil Production and Sales or Coordinate Lower Production?

With the rise of US shale oil and the global economic downturn, the supply and demand balance has tipped to excess supply. The decision not to take any action at an OPEC meeting at the end of 2014 was critical in the fall of the price of oil. After that, Saudi Arabia began exploring how to achieve two options at the same time. In other words, whether to give priority to regaining market share (in this case, oil price does not recover), or to give priority to balancing supply and demand (in this case, it will lead to recovery of oil price). As a result, Saudi Arabia tried to increase production and sales, so the oil price continued to be sluggish.

Under these circumstances, when the embargo on Iran was lifted in January 2016, the country launched a clear increase in production and sales to recover the share lost during the embargo. The production target is set at the output level before the embargo was invoked, and priority is being given to the recovery of its own market over the problem of low oil prices.

Saudi Arabia, on the other hand, expressed that it would not be the swing producer of the oil-producing countries, preferring to leave prices at a certain level to the oil market. However, fast forwarding from the end of January to February 2016 where WTI and Brent fell below US$30/bbl, it appears that it became necessary to do something to stop the production increase as Iran's market recovered. Thus, Saudi Arabia, Venezuela, Qatar and Russia agreed on 16 February 2016 to "freeze output at January 2016 levels" on condition that other major oil-producing countries followed suit.[80]

However, Iran did not go along with this idea, and since the United States, which produces shale oil, was not asked to participate in the meeting of oil-producing countries in Doha, Qatar on 17 April, the agreement had no effect. Furthermore, at the OPEC meeting in June, the gap between Saudi Arabia and Iran's positions were not bridged, and no progress was made on discussions to coordinate production. The price of oil declined again following the UK voting to leave the EU in a referendum on 23 June, and due to the concerns over a global economic slowdown in the future. Because of this,

[79] *Bloomberg*, 11 August 2016
[80] *Reuters*, 16 February 2016

it was expected that Saudi Arabia would take some measures in the market, but on 10 July 2016, Saudi Arabia's Minister of Energy, Industry and Mineral Resources, Khalid A. Al-Falih, declared that he would not cut production to push up crude oil prices (meaning that Saudi Arabia would tolerate the slump in crude oil prices).[81]

Given this stance, there was no sign that oil prices would recover, so in August, Saudi Arabia said that it would cooperate with OPEC/non-OPEC countries toward re-balancing the market, and at the unofficial OPEC meeting in Algiers on 28 September, OPEC agreed to freeze output within the general framework including Iran, maintaining output between 32.5-33 million b/d.

Problem: Increased production and sales of crude oil conflicts with raising its price. Because of this, oil-producing countries that cannot take effective action to stem the decline in revenue due to the stagnation of oil prices must rely on increased output and sale of crude oil. However, the prolonged oil price slump has left domestic economies weak. At the same time, there are oil-producing countries that cannot secure investment for increased production due to the deterioration of domestic security, making the recovery of oil prices a top priority for those countries.

2. Controlling Expenditures

If it is not possible to increase revenues, governments will reduce expenditures by reducing or abolishing subsidies, reducing operating costs, restraining investment and laying off employees. However, as mentioned at the beginning of this chapter, not all countries can respond to such circumstances due to their domestic situations. Therefore, it is up to oil-producing countries that have the capacity to act, to think about what measures can be implemented.

Reducing and Abolishing Subsidies

In September 2016, the GCC countries of the Middle East raised the price of fuel oil by cutting subsidies. First, the UAE raised prices in August 2015, followed by Saudi Arabia later that year in December. They were followed by Bahrain, Qatar and Oman at the start of 2016. Finally, Kuwait cut gasoline subsidies from 1 September 2016. Among them, the UAE and Oman are reviewing the price of fuel oil monthly as international market prices fluctuate.

Even Kuwait, which finally succeeded in reducing subsidies among the GCC countries, was considering a review of its subsidy system from a relatively early stage. In late October 2013, Prime Minister Sheikh Jaber Al-Mubarak Al-Hamad Al-Sabah said, "The current welfare state that Kuwaitis are used to is unsustainable." Furthermore, with the end of March 2017 as the review deadline, in addition to examining taxation, there were also plans to reduce subsidies, to raise other various fees

[81] *The Daily Caller*, 10 July 2016

and public service fees. However, the government recognized that one of the reasons why it could not escape the influence of the Arab Spring was that improving the lives of the people was a huge social expenditure, and that its implementation was inevitable. Since then, due to oil prices in decline from the middle of 2014, Kuwait is forecasting a deficit of KWD12.2 billion (about US$40.7 billion), twice the amount compared to the previous year, and on 14 March 2016, the Kuwaiti Cabinet approved an economic reform plan. The economic reform plan proposed a 10% corporate tax on Kuwaiti businesses, which was imposed on foreign companies, and partially eliminating some subsidies in order to raise the price of fuel for automobiles, electricity and water rates. In Kuwait, however, obtaining the cooperation of the National Assembly proved to be a greater obstacle to promoting economic reform than obtaining the understanding of the public. This time, too many parliamentarians voiced opposition to an appeal to the people who cast their vote in the National Assembly election, raising concerns about the way forward.

Problem: What Kuwait fears the most is that increasing the public burden by reducing or abolishing subsidies will cause public dissatisfaction. As with the introduction of a new tax system, it will be necessary to disclose how previous subsidies will change and support the lives of citizens (e.g. securing employment of young people).

Merging Ministries and Government Agencies

Each country seeks to control expenditures by integrating and simplifying national organizations that have grown. As mentioned earlier, in Saudi Arabia, King Salman reorganized ministries and agencies on a large scale on 7 May 2016, and in the UAE, Prime Minister Mohammed bin Rashid Al Maktoum announced the reorganization of government ministries and agencies on 8 February 2016. Both countries are trying to create new functions that correspond to the times while reducing ministries and agencies with overlapping functions, and both appointed ministers with the ability to manage transformation and dynamic portfolios. Kuwait also merged ministries and agencies on 14 March 2016 in its economic reform plan. In Qatar, state-owned oil company Qatar Petroleum (QP) announced in late June 2016 that it would merge its employees, assets and customers with Qatar International Petroleum Marketing Company (Tasweeq), a state-owned oil retailer, within the year. This will enable QP to strengthen the relationship with Tasweeq's overseas customers and partners. Furthermore, QP announced on 11 December 2016 that it would integrate Qatar Gas and Ras Gas, which operate natural gas businesses in the country, within a year. Through this merger, QP aims to become a unique global energy company in terms of scale, service and reliability.

Problem: There is no problem with seeking a public perspective or economies of scale. However, as fewer royalty and major tribal chiefs occupy positions of cabinet ministers and executives, there is no denying the increased danger of opposition to administrators (a king or a chief).

Reducing Operating Costs, Maintaining Crude Oil Production Capacity Targets and Reducing Employees

Each country is engaging in efforts to reduce energy-related expenses, including national oil companies. In Saudi Arabia, the government requested a 20% discount to oil service companies from the beginning of 2015 and asked drilling rig companies to revise their contract prices as contract rates of drilling rigs fell. At ADNOC in the emirate of Abu Dhabi, development companies under its umbrella are obliged to reduce operating costs by 10-15%, even though it will maintain its R&D budget from the middle of 2015. In addition, in 2016, ADNOC pursued economies of scale by collectively procuring materials that had previously been procured independently by development subsidiaries.

Despite reducing operating costs in this way, ADNOC said it will continue to secure crude oil production capacity to cope with future increases in oil demand. This can be taken as lip service to eliminate oil market concerns over "anxiety about future supply capacity" due to a sharp decline in oil prices. This is because as the oil fields that have been developed naturally decline over time, a significant amount of money is required to maintain the production capacity of these fields. Unless further investments in new oil field development are made, there will be no expansion of crude oil production capacity. In addition, development of new oil fields takes 5 to 10 years, and investment must be maintained over the medium to long term.

Furthermore, ADNOC reportedly laid off 5,000 employees on 26 May 2016. However, the timing is fortuitous as oil field development requires a lot of manpower, and controlling mass layoffs and development orders by development companies in oil-producing countries is a concern because manpower cannot be secured when needed. Currently, many drilling rig companies, well-logging companies and others are also laying off employees, which leads to further "anxiety about future supply capacity."

Problem: Excessive cutbacks to operating costs can lead to accidents. Safe operation of facilities is essential, and a massive amount of time and money is involved in terms of lost profits, restoration costs and credit recovery in the event of an accident. Also, the accumulation and transfer of knowledge with employees is important, so firing them does not solve any problems.

3. Creating an Economy that Does Not Rely Solely on Oil Partial Privatization of State Oil Companies

In Saudi Arabia and Kuwait, privatization efforts have been made for an initial public offering for parts of state-owned oil companies, and both have introduced private funding (up to 50% in Kuwait's

economic reform plan) for a certain percentage of state-owned oil companies. Behind these moves is the possibility of supplementing deficits while oil prices are stagnant, but in Saudi Arabia, there is a strategy for the SWF to collectively manage funds obtained from listing on the stock market, reinvest in growth fields leading to revenue and aggressively manage financial assets to develop the domestic economy while lowering its dependence on crude oil. Kuwait intends to privatize not only the state-owned oil companies but also the schools and hospitals that it manages, and it is trying to focus on the development of the private sector using non-government means.[82]

Problem: Both cases have an immediate effect on improving the fiscal balance, but it takes time to reach the final goal, so how to proceed with "stopgap measures" during that time is vital. In Saudi Arabia, Vision 2030 sets forth various items for industrial diversification and employment, and a goal vision, but there are high hurdles for both. For example, with industrial diversification, the focus is on promoting tourism and distribution utilizing geographical advantages by deregulating foreign investment, but what is Saudi Arabia doing to make the country attractive for foreign companies? Will tourist visas no longer be needed to promote tourism? It is not known whether these and other problems on the way toward the goal vision will be solved. In addition, Saudi Arabia wants to become an investment powerhouse, but when Saudi Aramco is listed on the stock market, will its underground resources such as oil, which will determine the valuation of its assets, be attributed to the company? Or, will they belong to the Kingdom of Saudi Arabia? In the future, various laws and regulations will be developed so that Saudi Aramco itself can be profitable.

3-1-2 Measures to Combat the Difficulty of Promoting Crude Oil Development

Crude oil development requires several years, huge development costs and advanced development technology. Except for Saudi Arabia, oil-producing countries in the Middle East have been promoting crude oil development by giving crude oil development rights to foreign companies and by entering development contracts that use production sharing methods.

However, due to the prolonged slump in oil prices, the willingness of foreign companies to participate in the development of crude oil is declining, while it is becoming increasingly difficult for oil-producing countries to independently fund crude oil development costs.

Using Foreign Investment

In such an environment, it is becoming impossible to avoid employing foreign investment financially and technically in the development of new oil fields. Several public biddings are underway to develop new oil fields in Iran, Iraq, Oman and Africa. (In Iran, the Iran Petroleum Contract (IPC)

[82] *Platt's Oilgram News*, 13 July 2016; *PIW*, 25 July 2016

has been delayed over the domestic application of the IPC and its implementation has been postponed.) UAE emirate Abu Dhabi and Qatar are renewing contracts as those for existing oil fields are expiring.

An important point for oil producing countries in examining bidding documents is the amount of investment necessary to achieve the targeted output volume, the length of time maximum output can be maintained (plateau production period) and the technology needed to accomplish this. In some oil-producing countries, the signing bonus at the time of tendering a bid is also important.

In recent contracts for the renewal of existing oil fields, in January 2015, Total of France bid for 10% of the onshore oil interest in Abu Dhabi, Japan's INPEX made a bid for 5% in April, Korea's GS Energy bid for 3% of the same in May and Chinese consortium bid for 12% in February 2017, and Total bid for 30% of Qatar's offshore oil fields (Al Shaheen oil field) in June 2016.

Problem: In the renewal of existing oil fields, the cases where new foreign capital have acquired oil field interests stand out. For oil field development, the accumulated knowledge of underground structures built up over many years may lead to efficient development of oil fields, but there is a risk of losing that knowledge and returning to square one if the owners of the oil field interests change.

Meanwhile, there have been cases with foreign investment where oil-producing countries cannot comply with the provisions of concession contracts and production sharing contracts (PSC) due to the sluggish price of oil. For example, in the case of a PSC, development investment is calculated as an expense and crude oil is secured for that expense, but if the price of crude oil is low, the total expenses will not be recovered even if production for all the crude oil can be secured and exact calculations will be delayed. In addition, due to the reduction of national budgets accompanying the slump in oil prices, it is difficult for oil-producing countries to pay contractual development costs and compensation made with foreign investment, and there are also oil-producing countries that have postponed, cut back or cancelled crude oil development projects.[83]

Using Incentives for Foreign Investment (Incentives in Contract Clauses)

The opening up of drilling areas, along with economic incentives in contracts, are what attract foreign investors who emphasize profitability by selecting fields of investment and portfolio management. In a seller's market (dominated by the oil-producing countries), foreign capital flows into the market but with an eye on economic conditions. However, when the price of oil is low like it is now, a buyer's market exists (foreign investment dominates), and foreign investment emphasizes projects with high rates of return (ROR) and invests in safe projects (ones in which underground resources have already been confirmed). Hence, oil-producing countries are trying to encourage

[83] *Platt's Oilgram News*, 3 March 2015

foreign investment by offering lucrative contracts that contain long contract periods, items that may be included in development costs and granting ownership rights over the produced crude oil.

Problem: Eventually, these unprecedented incentives will lead to a reduction in the incomes of oil-producing countries in the long run, and will also affect the terms and conditions of future contracts. The new IPC has not been concluded in Iran, because, from the standpoint of religious groups, compared to previous by-back contracts, it makes underground resources more available to ownership by foreign investment, and has been met with opposition from those who see it as being against the national interest.

On the other hand, the stable continuation of incentives makes it easier for foreign investment to make entry decisions. It should also be recognized that oil-producing countries will also make it easier to get stable revenues and to reduce expenditure over the medium to long term.

3-1-3 Measures for Securing Difficult Sales Channels

Increasing sales is difficult when there is a glut of crude oil. Oil-producing countries have accordingly taken various approaches toward oil-importing countries.

Package Sales (Refinery Construction and Crude Oil Sales Package)

The flow of crude oil imports and exports around the world is about to change drastically with Russian crude flowing south to Asia and the approval of US crude oil for export. Aware that securing sales channels is becoming more difficult, oil-producing countries, including within OPEC, have added new measures, shifting from simple crude oil sales to "package sales." In Asian countries, although domestic oil production and some crude oil imports have met supply up until now, imports of crude oil have increased due to higher domestic demand and domestic refineries cannot keep up, making the import of large amounts of petroleum products necessary. Instead of importing crude oil and refining it at domestic refineries to add value, oil-producing countries are promoting packaging crude oil sales while cooperating with refinery construction in accordance with the trend of importing crude and using refineries that are at hand.

Problem: It is getting harder for oil-producing countries to engage in deficit financing while oil prices fall, and it is becoming more difficult for them to finance crude oil distributors by themselves. For this reason, it is necessary to build packages through bilateral talks with new third-party countries responsible for financing.

The Idea of Joint Reserves

Saudi Arabia and Abu Dhabi are using a scheme similar to a joint reserves initiative in the far east of Asia to stockpile oil in countries where future demand is expected to grow, and that type of scheme is spreading. Saudi Arabia concluded a bilateral cooperation agreement in conjunction with the visit of Deputy Crown Prince Mohammad bin Salman Al Saud to Japan at the end of August 2016, where both countries agreed to increase joint stockpiles in Okinawa (1 million KL, or about 6.3 million bbl) by 30%.[84]

In a joint statement between the UAE and India in August 2015, Indian Prime Minister Modi expressed that the UAE would participate in India's strategic oil stockpiling plan. Following the statement, in February of the following year, UAE energy minister Suhail Mohamed Faraj Al Mazrouei discussed the use of UAE crude oil in bilateral talks during a visit to India. During the talks, the UAE proposed to India that upon completion of the storage tanks being built in Mangalore, 750,000mt, equal to half of the 1,500,000mt (about 11 million bbl) storage capacity, would belong to the UAE with 500,000mt given preferentially to India in the case of an emergency, and that UAE's ADNOC would sell the remaining 250,000mt.[85]

In addition to this, India is considering investing in oil bases that Oman is planning to build in Duqm and building its own national stockpiles.[86]

Problem: Even if oil-producing countries store oil in tanks of a consuming country, it will not lead to new sales unless it is used, so they must continue to promote sales using the joint stockpiles as a foothold.

De Facto Price Reduction Sales Using the Adjustment Range of the Selling Price Formula

There are two methods for determining crude oil prices in Asia. One is a predetermined method and the other is a deferred method. The difference is whether the prices are being offered before crude oil is traded.

In the predetermined method, the crude oil price is not presented as an absolute value, but is displayed using an adjustment range of "+" or "-" based on the benchmark crude oil price as a reference before the loading month. For example, with Saudi Arabian light crude oil prices for Asia, the average price of benchmark Oman crude and Dubai crude is displayed in the "+" or "-" adjustment range. The price of benchmark crude uses the market price traded in futures markets and applies the monthly average calculated from daily closing prices.

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[84] *Platt's Oilgram News*, 11 October 2016
[85] *Platt's Oilgram News*, 12 February 2016
[86] *Platt's Oilgram News*, 28 May 2015

With the deferred method, the government of an oil-producing country selling crude oil announces the absolute value of the price of crude oil after it makes clear to the buyer (generally on the 2nd of the month after the loading month) the monthly average of the market benchmark price (the price of Dubai crude and Oman crude).

From the buyer's perspective, oil is traded on mutual trust with the seller, but since market prices are taken into consideration in both methods, the predetermined method offers some psychological comfort in that the price is known at the time of the trade.

Then what criteria do buyers make purchase decisions about increasing the purchase? It is important that the crude oil price is low, and the netback evaluation is high. The netback evaluation shows how much more expensive petroleum products can be made when crude oil is refined. Generally, crude oil that can make more gasoline and diesel oil is higher in netback evaluation than crude oil that makes heavy oil more.

Even though the netback evaluation is almost the same, there are cases that the crude oil price is different. For example, when comparing Arabian Light crude oil and Iranian Light crude oil, Iranian crude is constantly set at US$0.1/bbl cheaper than Saudi crude. This can also be said to be a de facto price reductions using adjustments on selling price formula to increase production and sales.

Problem: To increase sales, it is necessary to improve production as well as improve export facilities and port conditions. Delays at shipping ports due to the lack of export pumping capability and dock skills will result in a penalty, which can lead to customers looking for oil elsewhere.

3-1-4 Measures to Transition from an Oil-Based Economy

As typified by Saudi Arabia, oil-producing countries have been reforming their entire economic policies aiming to transition away from having energy-dependent economies, an example of which is Vision 2030. This section examines not only the reliance on petroleum energy, but how countries are responding to domestic energy demand and how they are securing revenue via other energy.

Adopting Renewable Energy

The oil-producing countries of the Middle East have been promoting natural gas to generate electricity and produce fresh water to respond to the rapidly increasing energy demands due to growing populations, but the UAE and Kuwait are net importers of natural gas. In Abu Dhabi, although it exports LNG to Japan, there has been concern from the beginning of 2000 about the lack of natural gas for the domestic market. Thus Abu Dhabi embarked on a natural gas import project from Qatar (called the Dolphin Project), importing 2 billion cfd/year from 2007 via pipeline. As this alone cannot meet future domestic energy demands, Mubadala Development was set up in 2002 to promote the Masdar Plan to build a sustainable society using advanced energy technology from 2008, and has

started research on photovoltaic, solar thermal power, wind power, hydrogen and underground storage of carbon dioxide. In 2013, Abu Dhabi began operating Shams-1, the country's first solar thermal power station with a capacity of 100MW. In 2008, it also started to study nuclear power, and in the following year, established ENEC to promote nuclear power generation, and FANR, a nuclear safety regulatory body. ENEC ordered four nuclear power plants from Korea in December 2009 and plans to begin phased operations from 2017.

The Dubai Electricity & Water Authority (DEWA) is promoting a large-scale photovoltaic power generation project in Sheikh Mohammed bin Rashid Al Maktoum Solar Park in Dubai, which does not have plentiful fossil fuel resources. The first phase is a 13MW facility that started operation in 2013, and in the second phase, a 200MW facility is slated to start in April 2017. Construction of an additional 800MW in phase three has already started. Dubai plans to generate 7% of its electricity via clean energy by 2020, 25% by 2030 and 75% by 2050. According to the plan, DEWA CEO Saeed Mohammad Al Tayer announced in June 2016 that it will construct a new 5,000MW mega solar power plant in the same park by 2030.

Saudi Arabia is also progressing with its own renewable energy efforts. On 17 April 2010, King Abdullah bin Abdulaziz Al Saud established King Abdullah City for Atomic and Renewable Energy (KACARE) by decree. This comes as Saudi Arabia's growing population puts pressure on the supply of fossil energy at a time when it is necessary to reduce the consumption of fossil energy by generating power and creating water from alternative energy sources that are durable and reliable. KACARE's vision is to secure a total generation capacity of 120GW by 2032, 50% of which is targeted to come from non-fossil fuels. Furthermore, the breakdown of non-fossil fuels is as follows: Solar power accounts for 41GW (of which photovoltaic (PV) is 16GW and concentrated solar power (CSP) is 25GW), wind power, 9GW; waste power (waste to energy), 3GW; geothermal power, 1GW; and nuclear power, 17.6GW.

However, Vision 2030 on 25 April 2016 announced the capacity of renewable energy to 3.5GW by 2020 and 9.5GW by 2030. After that, in the detailed edition on 9 May 2016, it is said that accelerating the introduction plan and achieving 9.5GW by 2023. And now, Saudi Aramco plays a central roll in renewable energy introduction projects.

Problem: The introduction of renewable energy in either country seems to have not assumed a situation where the price of oil dropped below US$50/bbl, and appears to have assumed that this energy would cost as much as oil and natural gas. However, as the price of crude oil declines, the cost of renewable energy will be relatively higher than fossil energy, and the cost of developing renewable energy will be squeezed by declining revenues due to lower oil prices. Given the circumstances, wind and solar technologies have experienced dramatic decline in their capital cost of recent years and this is expected to continue. In the third phase of the Solar Park using solar energy in the Emirates of Dubai there is a

bid of 2.99¢/kwh at the power supply cost, and development using scale merit will increase from now on.

Promoting the Export of Natural Gas and Electricity

Iran is trying to export natural gas and generate electricity using natural gas to transition from having an oil-dependent economy. Iran has been feeling the effects of the oil embargo on its crude oil since mid-2012. Because of the embargo, Iran has been looking to export natural gas and electricity instead of crude oil. Until now, Iran has only exported a small amount of raw gas to Turkey, Armenia and Azerbaijan, but concluded a contract with Iraq in July 2013 to export 7 million m^3/day of natural gas (increasing to 25 million m^3/day in the future). As of March 2016, actual exports are 4 million m^3/day due to facilities problems, but will expand to 35 million m^3/day in the future.[87]

In addition, there are also plans to build a natural gas pipeline connecting Iran and Pakistan, with construction of the Iranian side completed in March 2016 and construction of Pakistan side to be completed by 2018. [88] As of March 2016, construction of a natural gas submarine pipeline connecting Iran and Oman is scheduled to be completed within two years. The US$1.5 billion pipeline is 400km long, running 200km on land from Rudan in southern Iran to Mobarak Mount and 200km on the sea floor to Oman Sohar Port. It will be able to export 28 million m^3/day of natural gas, one third of which is LNG shipped from Oman.[90]

According to a report released by Iran's energy ministry in June 2015, the nation's power generation capacity as of the end of March 2015 was 73GW, with plans to reach 75GW by March 2016. Currently, the average generation capacity of Iran is 62GW/day, which is increasing by 1.5% annually.

According to deputy energy minister Houshang Falahatian, electric power exports from Iran are about a net 8,000 GWh (exports are 12,000 GWh with imports of 4,000 GWh), with plans to increase it to 25,000 GWh in three years giving preference to exporting to neighboring countries and regions. Currently, Iran exports to Turkey, Armenia, Azerbaijan, Pakistan, Afghanistan and Iraq, and plans to increase its dependence on exports from 38% to 45% by 2025.[89]

Problem: Building and enhancing infrastructure is indispensable for exporting natural gas and electricity. However, it is possible that facilities may not be able to cope with a rapid increase in exports. Moreover, when converting natural gas to LNG and exporting it, construction of liquefaction equipment at the port of shipment will also be necessary. It will be necessary to take measures to apply the scheme with Oman (export natural gas to Oman, create LNG in Oman and export it).

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[87] *Jetro Trade Publicity*, 7 August 2013; *Shana*, 1 March 2016
[88] *Press TV*, 12 June 2016 90
Pennenergy, 13 June 2016
[89] *Tehran Times*, 28 April 2015 and 20 June 2015

3-2 Oil Majors

The decline in revenue due to low oil prices and the damage to profits can result in a significant drop in stock prices, but each of the oil majors maintains a certain level of dividends as a protective measure.

Figure 27 Change in oil major dividends (up to the third quarter of each fiscal year)

	BP (US$mn)	Shell (US$mn)	ExxonMobil (US$mn)
2014	4,121	6,457	8,644
2015	5,118	7,588	9,036
2016	3,429	7,354	9,320

Source: Earnings report of each company and other documents

Figure 28 Change in oil major dividend per share (up to the third quarter of each fiscal year)

	BP (US$/share)	Shell (US$/share)	ExxonMobil (US$/share)
2013	0.09	0.45	0.63
2014	0.10	0.47	0.69
2015	0.10	0.47	0.73
2016	0.10	0.47	0.75

Source: Earnings report of each company and other documents

To prevent share prices from falling, it is assumed that the companies are forced to respond by maintaining dividends or increasing shareholder returns through increased dividends. In terms of expenditures, this leans toward reducing expenses, and the responses and their problems under such difficult circumstances will be examined in the following sections.

3-2-1 Combating Deteriorating Profitability Liquidating Assets

Oil majors suffering from a lack of cash can sell non-core assets to quickly secure income. BP announced that it would target the selloff of US$10 billion by 2016, and Royal Dutch Shell said it aims to sell assets of US$30 billion between 2016 and 2018, as mentioned in the section on earnings in Chapter 2. Even ExxonMobil, which seems to have enough cash on hand, is no exception.[90,91]

[90] *Petroleum Argus*, 6 March 2015

[91] *Platt's Oilgram News*, 20 May 2015

Major asset sales projects announced in 2015 are shown in the table below, but what these companies have in common is that they have not only been selling upstream assets such as North Sea oil fields and deepwater in South America, but also midstream and downstream projects as well.

Figure 29 Main asset sales announced in 2015

	Asset sold
ExxonMobil	Anasuria Cluster (North Sea oil field; Upstream) California and Louisiana refineries (USA; Midstream)
Royal Dutch Shell	Anasuria Cluster (North Sea oil field; Upstream) Campos Basin (Brazil deepwater; Upstream) Lubricants business (China; Downstream) Refining business (Japan; Downstream) Gas transportation infrastructure (Russia; Midstream) Eiba LNG business (USA; Midstream)
BP	Tiber and gila discoveries (Mexico deepwater; Upstream) Oil refinery interests (Germany; Midstream) Pipelines and infrastructure (North Sea oil field; Midstream) Bitumen business (Australia; Downstream)

Source: Corporate information materials

Problem: The oil majors have been forced to sell off assets even in project fields that are their specialty, and in which they have prioritized exploration and development investment, such as in polar regions, deepwater and LNG, that require expensive investments and advanced technology, creating cause for anxiety about the future.

State-run and local large enterprises such as Petronas (Malaysia) and Woodside (Australia) in LNG, and Petrobras (Brazil) and Statoil (Norway) in deepwater are becoming increasingly prominent. Such a situation is preferable for the oil and natural gas industries because it leads to an overall increase in development technology capabilities. However, as there are many projects that require high investment along with technological capabilities in such development, there are situations where the development stagnates in the future, that is, the development plan may be reduced, delayed or cancelled.

Layoffs

One quick way to reduce costs is to lay off employees. In 2016, BP laid off about 4,000 employees in its upstream sector and plans further cuts of 3,000 people in its refining and other downstream

businesses by the end of 2017. Between 2015 and the end of 2016, 12,500 jobs were lost at Royal Dutch Shell, with 5,000 layoffs in 2016 alone.[92,93]

As of November 2016, ExxonMobil has not announced any significant layoffs, but if oil prices remain around current levels, it may have to act.

Problem: AS a remedy for excessive expenditure in the booming economy, cost saving such as reduction of personnel is effective for raising substantial profits. However, when dealing with difficult conditions, there is a risk of excessive worker reduction. Especially for the workers in the upstream sector, various abilities are often required. For this reason, from a human resource development perspective, investment cancellations and postponements, as explained below, are a source of apprehension for the future.

Cancelling and Postponing Investments

Another means of cost reduction is to cancel or postpone investments.

Changes in investment amounts of the oil majors were discussed in Chapter 2, but let's look at their entirety. The table below shows declining investment amounts for each fiscal year or reporting period, with the total amount of the three companies forecast in 2016 30% lower than results for 2014.

Figure 30 Change in capital investment budgets of the oil majors

Unit: US$bn	2014	2015		2016		2017	
	Result	Budget	Result	Guidance as of Oct. 2015	Prospect as of Nov. 2015	Guidance as of Oct. 2015	Guidance as of Nov. 2016
ExxonMobil	**38.5**	34.0	**31.1**	34.0	**20.5**	34.0	23.0
Royal Dutch Shell	**35.0**	30.0	**28.9**	35.0	**29.0**	Na	25.0
BP	**22.9**	20.0	**18.7**	18.0	**16.0**	18.0	16.0

Source: Earnings report of each company and Petroleum Argus articles from 30 October 2015 and 4 November 2016

Next, the table below shows the postponed FID for major projects of each company and the write-offs associated with the cancellation of the project as mentioned in Chapter 2.

[92] *Jiji Press*, 2 February 2016
[93] *Reuters*, 25 May 2016

Figure 31 Postponed final investment decisions (FID) of each company and upstream write-offs

	Postponed FID for major project	Upstream write-off associated with cancellation
ExxonMobil	・Snorre2040 (Norway)	-
Royal Dutch Shell	・Carmon Creek (Canada oil sands) ・Pierre River (Canada oil sands) ・Allow LNG, Browse LNG (Australia) ・Bonga Southwest (Nigeria) ・Vito (USA Gulf of Mexico)	・Cancellation of oil sands operations in Alberta, Canada ・ Cancellation of drilling project in Alaska
BP	・Tangguh Train 3 (Indonesia) ・Mad Dog Phase 2 (USA Gulf of Mexico)	Cancellation of projects in Brazil and the Gulf of Mexico

Source: Corporate information materials

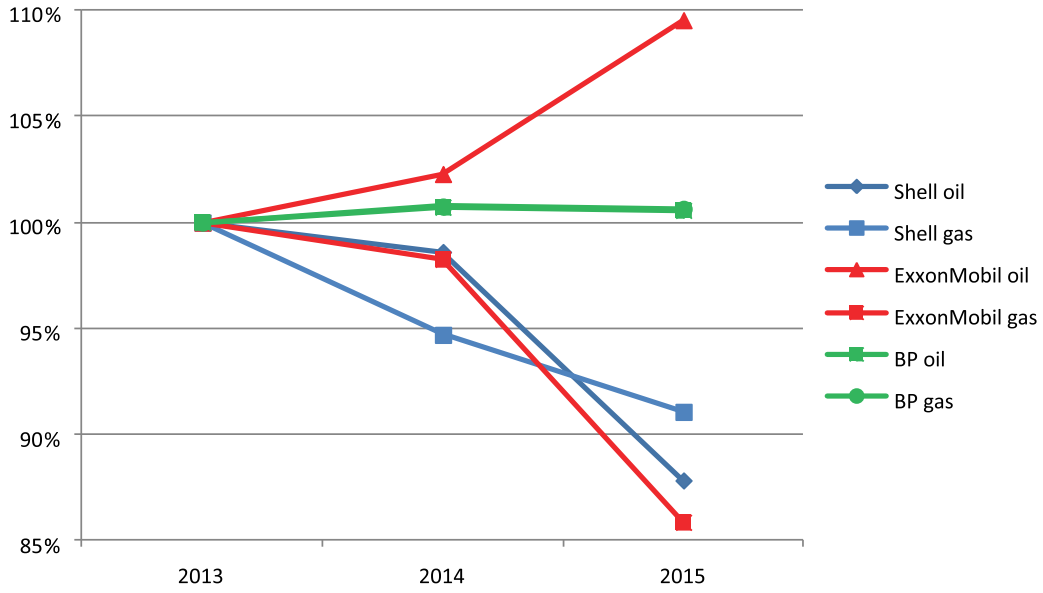
Problem: Such reductions in investment will have a broad effect over the long run. The short run response in the form of delaying projects/investments is not in itself a problem, but rather a reaction to uncertainty about future net revenues. So the effect of these actions in the long run will depend on how quickly the uncertainty is resolved either through efficiency drives and/or new information on expected prices. In that respect, as mentioned in the section on oil-producing countries, it is very difficult to convert to assets with high profitability given the global economic downturn.

The chart below shows the changes in the proven reserves of the oil majors. The proven reserves can be said to be a function of the expected price of oil. Therefore, when there is a significant change in the oil price, it is necessary to pay attention that there will be a corresponding change to proven reserves. Looking at the situation as of 2015 after paying attention to the above, oil and gas at BP are both flat, and while ExxonMobil's gas is growing, other areas are declining.

However, as the chart does not reflect Royal Dutch Shell's acquisition of the BG Group or InterOil by ExxonMobil, it is necessary to monitor the situation for the time being.

In addition, although the investment situation of each company was examined in Chapter 2, in addition to the fact that they are shifting to midstream and downstream, there is still uncertainty in investing in the upstream sector, and although updating proven reserves is a great concern for each company, there is uncertainty about the future as they have not made sufficient investments.

Figure 32 Change in proven reserves (2013 is the benchmark year of 100%)



Source: Annual report of each company and other documents

Up to this point, the oil majors have taken steps to reduce expenditures and investments to maintain dividends to counter the deteriorating profitability of international capital. The next section will look at other measures that can be taken to improve profits.

3-2-2 Improving Profitability

To improve profitability for companies as large as the oil majors, shifting business to highly profitable fields and hedging risk in the crude oil futures market is a natural thing to do, and this section will focus on the persistent cost-cutting activities at the operation level.

Reducing Operation Costs through Partnerships

When profits are good, even oil companies with independent management have started to form partnerships.

For example, Royal Dutch Shell is taking steps to strengthen refining and sales tie-ups with Total of France, and to strengthen tie-ups that include asset exchanges with Russia's Gazprom.[94,95]

As mentioned in Chapter 2, BP also attempted to combine operations with Det Norske's upstream operations, as well as enter a "framework agreement" with China National Petroleum Corporation, that covered retailing ventures in China and oil and LNG trading opportunities globally.[96,97]

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[94] *Reuters*, 4 May 2015
[95] *Reuters*, 19 June 2015
[96] *Petroleum Argus*, 17 June 2016
[97] *Platt's Oilgram News*, 22 October 2015

Problem: Reduction of operation cost through partnership is one of effective solutions. In the first place, the alliance is only established if mutual benefits are recognized. In other words, both parties must find out what kind of commercial advantage it has. From this point of view, there is little opportunity for both parties to continue to build a Win-Win relationship by effectively utilizing their specialty areas. However, there seems to be possibilities such as the division of technology development fields and the construction of an efficient supply chain. Therefore, the partnership that is currently in progress is a "framework agreement" to the last, but in order to evolve and develop in the future, it is necessary to watch over the future for its effectiveness.

Reducing Manufacturing Costs through Technical Development

As a matter of course in the manufacturing industry, the oil majors focus on reducing manufacturing costs through technical development as a producer.

For example, ExxonMobil has developed a low-cost technology for shale gas drilling, and technology to directly manufacture ethylene from crude oil without going through the normal oil refining process.[9899]

Problem: When companies plan to reduce expenditure, reduction of R & D expenses tends to be subject. With this reduction, there arises a problem that sufficient cost effectiveness regarding research and development can not be raised. In recent BP and R / D Shell, it is reminded that the fact that technical development articles can not be found has not been sufficiently effective.

In fact, it is necessary to continue investing in R & D as well as crude oil development even when the business environment is severe. And by setting up a system that can start immediately when the environment turns around, it can be said that such company can lead other companies. However, it is important not to study a large number of fields extensively, but to focus on the fields that are needed from now while looking at market trends.

[98] *Platt's Oilgram News*, 5 March 2015
[99] IHS, News Release, 6 July 2016

Chapter 4 Impact on Global Energy Markets

4-1 OPEC Unable to Regulate Crude Oil Prices

Since crude oil production quotas by member countries were abolished at an Organization of the Petroleum Exporting Countries (OPEC) meeting held in December 2011, the oil supply and demand balance has been supported by robust demand from China and emerging countries, and has maintained equilibrium for two years despite the increase in shale oil production in the United States.
This is why the lack of progress on discussions about production quotas was not a major problem.

However, the lack of progress on production quotas was largely seen as a betrayal of expectations by market participants because no progress was made at the OPEC meeting held at the end of November 2014 to discuss measures to combat oil prices that began to fall from mid-2014.

OPEC's Lack of Cohesion

According to initial observations by market officials at the time, it was hoped by market participants that OPEC would unite at the meeting and do something to stop falling oil prices. OPEC nations that were trying to halt the decline were discussing production quotas with OPEC's largest member, Saudi Arabia. However, there were memories of the past when Saudi Arabia played the part of swing producer only to see revenues decline and deficits persist for many years. This may have been the biggest factor that Saudi Arabia hesitated to reduce production and lose market share. Moreover, Saudi it is likely that Arabia believes that the main cause of the decline of the price of oil this time is largely due to the increase in shale oil produced in the United States, and maintained its stance to strictly engage in discussions for OPEC to reduce production. On 22 December 2014, Saudi Arabian oil minister Ali Al-Naimi said that low oil prices were caused by speculation and the lack of cooperation from non-OPEC nations. He also sent a clear message, saying that Saudi Arabia would not cut production to maintain its market share even if non-OPEC producers cut their production.

Kuwait and the UAE have shown some degree of understanding of Saudi Arabia's stance. Both countries tolerate Saudi Arabia's policy of, "although low oil prices affect the national budget, there is no choice other than to maintain current output to prevent OPEC's market share from eroding." On the other hand, Iran, Venezuela, some African oil-producing countries and Oman, a non-OPEC country, have severely criticized Saudi Arabia for not discussing cuts to production despite oil prices collapsing.

Given these circumstances, on 11 February 2015, the Executive Director of the IEA said that US shale oil had taken over the role of regulating oil production from OPEC. He further commented that if the price of oil rose, shale oil production would rapidly increase.

At an OPEC meeting held in June 2015, OPEC decided to maintain its output level of 30 million b/d (actual production substantially exceeded this), and no further progress on output levels was made during a meeting in December the same year. In the meantime, following the final agreement to the

Joint Comprehensive Plan of Action (JCPOA) on 14 July, Iran began commenting on its plans to recover lost interests following the lifting of the embargo, stating that it could export 500,000-800,000b/d immediately after the embargo was lifted (16 July 2015), and that there was no change in plans to proceed with increased production and exports even if the oil price fell to US$30/bbl (17 November 2015). Likewise, Iraq advocated that Iran had the right to increase production after sanctions were lifted, stating that Iraq was planning to further raise its own crude oil production in 2016 (4 December 2015).

OPEC members have continued to make remarks that prioritize their own interests, which suggests that they are becoming less inclined to make concessions as OPEC members.

Lack of Cooperation between OPEC and Non-OPEC Members

At the start of 2016, the price of crude oil fell below US$30/bbl, marking a new phase in relations between OPEC members and other major oil producing countries. Both OPEC and non-OPEC members began to backtrack on their policies and statements as crude oil prices fell to unexpected levels.

With oil prices below US$30/bbl at the end of January 2016, Russia, which had been reluctant to agree to OPEC's output cuts, indicated that it would agree to talks in a joint OPEC and non-OPEC meeting (28 January 2016) in response to an appeal from OPEC's secretary general. That day, Saudi Arabia, in an unofficial comment, proposed a cut of up to 5% to output for all oil-producing countries. This proposal was extended to Venezuela, Qatar, Oman and UAE in early February. On 16 February, Saudi Arabia, Russia, Qatar and Venezuela agreed to freeze crude oil output at January 2016 levels, subject to other major oil-producing countries following suit.

The next day, however, Iran voiced strong opposition to the agreement. Although Iran supported the OPEC/non-OPEC member talks to boost crude oil prices by regulating output, January was the month the embargo was lifted, and its output in January was drastically different from pre-sanction output levels. It made no sense to ask Iran to freeze output without asking countries to adjust their outputs that had increased while Iran was under sanctions. For this reason, there seems to have been a compromise in the works for Iran, but Iran remained firm in its stance. Furthermore, Iranian energy minister Bijan Namdar Zangeneh announced on 13 March that Iran would not participate in talks to freeze crude oil output unless its output reached 4 million b/d.

Initial talks were originally planned to be held in Moscow on 20 March, but with Iran's remarks, the meeting was postponed to Doha, Qatar on 17 April. Saudi Arabia's Deputy Crown Prince Muhammad bin Salman Al Saud, urging Iran to participate, said on 31 March that his country would maintain its output level only when major oil-producing countries, including Iran, joined the production freeze. On the other hand, Kuwait said that a production freeze was possible, stating on 5 April that it would be difficult to sell crude oil in oversupplied markets and that Iran's increased

production would not hinder the maintenance of production levels even if Iran did not participate in the talks. Prior to the opening of the talks in Doha, host country Qatar invited Norway to participate, but Norway declined, while non-OPEC countries such as Oman, Azerbaijan and Colombia expressed their intention to participate. Besides Iran, Brazil and other countries with plans to increase production within the year showed no intention to participate in the freeze.

Eventually, at the OPEC/non-OPEC member meeting on 17 April, the three-way deadlock between Iran, which objected to the freeze, Saudi Arabia, which would not accept an agreement without Iran, and Russia, which would only agree if other nations followed suit, went unresolved.

With oil remaining below the benchmark of US$50/bbl, momentum increased for an informal OPEC meeting in Algeria at the end of September alongside the IEF, but at an informal meeting that betrayed market expectations, OPEC agreed that total output should be kept at 32.5-33 million b/d. However, discussions on restrictions and monitoring for each country were left to the OPEC meeting at the end of November.

At the 171st OPEC meeting on 30 November, production limits were set for each OPEC member country for the first time in about eight years. However, the agreement was on the condition that non-OPEC members would participate and that a crude oil monitoring committee be established on the assumption that crude oil would recover sharply due to improved security in Libya and Nigeria, which were not bound by the reduction, but were are many concerns over matters such as the need to establish monitoring methods. In addition, OPEC/non-OPEC nations agreed to cooperative production cuts on 10 December, such as whether to step in to establish penalties within OPEC or whether non-OPEC oil-producing countries could continue with production cuts in the event the production limits are observed, but doubt remains as to its effectiveness. Ultimately, regardless of the sharp increase in shale oil production in the United States, further OPEC/non-OPEC cooperation will be necessary to see if it is possible to maintain crude oil prices at a certain level without participation by the United States.

In this way, although the opposing axis of Saudi Arabia and Iran remains inside OPEC, production adjustment was decided under a highly sophisticated political judgment. Furthermore, as a result of participation by 11 non-OPEC countries, a system has been created to cooperate with more than two-thirds of global oil supply. It will be important that the movement of production growth in Iran which was treated as an exception from production adjustment, and the action of shale oil production growth in the United States which is another non-OPEC big oil producing country, is monitored in the future.

4-2 The Difficulty in Predicting the Future of Crude Oil Prices

In addition to the situation of OPEC's lack of cohesion and the lack of cooperation between OPEC and Non-OPEC members, the factor of uncertainty in the break-even price of shale oil complicates the prediction of crude oil price.

1. What is the Break-even Price of Shale Oil?

After the OPEC meeting at the end of November 2014, Saudi Arabia cited speculation and the lack of cooperation from OPEC as reasons for continuing relative low oil prices. It also admitted that it allowed the price of oil to fall to suppress the production of non-OPEC producers, especially shale oil.

At the time, the cost of producing oil in OPEC countries ranged from US$1-6/bbl in Saudi Arabia to US$5-20/bbl in Qatar and Iran, while non-OPEC shale oil was estimated at US$46-93/bbl, far costlier than OPEC's conventional crude oil.[100] In OPEC, if crude oil market conditions deteriorate, some shale oil will be unprofitable and shale oil production will be curtailed. In this scenario, the supply and demand of oil is said to be balanced and stops oil prices from falling. In fact, the decline in shale oil production was insignificant, and did not stop the collapse in oil prices. So, what is the actual break-even price of shale oil?

Research by the Energy Information Administration (EIA) and oil publications suggests that the break-even point for shale oil production differs between each production area. This section will introduce the findings focusing on Bakken, Eagle Ford and Permian, which are regarded as the main production regions, using the research published by EIA in March 2016.[101]

Capital Expenditure

First, the capital expenditure for production wells is calculated as the drilling, completion and facilities invested per well in 2014 for each major drilling region. The results for the three regions are shown in the table below.

Figure 33 Capital expenditure per well at Bakken/Eagle Ford/Permian

【Bakken】	Unit	Elm Coulee	Parshall	New Fairway	Periphery
Well Cost	MM USD	7.5	7.8	7.9	8.1
・Drilling	MM USD	2.4	2.4	2.4	2.6
・Completion	MM USD	4.4	4.8	4.9	4.8
・Facilities	MM USD	0.6	0.6	0.6	0.6

【Eagle Ford】	Unit	Low Energy	NE Core	Western C	Gassy Edge
Well Cost	MM USD	6.9	7.3	7.5	7.6
・Drilling	MM USD	2.1	2.5	2.1	2.4
・Completion	MM USD	4.4	4.3	5.2	5.1
・Facilities	MM USD	0.4	0.5	0.2	0.2

[100] *PIW*, 16 March 2015

[101] EIA, *Trend in U.S. Oil and Natural Gas Upstream Costs*, March 2016

【Permian】	Unit	Bone Spring	Wolfcamp D	Wolfcamp M	Sprebery
Well Cost	MM USD	6.6	7.7	7.8	2.5
・Drilling	MM USD	2.3	2.2	2.1	1.2
・Completion	MM USD	3.8	4.9	5.2	1.0
・Facilities	MM USD	0.5	0.5	0.5	0.2

Source: EIA, *Trends in U.S. Oil and Natural Gas Upstream Costs*, March 2016

These differences arise from the difference in oil well design based on the subterranean structure of each drilling region. For example, the investment per oil well at Eagle Ford is cheaper than at Bakken. This has to do with the fact that the true vertical depth (TVD) of oil wells at Eagle Ford is shallower than those at Bakken, and that there has been little use of horizontal drilling. This means that the number of days to drill can be reduced which can lower costs by reducing the number of operating days of the drilling rig. Also, shorter drilling distances means less usage of pipes (casing, liner and tubing). The amount invested in the Spraberry Trend in the Permian Basin is low because horizontal drilling is not scheduled.

Operating Costs

Next are operating costs. Operating costs vary depending on factors such as the location of the production well, the performance of the production well and the efficiency of operation. That is, when the production well is located far away from the area of consumption, transportation costs are higher, and if it is located closer, those costs become cheaper. Depending on whether the oil is transported by pipeline or by rail, the shipping cost will also vary greatly. It is estimated by EIA that it is more than US$5/bbl cheaper to transport oil by pipeline to the Gulf of Mexico than the US$10-13/bbl it costs to transport it by rail from Bakken to where the oil is needed.

Also, the performance of the production well, affects artificial lift and maintenance costs. That is, shale oil is obtained through the method of hydraulic fracturing, but depending on the conditions of the cracks when using this method, the viscosity and amount of water, and the size, concentration and material (proppant) injected into the cracks changes. It is sometimes necessary to use ceramic proppant for its high strength and high heat resistance, which is a technically important factor in operating expenses.

Additionally, the cost of the "water," which is inconspicuous in the production of conventional crude oil, cannot be ignored. Bakken requires 0.75-1.00 barrels of water to produce one barrel of crude oil, and incurs costs to produce the water, inject it, recover it and dispose of it, plus the cost of operating pumps.

It also costs US$2.00-4.00/boe in general labor costs (general & administration costs).

Thus, Bakken's operating costs are calculated to be US$15-37.5/boe, US$15.5-24.5/boe for Eagle Ford and US$13.3-33.8/boe for Permian.

Future Changes in Costs

EIA forecasts how each item relating to operating costs will change from 2014 to 2015.

Figure 34 Changes for operating costs 2014 to 2015

Item	Change	Description of change for 2015
Short Transportation	-3%	Improved pipeline infrastructure will allow for less trucking. Saving on fuel costs will be seen.
Long Transportation	-3 – -60%	Lower Rail activity and improved infrastructure will drive this improvement.
NGL Fractionation	0 – -5%	Fractionation changes have been high but decrease as fuel costs are low.
Water Disposal	+1.8%	Many water disposal contracts have fixed rates and some of this will escalate based on PPI or other indexes. Only companies that dispose of their own water will see savings.
General & Administration	+5%	Severance package/payments due to layoff are increasing G & A despite lower future operating cost. Saving will not be realized until 2016.
Artificial Lift	-10%	Oil field services rates are dropping due to lower activity and lower input costs rates such as energy.
Artificial Lift Maintenance	-10%	Oil field services rates are dropping due to lower activity and lower input costs rates. Maintenance will now be avoided in some cases where it was profitable at higher prices. Companies that pay a fixed maintenance may not see better rates in 2015 unless they are able to renegotiate.
Direct Labor	-3%	Saving will be due to fewer operational employees.
Others (Pumping, Compression, etc.)	-10%	Energy cost savings.

Source: EIA, *Trends in US Oil and Natural Gas Upstream Costs*, March 2016

Break-Even Costs

EIA does not specify the final break-even costs in its report. This figure depends on fluctuations in capital expenditures, as well as fluctuations in break-even costs that depend on the number of years of depreciation and production.

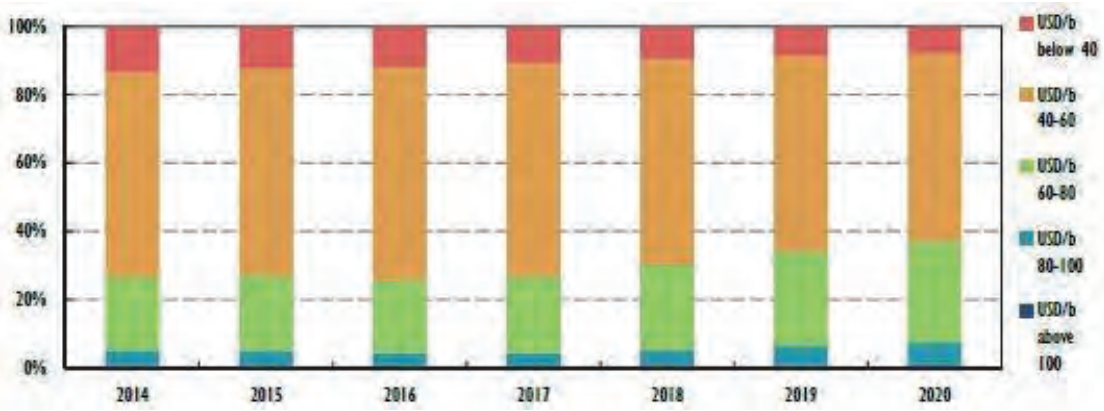
This section will introduce the break-even price of shale oil that was published in the

Medium-Term Oil Market Report (MTOMR 2015), released by the International Energy Agency (IEA) in February 2015.

According to the figure below, there are wide variations in the break-even point from less than US$40/bbl to over US$100/bbl. Looking at only the operating costs as mentioned above by EIA, all are below US$40/bbl, but that is because the IEA factors in capital expenditure, government taxes and so on into the break-even costs.

According to the IEA's explanation, the break-even point in 2014 was less than US$50/bbl, which accounts for 48% of all US crude oil production and 41% of unconventional crude oil production. In the future, the proportion of the break-even price over US$80/bbl will increase, but is forecast to be less than US$50/bbl and 37% of total production by 2020.

Figure 35 Percent of US production of crude and condensate from tight and shale oil within breakeven price ranges



Source: IEA, *Medium-term Oil Market Report 2015*, February 2015

2. Crude Oil Prices that React Contrary to Expectations' to Changes in Supply and Demand Factors

At the OPEC/non-OPEC oil-producing country meeting held in Doha, Qatar on 17 April 2016, due to the absence of Iran and failure to agree on production freezes, most forecasts were about "crude oil prices falling a notch" and "further prolonged stagnation of oil prices." However, almost simultaneously, news about the reduction of over 1 million b/d due to an oil worker strike in Kuwait, wildfires in Canada that affected the production and transportation of crude oil, and attacks by armed groups on Nigeria's oil production and transportation facilities caused oil prices to reverse course and rise. In the markets, crude oil prices moved unnaturally even though the Kuwaiti strikes were resolved and the view that the looseness of the supply and demand balance had returned, and the wildfire in Canada had subsided.

On the other hand, prices may have moved due to other factors. In February 2016, news reports speculated that Saudi Arabia and Russia agreed to freeze crude oil output at January levels, causing

oil prices to rise even though the freeze would not come into effect unless Iran agreed. Even at the OPEC meeting in June, oil prices moved based on the expectations of a possible last-minute agreement. At the same time, in remarks that felt like lip service from the leaders of the major oil-producing countries, oil prices rose on the over-expectation that the market would improve the supply and demand balance.

The comments about market trends were that crude oil prices may fluctuate due to the movement of financial instruments. For example, the price of crude oil denominated in US dollars falls as the US dollar strengthens against other currencies, and crude oil prices rise as the dollar weakens. This movement in crude oil prices has nothing to do with trends in supply and demand.

It has long been said that crude oil has become a financial instrument. Speculative money flows in, causing profit and loss by moving crude oil price more than supply and demand factors. And it is aimed to raise profits by moving prices. This also has no connection with trends in the supply and demand of oil.

These movements are sensitive to short-term changes, and the perspective of how crude oil prices move with long-term trends can be overlooked. Although OPEC, the IEA, EIA and others announce regional demand and supply in monthly reports, it is difficult to say that these long-term perspectives are reflected in the oil futures market; rather, they more closely resemble day trading.

If this trend accelerates in the future, when the growth of demand and supply does not match, it may contribute to an environment that is more turbulent than expected.

4-3 Potential for Future Chronic Supply Shortages Resulting from the Lack of Willingness to Invest in Oil Development 1. Low Oil Prices Produce Some Degree of Demand

The 2nd Technical Meeting held on 18 July 2016 at OPEC headquarters announced its medium to long-term oil forecast, and was attended by about 40 participants, including OPEC members, China, India, Japan, Korea, the Economic Research Institute for ASEAN and East Asia, the Asia Pacific Energy Research Centre and the Institute of Energy Economics. Until now, energy research institutes such as IEA and EIA have claimed that low oil prices relatively increase the cost competitiveness of oil and lead to an increase in future oil demand, and at this meeting it was noted, oil demand was expected to increase mainly in non-OECD countries due to the low price of oil that had continued for nearly two years.

Until now, low oil prices have been said to have a positive effect on the world economy, but OPEC disagreed with the assertion, arguing that while it may be a common perception for importing countries, it is painful for oil-producing countries (national revenues decrease), and that there are cases of financial market chaos when crude oil prices collapse. In fact, the declining revenue of oil-producing countries slows down economic activity, affecting the economic activities of neighbouring countries dependent on exports to oil-producing countries, causing a chain reaction that affects energy

consumption, including oil. Therefore, a large increase in demand for oil is desirable at the beginning when the oil prices begin to fall, but it should be seen that the long-term of low crude oil price will have various adverse effects related to increases in oil demand

2. Declines in Oil Development Investment Due to Persistent Low Oil Prices May Lead to Supply Shortages in the Future

That said, it is likely the global oil demand will continue. Surplus supply currently balances supply and demand by gradually increasing demand. Furthermore, it is said that oil demand will follow an upward trend after that. The problem here is that at the 2nd Technical Meeting mentioned above, OPEC was seriously concerned about the lack of investment caused by low oil prices. Like OPEC, interviews conducted in the United States (Washington) and Europe (London) from 13 to 20 November 2016, indicate that energy experts, government officials and international oil companies are all concerned about future supply problems due to the lack of investment. The net profit of the oil majors has been greatly reduced, and they are carrying out large-scale cost-cutting measures and layoffs. Capital expenditure in upstream sectors is expected to be cut in 2017 for the third consecutive year. The economic situation of oil-producing countries seems to be more severe than appearances suggest.

The supply concerns in the future have been found to be continuing at hearings in Europe (Paris) which was conducted from 8 to 12 March 2017. In other words, since the interview in November last year, OPEC and 11 non-OPEC countries decided to implement collaborative production reduction at the end of 2016, contributing to the environment supporting the crude oil price.

However, with this price level as the background, the possibility of increasing shale oil in the United States is emerging. This increase in production will also reduce the power to raise crude oil prices. The report released by the IEA on 6th March predicts that shale oil production will decline from the beginning of the 2020s if the crude oil price is around $50/bbl. [102] In the hearing, production at non-OPEC other than the United States is considered to be sluggish too. International petroleum market analysts are also concerned that the improvement of the financial situation of international petroleum capital was postponed. That is, as a result of their resumption of investment despite the incomplete crude oil price level, they are concerned that their cash flow will be affected and the timing of arrival of a proper break-even point in crude oil development will be delayed.

Saudi Arabia's Minister of Petroleum and Mineral Resources in 2015, Ali Al-Naimi, voiced concerns that if continued investment in oil development cannot be continued, the natural depletion of oil fields and annual increase in oil demand may lead to supply shortages in the medium to long term. To respond to natural depletion and increased oil demand, Al-Naimi noted that new production

[102] IEA, *Global oil supply to lag demand after 2020 unless new investment are approved soon* ,6 March 2017

capacity of 5 million b/d had to be added every year. Moreover, to ensure the continued stable supply of crude oil, sustained investment in crude oil development is necessary. Specifically, Al-Naimi stated that it was necessary to invest US$7 trillion over the next ten years.

The IEA recently issued *World Energy Investment 2016* on 14 September 2016. It claims that the amount of investment in upstream oil and natural gas energy was US$583 billion in 2015, a 25% decrease compared to the previous year. The IEA also expects a further decline of 24% in 2016. It also reported that the decline in investment in the upstream sector will be significant for shale oil and natural gas in North America, and steady in the oil sectors of Russia and the Middle East. This is because of a secondary tax on oil production in Russia (the higher the crude oil price, the higher the tax; the lower the price, the lower the tax), a weak ruble, and firm upstream investment in the Middle East due to a review of low-cost rig contracts due to the decline in drilling rig prices.

In general, maintenance and upgrading of crude oil production is achieved by combining the maintenance of active oil fields with the development of new oil fields. In actively-producing oil fields, periodic refurbishment is carried out for each production well to extract the maximum amount of crude oil from underground. Normally, there is no single production well in an oil field; it is common for an oil field to have 100 or 200 production wells. Unless each of these production wells is carefully maintained, production from the wells will gradually decline. Once a production well has gone into decline, it is technically difficult to revive it. When this happens, it is necessary to drill one or several new wells, but new wells naturally cost more than refurbished ones in terms of time and money, and also come with a higher risk. Until now, Middle Eastern oil-producing countries have stated that they are reducing oil field operating costs as a cost-saving measure, but the reduction of refurbishment costs makes maintaining crude oil output difficult. Moreover, no matter how much refurbishment is done, there is no stopping the decline of production, while current production cannot be maintained unless parallel wells are drilled. Further drilling of new production wells must be done to increase production. The drilling of new production wells can be completed in a relatively short period of time because the structure of the formation is already known in the drilling area that is already producing oil, but in a new drilling area, exploration, evaluation, development and finishing can take nearly 10 years. Given the current situation where expenditure on new investment projects is difficult due to lower revenues, there are no limits to the postponements and cancellations of investment for crude oil development.

OPEC's concern is that unless oil development continues, it cannot supply oil when demand increases. (Not meeting demand means that OPEC will lose market share.) Compared with the development of conventional oil, the characteristic of development of unconventional oil, such as US shale oil, is that there are many excavated drilled but uncompleted (DUC) wells. It is said that these wells are waiting for a recovery in the price of oil before they are completed. According to the EIA report on 12 September 2016, "EIA Estimates of Drilled but Uncompleted Wells", the DUC as of the end of September 2016 in the seven major shale development areas are 5,065 wells, about 10% of total

shale oil well in those regions. These wells will commence production wells according to oil price. However, it is necessary to take into consideration that there are reasons why the DUC of shale oil in the United States is not only due to the oil price, but also because restrictions on the transportation method connecting the production area and the consumption area, it is not possible to produce it.

As to changes in the price of oil, OPEC producers of conventional crude oil have an advantage in that the break-even point is relatively low, compared to shale oil. As such, the warning bells are sounding for continued investment in crude oil development on an ongoing basis should low prices persist.

In addition to the problems faced by the producers, consumers also have their own concerns. Namely, the oil majors are among the producers and their reductions in upstream investment and withdrawal from development projects are factors that can lead to a supply shortage in the future, so cooperation between oil-producing countries and the oil majors will surely take on greater importance.

Chapter 5 – Implications for the Energy Security of APEC Member Economies

5-1 Supply Interruptions Could Happen at Any Time

Causes of supply interruptions include war, terrorism, natural disasters and accidents. The location of supplier countries and consumer countries as well as the timing of transport are also relevant. The magnitude and duration of supply disruptions is also important. In particular, consuming countries must always tune their attention to and collect information about the causes of supply interruptions in supplier countries. Consuming countries need to also take measures so as to prepare for worst case scenarios, with the knowledge that oil has been used as a political on some occasions in the past.

In recent years, the decline in oil prices since the middle of 2014 has caused concern over future supply shortages of crude oil. This is mainly due to: (1) falling crude oil production caused by the phenomenon of an inversion in production costs and sales prices; (2) declining appetite for crude oil development mainly among international oil capital due to stagnant prices; (3) declining crude oil production capacity caused by the fact that falling revenue in oil producing countries makes it harder to fund crude oil development costs similarly due to stagnant oil prices; and (4) declining crude oil export capacity of oil producing countries because they are increasing their own use of energy.

Although governments need to ensure that they do not implement measures or policies which mask the important price signal, there are measures available to countries to limit the impact of future oil supply disruptions.

1. Government Stockpiles and Private-sector Stockpiles

In 1962, the Organisation for Economic Co-operation and Development (OECD) recommended that member countries should hold national stockpiles of oil that account for 60 days of consumption. Five years later in 1967 the Third Middle East War occurred, causing a blow to the economies of developed countries that relied on imports for most of their oil need. Afterward, following the first oil shock of 1973, the International Energy Agency (IEA) was established in November 1974, and an agreement was reached among member countries to achieve the goal of 90-day stockpiles of oil and create flexible arrangements in case of an emergency. For example, Japan effectively commenced its oil stockpiling system from fiscal 1972. Given the major impact the first oil shock caused on people's lives, Japan increased its stockpiles from 60 days to 90 days, and from fiscal 1978 private sector stockpiles were also introduced. At the end of 2015, the total of government and private-sector stockpiles in Japan stood at 213 days.

This government and private-sector stockpiling will play an important role as a bridge until measures can be taken during an emergency situation involving a supply interruption.

2. Creation of Flexible Arrangements between Neighbouring Countries

Under the IEA, which was established as a subordinate body to the OECD, a mechanism was established between member countries that involves flexible arrangements of coordinated use of oil

stockpiles. Under this mechanism, Japan, for example, since it began oil stockpiling, released its own stockpiles for emergency coordinated use in 1979 following the second oil shock, in 1991 during the Gulf War, in 2005 following Hurricane Katrina in the southern United States, and in 2011 during the civil war in Libya.

The mechanism for releasing stockpiles not only during an emergency in one's own country, but also for flexible coordinated use between OECD member countries provides the benefit of not having to maintain excessive stockpiles when the extent of an emergency differs between countries.

Some APEC member economies that do not belong to the OECD have already established government stockpiles and private-sector stockpiles. Establishing a flexible arrangement mechanism between countries on top of this stockpiling would contribute to the unity and mutual development of APEC member economies.

5-2 Establishment of Diversified Energy Portfolios not Dependent Solely on Oil

Energy is not limited to oil only. Therefore, countries have to be prepared for more than just oil. It is important to utilize energy sources in line with each country's situation and policies.

First, each country will likely give top priority to using energy sources located within the country. This could be coal, oil or natural gas. Other sources of energy include biomass fuel, which has gained prominence over the last ten or so years, hydroelectric power, which has produced electricity for many years, and wind power and solar power, which have seen technological advancements recently.

With such myriad energy sources, it is important not to overly rely on a single form of energy. If energy supply is comparatively small, this will not be a major issue, but when large amounts of energy must be consumed, relying on a single form of energy could severely impact economic activities in the event of a supply interruption. Moreover, if the price of energy sharply increases, competitiveness will decline significantly and economic activities will fall into an unhealthy condition. Of course, in fields that utilize energy, consideration must be given to avoid over-concentration, even if there are no other alternatives.

In recent years, with discussions on energy diversification advancing, the introduction of global warming countermeasures is now required alongside such diversification. In particular, in regions where air pollution is growing more serious due to urbanization and population increases caused by economic growth, the introduction of biofuels has been used in measures to use alternative automotive fuels and curb the consumption of fossil fuels. However, there is a major issue with the supply side of biofuels. That is: (1) the absolute supply volume is small; (2) biofuels compete with food; and (3) little progress has been made with the commercialization of second generation biofuels that do not compete with food. Furthermore, today the price of crude oil has fallen off its highs, which has caused the production and development cost of biofuels to exceed the production cost of oil products, making it more difficult to introduce biofuels.

One solution to this issue has been progress with the introduction of electric vehicles (EV). In Manila, the Philippines, efforts are being made to introduce 100,000 electric tricycles before the end of 2016. In addition, in Indonesia and Thailand, electric buses have been developed and are now taking part in trial operations on the streets of downtown Jakarta and Bangkok.

While the introduction of EVs has caused advances in global warming countermeasures with an eye on automotive fuels, these simply transfer the problem of energy diversification to power generation. Generally, coal and natural gas are most used to produce power, and there is a risk of supply interruption for these forms of energy as well. Consequently, it is important to fundamentally reduce dependence on energy imports. In this sense, it will be important to advance the introduction of renewable energy that does not require imports. Some African countries are pursuing power generation using geothermal sources, instead of only utilizing hydroelectricity, to produce power from renewable energy. Also, solar power and wind power have the benefits of localization (i.e., these sources of power can supply electricity to a specific community and do not need to be connected to a distribution grid.)

It will be vital for APEC member economies to pursue risk management by promoting energy utilization in tune with the characteristics and features of each economy, and to select forms of energy that could lead to economic competitiveness.

5-3 Energy Conservation Reduces Energy Usage

The preparations for supply interruptions and energy source diversification proposed here are important measures for consuming countries, but the promotion of energy conservation is also an important measure that curbs the use of energy itself in consideration of energy security.

Until now, government-led approaches to energy conservation have focused on encouraging consumers to actively control their use of energy or promoting energy conservation through laws and measures encouraging improved energy usage efficiency from manufacturers of equipment and devices that use energy. In the transportation sector, which accounts for about 60%[103] of worldwide oil consumption, for many years, measures have been taken to diversify energy sources (development of EV and alternative fuel vehicles) and to improve fuel economy, as effective means of energy conservation.

However, when taking energy conservation measures for the transportation sector, one must not overlook the importance of urban planning and the development of mass rapid transit. The actual fuel economy of vehicles differs depending on the speed, so, for example, the fuel economy of a vehicle traveling at 10km/hour is only about half that of a vehicle traveling at 25km/hour. Furthermore, the energy one vehicle requires to transport one person one kilometre is eight times that of a train.[104] In this manner, when working to lower oil consumption, it will be important to promote a shift to more

[103] IEA, *Energy Balance 2016*
[104] Case of Japan. Ministry of Land, Infrastructure, Transport and Tourism, Government of Japan.

efficient modes of transportation, such as trains, or implement urban planning that reduces traffic congestion. In countries beginning or in the process of mass-motorization, this is doubly important, as appropriate urban planning is one of the necessary aspects of oil security.

Conclusion

The decline in oil prices that began from mid-2014 is not a problem affecting oil futures market participants alone, and it is requiring not only oil-producing countries which rely heavily on oil revenue, but also the international oil majors that are active in the oil industry, to take survival measures.

In addition to rebuilding government organizational structures, revising the management of state-owned oil companies, drawing down the assets of sovereign wealth funds (SWFs), holding initial public offerings (IPOs) of state-owned enterprises and proceeding to draw up new economic policies, oil-producing countries are also having to implement policies that impose a greater cost on citizens, such as the abolishment of subsidies and introduction of new tax systems. Meanwhile, international oil majors are attempting to rebuild their businesses by reviewing their asset holdings, selling or buying assets (selection and concentration) based on those reviews, reducing their operating costs and postponing or curtailing their capital investment.

However, as a result of the prolonged oil price slump, these measures that have been taken in an attempt to survive also pose the danger of becoming "double-edged swords" in the future. Oil-producing countries cannot go on drawing down their SWFs permanently, and neither can they rely on government bonds or bank borrowing endlessly. The mounting excess burden on citizens brings to mind the Jasmine Revolution witnessed previously in Tunisia. Reducing operating costs, which is being implemented as one means of reducing capital expenditure will make it difficult to maintain and bolster oil production capacity. For that reason, oil-producing countries hope to try to enhance oil production capacity by introducing foreign investment. However, at the same time, besides curtailing investment as a means of combating deteriorating revenues, the international oil majors are also being selective about their investment targets and under the current circumstances oil-producing countries are unable to attract the investment from international oil majors that they are hoping for.

In 2016, the Organization of the Petroleum Exporting Countries (OPEC) and 11 non-OPEC countries began working together to rein in and restore falling oil prices. On the occasion of the 171st OPEC Meeting, the non-OPEC countries, which until then had left all the decision making to OPEC, began to show signs of a willingness to cooperate on reducing production. However, even though a monitoring organization was set up to determine whether production cuts are being implemented, a monitoring method has not been established. Furthermore, it will be important to remain aware of the impact of US shale oil, a chief factor driving the decline in oil prices, in the future. Consequently the outlook for oil prices and market conditions is unclear.

Against this backdrop, there is a possibility that the sluggish appetite for investing in oil development may trigger supply shortfalls at a certain period of time in the medium- to long-term as investment levels are not sufficient to offset the natural decline of oil fields or match growth in petroleum demand.

Oil-consuming countries with low self-sufficiency may need to make provisions for supply interruptions that may occur as a result of this underinvestment. To that end, they will likely have to consider introducing or enhancing national and private-sector oil stockpiles, and establishing oil-sharing systems with neighboring countries. They will furthermore need to ensure energy diversification so as not to be solely reliant on oil. The type of post-oil energy they introduce to achieve that will depend on each country's circumstances, but it will be essential to avoid over-dependence on a single energy. Lastly, promoting energy conservation, in other words, curbing energy consumption itself, will also be an important measure. Up to now energy conservation has involved calling on consumers to conserve their energy use and/or supporting manufacturers of equipment and devices to improve energy consumption efficiency. In the transportation sector, which accounts for approximately 60% of the world's entire oil consumption, it must not be forgotten that promoting energy conservation through urban planning and the establishment of Mass Rapid Transit (MRT) systems will also generate substantial outcomes.