



EXTERNAL CHALLENGES & OPPORTUNITIES FOR THE PARK GEUN-HYE ADMINISTRATION

KOREA'S EVOLVING ENERGY STRATEGY: A DIFFERENT SHADE OF GREEN¹

By George Hutchinson

Abstract

The health and strength of Korea's manufacturing-intensive, export-led economy remains almost entirely dependent on access to energy imports; in particular, oil from the Middle East. This continues to leave the country's strategic outlook exposed and vulnerable. The "low carbon, green growth" vision of the previous presidential administration emphasized supply-oriented policies, focusing on growth and investment in nuclear and renewable energy. However, as Korea revises its National Energy Plan, indications are the Park Geun-hye administration will favor demand-side solutions. Additionally, previous plans to expand nuclear energy capacity will likely be canceled and less emphasis on renewables is expected. The revised plan will set the country on a new, strategic five-year trajectory that will profoundly impact its politics, economy and energy security. To provide context to the impending shift in policy, this paper will examine Korea's energy portfolio and assess its level of dependency and energy security vulnerability. Additionally, the paper will examine recent energy policies and strategies as they have evolved up to the current administration. Finally, the paper will gauge the strategic direction Korea is set to embark upon as it seeks to enhance its energy security while carefully balancing impacts to social equity, the environment, and the Korean economy.

Background

Korea continues to be an economic powerhouse. Renowned for its shipbuilding, automobile and electronics industries, Korea now ranks as the world's fifteenth largest economy and carries the lowest unemployment rate among all OECD countries.^{2,3} The strength of Korea's economy largely depends on manufacturing and trade to produce exports. The country ranks fifth among the world's largest merchandise exporters—exports make up over half of Korea's GDP—a far higher percentage compared to Japan or China.^{4,5} But this is where the tenuousness of the country's success begins to materialize. Korea also ranks sixth among the world's largest importers.⁶ Because it lacks natural resources, Korea must import vast materials and supplies to fuel its manufacturing-intensive, export-led economy. The country's largest import items are crude oil and fossil fuels (crude oil, natural gas and coal), accounting for nearly 30 percent of total imports.⁷ Here is where the magnitude of Korea's dependency on imported energy reveals itself. To meet its energy needs, Korea is almost entirely dependent on foreign imports.

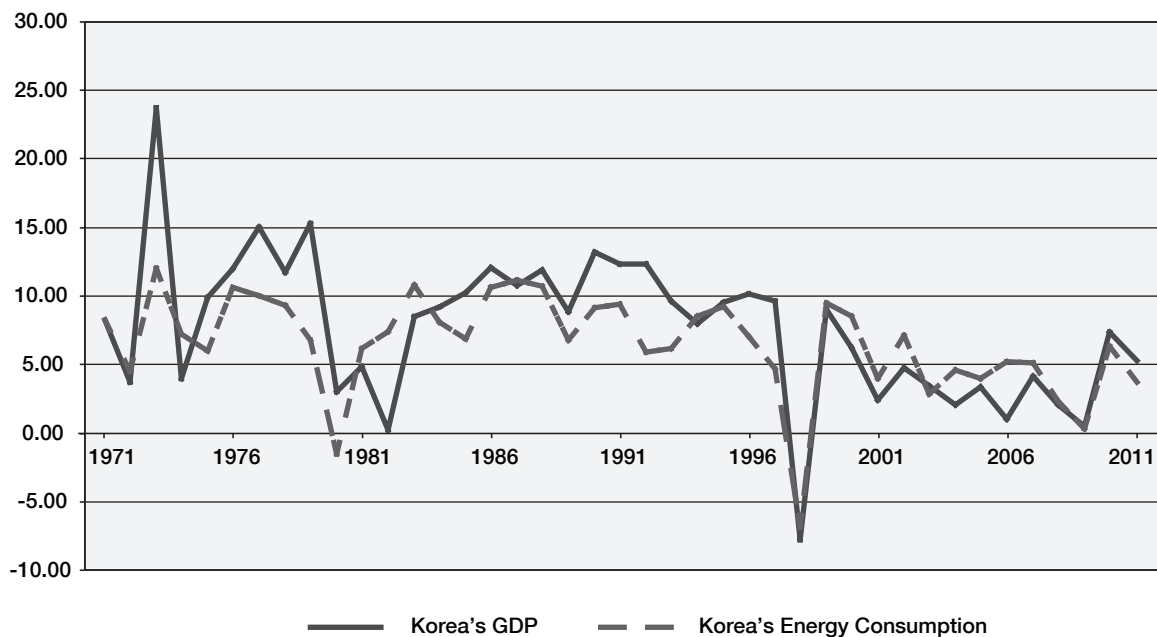
Korea's industrial sector soaks up over 60 percent of all the energy consumed in the country. This makes Korea's energy intensity the fifth highest among OECD countries

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and underscores the role energy plays as a critical input to Korea's economic productivity.^{8,9} Thus, in order to sustain manufacturing, grow exports and hence increase GDP, Korea depends on an uninterrupted supply of energy to power its industrial sector—from the machines that power its mills through the day to the lights that burn throughout its factories at night. Unsurprisingly, Korea's GDP growth and energy consumption are highly co-integrated with causality running from energy consumption to GDP—a characteristic that is indicative of a highly energy dependent country (See Figure 1). Therefore, restrictions or disruptions affecting energy consumption could cause serious adverse affects to Korea's economy. In essence, the Korean economy depends on unrestricted access to imported foreign energy to meet nearly all of its power needs. This will continue to leave the country's strategic outlook exposed and vulnerable. To grasp

Figure 1

Rates of Growth in Korea's GDP and Energy Consumption, 1970–2012
(Percentage change from previous year)^{10,11}

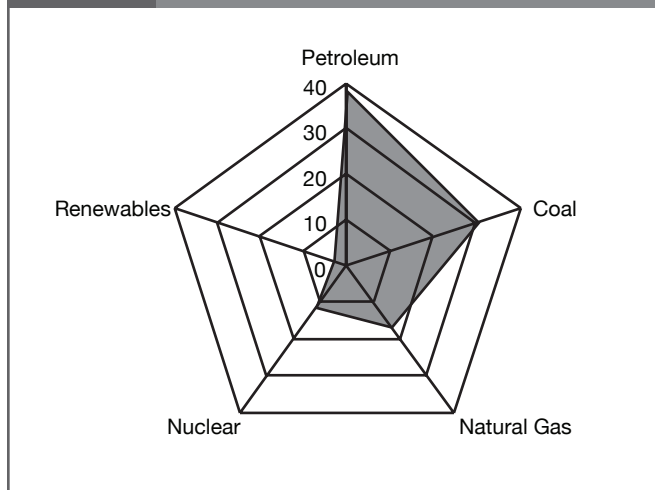


Sources:

Consumption: <http://www.bp.com/en/global/corporate/about-bp/statistical-review-of-world-energy-2013.html>

GDP: <http://databank.worldbank.org/data/views/reports/chart.aspx>

Figure 2

Korea's Energy Portfolio
Percentage of Primary Energy, 2011

the degree of vulnerability, a deeper examination of Korea's energy portfolio and source of imports is required.

Among the World's Largest Energy Import Portfolios

Korea is the world's tenth largest energy consumer.¹² The country's energy portfolio is made up of the following resources, in descending order of predominance: petroleum, coal, natural gas, uranium and renewables. The fossil fuels group (petroleum, coal and natural gas) comprises 85 percent of the portfolio. Of the non-fossils, nuclear energy makes up 12 percent and renewables, including hydro, stand at 3 percent (See Figure 2). Korea produces four percent of its own energy through trace amounts of indigenous coal, natural gas and renewables. The rest—96 percent of Korea's energy requirement—is imported.¹³

Korea is the third largest importer of coal and fourth largest generator of nuclear energy;¹⁴ 100 percent of the uranium required to operate its nuclear plants is imported from abroad. The country's coal and uranium imports are spread among a diverse set of suppliers. Significant coal suppliers include China and Australia, while uranium imports are mainly supplied by the United States, Australia, and Russia. Korea is also the world's second largest importer of liquefied natural gas (LNG) and fifth largest importer of oil. The country's LNG supplier portfolio includes Middle East countries, but is generally diversified, with countries like Indonesia, Malaysia and Russia positioned as significant sources of supply.¹⁵ However, the country's oil imports predominantly come from the Middle East—87 percent.¹⁶ For these imports, Korea relies completely on tanker shipments since it has no international pipelines.

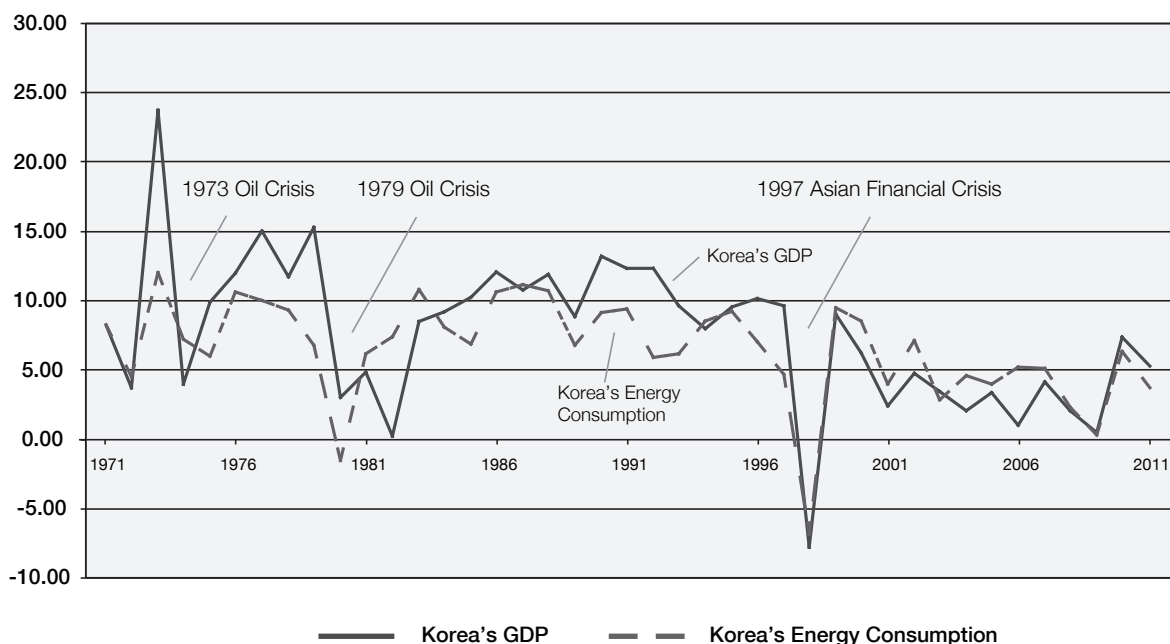
Perilous Middle East Oil Dependency and Attempts at Mitigation

Korea's Middle East imports must travel through a gauntlet of maritime chokepoints—the Strait of Hormuz that lies between Oman and Iran as well as the Strait of Malacca, which lies between Indonesia, Singapore and Malaysia. Reliance on the straits serves up an array of challenging scenarios that could result in serious supply disruption—military events, blockades, sabotage, terrorist actions, and piracy, to name a few. While Korea is not alone in relying on these sea lanes—other Northeast Asian countries (e.g., China, Japan and Taiwan) rely on the straits for energy imports—the country stands out as particularly vulnerable, not just because of its ultra-dependency on the Middle East for oil and its lack of access to international pipelines, but also due to its geographical and regional predicament. In this regard, Korea is disadvantaged on multiple levels. For oil, unlike the United States, Korea lacks the good fortune of having major suppliers close at hand, whose top suppliers of imported crude oil include its border countries, Canada and Mexico. Korea's only land border is cordoned by the existence of the Democratic People's Republic of Korea; in essence, this serves to block overland pipeline access to the energy supply potential of the Russian Far East. To Korea's west lies China and to the east lies Japan—both even larger importers of oil than Korea. Together, the three countries represent the world's largest energy market but they do not belong to a strong framework through which to coalesce and directly influence petroleum issues; rather, they tend to compete head on for oil supplies. Thus, blocked at its northern border and lacking a cooperative energy framework, Korea must reach beyond the region and rely upon the Middle East and costly, risk-laden oceangoing conveyances that in turn, rely on unfettered access to the Hormuz and Malacca Straits. Disruptions to free movement within these shipping lanes would have an immediate, grave impact on Korea's Middle East oil-dependent economy. Korea has previous experience surviving such episodes.

Events of the 1970s made it urgent for Korea to lessen dependence and increase supplier diversification of oil, and increase non-petroleum sources of energy. The "oil shocks" of 1973 and 1979 had devastating impacts on Korea's economy (See Figure 3). As a total share of Korea's energy consumption, oil reached a peak of over 60 percent in 1978, almost all of which was coming from the Middle East. With its economy hit hard twice in the same decade, Korea confronted its increasingly dangerous dependence by aggressively pursuing crude oil stockpiling, oil exploration and development, and by adding LNG and nuclear energy to its portfolio. Through the efforts of its state-run Korea National Oil Corporation (KNOC), in 1980 Korea began building up a significant strategic reserve

Figure 3

Economic Effects of 1970s Oil Shocks and Asian Financial Crisis (Dips in Korea's GDP and energy consumption; expressed as percentage change from previous year)



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Consumption: <http://www.bp.com/en/global/corporate/about-bp/statistical-review-of-world-energy-2013.html>

GDP: <http://databank.worldbank.org/data/views/reports/chart.aspx>

of crude oil and petroleum products. The Asian financial crisis of 1997-98 further catalyzed efforts to expand strategic storage capabilities and in 2001 Korea became the 26th member of the International Energy Agency (IEA), the autonomous body that coordinates actions among OECD nations to seek stability in global energy markets. The key requirement for IEA members is to hold at least 90 days of emergency oil stocks. Today, Korea holds 258 days of combined private and public supplies, the largest amount of all IEA countries.¹⁷ The country is also currently promoting an ambitious plan to become “Northeast Asia’s Oil Hub” through the construction of large scale oil storage facilities in Yeosu and Ulsan that will add an additional storage capacity of 37 million barrels of oil and position Korea as a regional petrochemical industrial complex. In addition to managing large stocks of petroleum, Korea’s other supply-oriented strategy is to invest in domestic and overseas energy exploration and production (E&P) activities and projects.

During Lee Myung-bak’s tenure as President, Korea’s Ministry of Trade, Industry and Energy (MOTIE), formerly the Ministry of Knowledge Economy, was charged with finding ways to help raise the country’s energy self-sufficiency rate by directly securing energy resources through development and investment in overseas energy projects. MOTIE set a target for the country to raise this rate from 4.2

percent in 2007 to 18.1 percent by 2012.¹⁸ The strategy for achieving this goal has been implemented through overseas investment projects—upstream and downstream—and E&P activities executed by three state-run corporations. KNOC and the Korea Gas Corporation (KOGAS) are charged with expanding equity in overseas oil and gas projects to bump up the country’s self-sufficiency import ratio for those resources. As of February 2013, KNOC is actively participating in 226 prospective overseas E&P projects in 24 countries.¹⁹ KOGAS is involved in 26 overseas projects in 13 countries.²⁰ The Korea Resources Corporation (KORES) is responsible for procuring strategic minerals and resources, including bituminous coal and uranium; KORES has stake in 38 overseas projects across 18 countries.²¹ To achieve the 18.1 percent goal, the Lee administration actively encouraged rapid expansion of the overseas investments through the three corporations from 2008 to 2012. According to Platts, Korea only logged a 13.7 percent self-sufficiency rate by the end of 2012, missing the target.²² As 2012 drew to a close, success (or non-success) of the overseas operations was being called into question. Combined debt among the three state-owned firms grew to \$50 billion over the five-year period and it was revealed that the Korean government was recognizing contributions to self-sufficiency from energy reserves secured overseas, regardless whether the energy was actually being shipped to Korea.²³

Thus, shortly after President Park Geun-hye was sworn into office in 2013, the investment activities and profitability of the state-run entities for the 2008-12 period were put under official review. Upon completion of the internal review, the government abruptly made significant policy adjustments, taking immediate steps to greatly reduce government investment in overseas projects and restructure the activities of the state-run firms. Other measures include narrowing the scope of the investment portfolio, focusing the activities of the state-run firms on upstream E&P activities versus downstream refining and logistics projects, and seeking local investment back home to raise funds for projects, rather than solely relying on government funding.

Waning Support for Nuclear and Renewable Energy

Stung from the oil shocks of the 1970s and recognizing the urgent need to diversify its energy portfolio, Korea has poured extensive resources into the development of its nuclear power industry, beginning with the country's first commercial nuclear plant in 1978. In 2008, nuclear power was included among the 22 "future growth engines" identified by the Korean government in alignment with President Lee Myung-bak's vision of "low carbon, green growth." At the time, Korea had 20 operational nuclear plants with 8 more under construction. Plans were set forth to build an additional 11 reactors, bringing the total to 39 and making nuclear power the country's largest source of power for electricity. With the price of oil at historically high levels, Japan was steadily increasing its use of nuclear energy and China was promoting nuclear power as an efficient, clean source of electricity with plans to build several new plants. Nuclear energy was an increasingly attractive option as energy costs, energy security and climate change concerns were accelerating the need to seek ways to decarbonize.

Korea took note of the explosive growth potential for nuclear power and implemented measures to secure its position as an international leader in nuclear technology and secure its demand for uranium supplies through ramped up foreign development efforts. By 2009, Korea famously won a \$20 billion deal to build four nuclear power plants in the United Arab Emirates. In addition, Korea was busy working on export plans and agreements with a handful of other nations, including Turkey, India and Jordan. Public relations efforts were ramped up by the Korea Nuclear Energy Promotion Agency (KONEPA) to conduct events and work on public acceptance of nuclear energy. Efforts at managing public opinion were increased even more after the Fukushima Daiichi nuclear accident occurred in March 2011 and in October of the same year, Korea launched the Nuclear Safety and Security Commission. Since the Fukushima accident, Korea has brought two additional reactors on line and

continued in earnest with plans to construct new ones. Despite all these promising developments, political pressure and anti-nuclear sentiment continues to build. The citizenry is becoming increasingly uncomfortable with the idea of nuclear energy and Korea's nuclear industry has been criticized for creating an opaque culture of secrecy that has fostered corrupt business practices. In October 2013, the Korean government indicted 100 people over a scandal that surfaced in late 2012 involving bribes and fake safety certifications for nuclear reactor parts. This has exacerbated concerns over nuclear safety in South Korea, and as the country watches Japan continue to struggle with Fukushima-related clean up efforts, plans to grow Korea's nuclear industry are derailing.²⁴ Uncertainties over nuclear energy would otherwise open up opportunities for renewable energy; however, mixed policy signals exist over the fate of renewable energy.

Following the global financial crisis in 2008, Korea rolled out policies and investment that supported a goal of expanding renewable energy from a 2008 baseline of two percent to 11 percent by 2030. Stimulus funding was injected into investment plans to support development of core technologies and avenues were opened for businesses to obtain financing for green energy initiatives. In 2010, the Framework Act on Low Carbon, Green Growth was passed to enforce the goal of reducing greenhouse gas emissions by 30 percent by 2020 and to give legal basis to the country's green growth strategy. To help spur domestic production of renewable energy, the Korean government instituted a renewable portfolio standard in 2012 that requires power companies to increase renewable energy sources. That year, the government also established an emissions trading scheme (ETS) that will go into effect in 2015 and help to facilitate greenhouse gas reductions. Thus, with a renewable portfolio standard, ETS, and targets in place to increase renewable energy and decrease greenhouse gas emissions, all against the backdrop of uncertainty over the direction of nuclear energy, conditions would seem to favor heavy implementation of renewable energy. Evidence suggests that, while the plug is not being entirely pulled on renewables, the same level of emphasis and investment will not be there. Shortly before the end of the Lee Myung-bak administration, the Korean government announced that it would revise policy governing the allocation of renewable energy subsidies, in effect, putting greater onus on private industry and market competition. Since President Park Geun-hye assumed office in February 2013, Korea appears to be putting greater emphasis on reducing energy consumption—demand-side measures—rather than focusing on supply-side development of renewables. The new Korean President recently signaled the new trajectory of her administration's view on energy at the 22nd World Energy Congress held in October 2013 in Daegu: "Korea will use its advanced information and communication technology, such as

energy storage systems and energy management systems, to reduce energy consumption and build an energy market where stored electricity could be traded.”²⁵

The Park Administration’s Pivot to a Demand-Side Focus

As of November 2013, the Korean government is busy developing an official revision to the country’s National Energy Plan—release of the document could come as early as December 2013. The plan will likely be adjusted significantly from the supply centric “low carbon, green growth” plan initiated in 2008 by Lee Myung-bak. President Lee’s plan sought to greatly expand supplies of nuclear energy and renewables, while increasing conventional oil and gas self-sufficiency through state-run overseas investment in projects and E&P activities. In contrast, the newly elected administration of Park Geun-hye has indicated it will promote demand-side energy efficiency and conservation initiatives. Emphasis will be placed on cutting consumption and reducing the country’s energy intensity through energy management, energy storage and information and communication technologies (ICT). During her 16 October 2013 keynote address at the World Energy Congress held in Daegu, President Park outlined her vision for a “convergence energy industry”—one where the government takes a leading role to transform the current energy sector to one that combines “brilliant ideas,” ICT and scientific technologies to develop an engine for a “creative economy.” Alluding to what will perhaps become the cornerstone of the new National Energy Plan, President Park described how ICT systems, such as energy storage and management, would help the country cut its energy consumption “by up to one million kilowatts by 2017, while creating 15,000 new jobs and expanding the market size to 3.5 trillion *won* (\$3.3 billion).” With ICT expected to be pivotal to the expanding, multi-trillion dollar global smart grid market, one can conclude that the Korean government sees an opportunity to leverage its world class manufacturing capabilities and ICT know-how as it aspires to become a dominant export player in this market space. The Korean government may do this while simultaneously addressing what President Park refers to as “the energy trilemma of energy security, social equity and the minimization of environmental impact.”²⁶ While a demand-side agenda will help the country reduce consumption, ease environmental concerns, and spur new market growth, supply-side solutions cannot be ignored.

Supply-centric initiatives won’t disappear, but they will likely be deemphasized. The push to greatly expand nuclear energy is waning, renewable energy shows signs of attracting less government support and investment, and overseas oil,

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gas and mineral E&P will be tapered to focus more sharply on specific investments. Nuclear energy had been a primary focus of Korea’s supply-side strategy, but due to mounting pressures over fallout from the Fukushima disaster and corruption in Korea’s nuclear industry, this will likely change. Based on a recommendation from a government-sponsored working group, future out-year targets for Korea’s nuclear capacity are expected to remain at current levels or decline slightly. Currently, nuclear energy accounts for approximately one-third of the country’s power generation. While this could have worked out in favor of renewables, the Korean government’s decision to allow competition to guide this market will mean slower growth moving forward.

Considering this, along with the need to reduce dependency on Middle East oil and avoid increased coal consumption for obvious environmental reasons, it is expected that Korea will lean heavily on a strategy that supports greater LNG investment. Because of its lower cost, short-term spikes in coal consumption are possible if concerns with nuclear energy cause additional reactors to drop off line. For the most part, however, Korea has expressed great interest in the unlocked potential of China’s vast shale reserves as well as tapping into the current North American shale gas boom. The United States won’t become a net exporter of LNG for at least a few more years and must continue to build up the necessary infrastructure. In the meantime, as part of its strategy to secure future supplies of LNG due to come on line, Korea seeks to recalibrate its overseas investments into the U.S. market by acquiring shale gas companies and assets. Korean investment not only helps secure abundant and much cheaper LNG supplies—it also opens opportunities for Korea’s LNG transport industry and sharpens Korean shale gas exploration and production know how for potential future plays in China and elsewhere. In addition to obtaining shale gas supplies, Korea has not given up entirely on discussions with Russia about the possibilities of developing a pipeline from Russia via North Korea. While the pipeline would be a lucratively compelling scenario for all parties, off and on tensions with North Korea continue to prevent this from

becoming a reality. While there has been little movement, Russia and Korea continue to agree in principle that it is a good idea. Shale gas plays and future pipelines may be wise investments for Korea, but neither addresses near term needs. Power shortages experienced during the summer of 2013 underscore just how tight the margins between energy supply and demand are for Korea. With six nuclear power plants out of commission, the Korean government took strident measures to reduce peak energy demand in public buildings and needed to draft plans for conducting rolling blackouts in the event additional reactors needed to go off line. Thus, Korea will need to take measures in the near term to maintain, or more likely, increase traditional supplies of oil, natural gas and even coal. Of the three fossil fuels, oil is the most problematic from an energy security standpoint since Korea is so dependent on imports from the Middle East. Exacerbating this is pressure from the United States for Korea to reduce imports from Iran. To mitigate this, Korea revised a law over the summer that will allow freight charge subsidies for companies that import oil from non-Middle East suppliers. Korea is also considering using Arctic shipping lanes to avoid Middle East choke points and open up trade options with Russia and potentially North America.

Conclusion

Korea appears to be in the midst of transitioning its national energy plans and priorities. Indications are the Park Geun-hye administration will favor demand-side solutions, abandoning previous plans to expand nuclear energy capacity and putting less emphasis on renewables while favoring cutting consumption and reducing the country's energy intensity through energy management, energy storage and information and communication technologies. Longer-term supply strategies appear to be in place that target North American and Chinese shale gas, but in the near term, Korea will need to rely on traditional fossil fuel imports. Thus, the health and strength of Korea's manufacturing-intensive, export-led economy will remain dependent on access to energy imports, particularly oil from the Middle East. Korea has implemented some near-term mitigating strategies that incentivize imports of non-Middle East petroleum and explore alternate means of transport. In any case, Korea's revised National Energy Plan will set the country on a new, strategic five-year trajectory that will profoundly impact its politics, economy and energy security.

George Hutchinson is a Senior Director for Power and Energy at Concurrent Technologies Corporation. Formerly, he served as a Korean linguist, logistics readiness officer and foreign area officer in the U.S. Air Force.

- ¹ Article written by George Hutchinson. The views expressed are those of the author and are not intended to represent the views or policies of Concurrent Technologies Corporation nor the United States Government.
- ² World Bank, "Data, GDP (current US\$)," <http://data.worldbank.org/indicator/NY.GDP.MKTP.CD/countries/1W?display=default>.
- ³ OECD Library, "Unemployment Rate, Percent of Workforce," http://www.oecd-ilibrary.org/employment/unemployment-rate_20752342-table1.
- ⁴ WTO, "Republic of Korea Rank in World Trade, 2012. Exports (excluding intra-EU trade)," <http://stat.wto.org/CountryProfile/WSDBCountryPFView.aspx?Language=E&Country=KR>
- ⁵ World Bank, "Data, Indicators, Exports of Goods and Services (% of GDP)," <http://data.worldbank.org/indicator>.
- ⁶ WTO, "Republic of Korea Rank in World Trade, 2012. Imports. (Excluding intra-EU trade)," <http://stat.wto.org/CountryProfile/WSDBCountryPFView.aspx?Language=E&Country=KR>.
- ⁷ KITA, "Annual Trade Indicator, Foreign Trade, Tables 3-11 and 3-13," <http://global.kita.net>.
- ⁸ KEEI, "Major Energy Indicators. Final Energy Consumption by Sector." http://www.keei.re.kr/main.nsf/index_en.html.
- ⁹ OECD Library, "Energy Intensity," <http://www.oecd-ilibrary.org/sites/factbook-2011-en/06/01/02/06-01-02-g1.html?contentType=ns/StatisticalPublication/ns/Chapter&itemId=/content/chapter/factbook-2011-47-en&containerItemId=/content/serial/18147364&accessItemIds=&mimeType=text/html>.
- ¹⁰ BP, "Statistical Review 2013," <http://www.bp.com/en/global/corporate/about-bp/statistical-review-of-world-energy-2013.html>.
- ¹¹ World Bank, "Data, GDP (current US\$)," <http://data.worldbank.org/indicator/NY.GDP.MKTP.CD/countries/1W?display=default>.
- ¹² EIA, "Korea, South. Analysis," <http://www.eia.gov/countries/cab.cfm?fips=KS>.
- ¹³ KEEI, "Major Energy Indicators. 2011 Energy Balance Flow," http://www.keei.re.kr/main.nsf/index_en.html.
- ¹⁴ NEI, "Top 10 Nuclear Generating Countries," <http://www.nei.org/Knowledge-Center/Nuclear-Statistics/World-Statistics/Top-10-Nuclear-Generating-Countries>.
- ¹⁵ EIA, "Korea, South. Analysis," <http://www.eia.gov/countries/cab.cfm?fips=KS>.
- ¹⁶ KEEI, "Major Energy Indicators. 2011 Energy Balance Flow," http://www.keei.re.kr/main.nsf/index_en.html.
- ¹⁷ IEA, "Closing Oil Stock Levels in Days of Net Imports," <http://www.iea.org/netimports.asp>.
- ¹⁸ MOTIE, "Energy Policies," http://www.mke.go.kr/language/eng/policy/Epolicies_02.jsp.
- ¹⁹ KNOC, "Investor Relations. Annual Report. 2013," http://www.knoc.co.kr/ENG/sub04/sub04_4_7.jsp, page 18.
- ²⁰ KOGAS, "Exploration and Production Projects," http://www.kogas.or.kr/kogas_eng/html/what/what_04.jsp.
- ²¹ KORES, "Businesses Overview," <http://eng.kores.or.kr:8080/gpms/eng2/businesses/overview.html>.
- ²² Lee, Charles S. "S Korea to halve 2013 funding for KNOC's overseas oil, gas acquisitions to \$321 mil," *Platts*, 6 Nov 2012, <http://www.platts.com/latest-news/oil/seoul/s-korea-to-halve-2013-funding-for-knocs-overseas-7228708>.
- ²³ Seo Jee-yeon, "Korea's overseas energy development flops," *Korea Herald*, 11 October 2012, http://www.koreaherald.com/common_prog/newsprint.php?ud=20121011000677&dt=2.
- ²⁴ Park, Ju-min, "South Korea charges 100 with corruption over nuclear scandal," *Reuters*, 10 October 2013, <http://uk.reuters.com/article/2013/10/10/uk-korea-nuclear-idUKBRE99906320131010>.
- ²⁵ Cheong Wa Dae, "President pushes for creative energy sector," 17 October 2013, http://english.president.go.kr/pre_activity/latest/latest_view.php?board_no=E02&search_key=&search_value=&search_cate_code=&cur_page_no=&uno=8503.
- ²⁶ "President Park Expresses Strong Desire for 'Creative Energy Economy' at World Energy Congress," *Business Korea*, 18 October 2013, <http://www.businesskorea.co.kr/article/1730/energy-economy-president-park-expresses-strong-desire-creative-energy-economy-world>.