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KOREA

ON THE HORIZON — RENEWABLE ENERGY IN ASIA

A PRACTICAL GUIDE





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PREPARED BY MERITAS LAWYERS IN ASIA

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IDR	Indonesian Rupiah	THB	Thai Baht
JPY	Japanese Yen	USD	United States Dollar
KRW	Korean Won	VND	Vietnamese Dong
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ON THE HORIZON — RENEWABLE ENERGY IN ASIA

As this book goes to press, the global economy is still struggling to climb out of its worst downturn since the Great Depression. At the same time, Japan faces its most significant crisis since 1945 as it deals with the impact of the tsunami and damaged nuclear reactors at Fukushima. While some countries such as China, Singapore, and India have successfully rebounded, most nations are facing dual threats of exceptionally slow economic growth combined with chronic levels of high unemployment. Unlike past recessions, this one has hit developed economies just as hard as less developed countries, which have traditionally borne the brunt of economic downturns.

No matter how the world economy performs over the next few years, two factors stand out that will strongly influence global economic prospects over the next decade. One factor is population growth. Most experts predict that the world's population will grow from 6.9 billion today¹ to 8 billion by 2025 and will add another billion by 2050. This projected increase is as many people who currently live in China and India. Continual population growth places high demands on the world's resources, as more people are demanding more goods and services. Equally significant, the large and rapidly growing economic powerhouses like China and India are accelerating their demand for energy and the goods and services it provides. Between just these two countries, over 3.5 billion people will be pushing their governments to promote rapid industrialization in order to meet the demands of their burgeoning middle classes. These are pressures that neither China nor India, nor any government for that matter, can resist for political reasons.

Economics aside, the combination of these two factors is also putting a heavy strain on our world's delicate environmental balance. The problem is that the energy resources supplied today to meet a growing population's increasing needs for goods and services are mainly derived from carbon-based sources that have significant long-term impacts on the environment. Coal is the dominant fuel in Asia and accounts for 54 percent of energy used today. While this share will go down over time (to an estimated 44 percent share in 2030), the use of coal in developing Asia is expected to increase by nearly 40 percent by 2030.²

¹ U.S. Census Bureau estimate at www.census.gov/main/www/popclock.html

² Estimates from USAID ECO-Asia Clean Development and Climate Program, based on data from International Energy Agency, Asian Development Bank, and Asia-Pacific Energy Research Center

For example, the Peoples Republic of China in 2011 is over 70 percent dependent on coal for its total energy needs, and it is the fastest growing economy in the world. As energy needs increase, so does the degradation of the environment. Adding another 2.5 billion people over the next 40 years will magnify the imbalance even more.

Another consideration involves the political climate where carbon-based energy is extracted and consumed. For example, much of the global oil supply is located in geographic areas that regularly experience bouts of political instability. Think about Venezuela, Nigeria, Libya, and points throughout the Middle East. As we have seen time and time again since the oil crisis of the 1970s, any even minor disruption in the assured supply of oil, gas, or other energy sources can and will have a significant impact on global prices.

And the trends of oil import dependency are going in the wrong direction. Over the past decade, oil imports to Asia have increased by 140 percent, and in 2010 the Asia region imported 60 percent of its oil.³ China's dependence on foreign oil is expected to keep rising, reaching 65 percent by 2015 and 80 percent by 2030.⁴

For all of these reasons, the current global energy mix, which is primarily carbon-based, is untenable over the long run. China, India, and other nations need to find alternate ways to fulfill their energy demands. The only real answer — and our best chance to bring balance back to the environment — is to turn toward alternative sources of energy, which can at least in part replace existing coal and oil sources.

The most cost-effective way of weaning ourselves from fossil fuels is through energy efficiency, and this can be done by taking actions to make homes, buildings, factories, and our transport systems more efficient.⁵ But at the same

³ National Association of State Energy Officials, "What's Hot in Trade and Imports," available at: http://www.naseo.org/committees/energyproduction/oil/Trade_Hot.htm#What's%20Hot:%20The%20Asian%20Magnet

⁴ Estimates for China's oil import dependency in 2030 range from 75%-82% based on these references: The World Bank, "Winds of Change: East Asia's Sustainable Energy Future," available at: [http://www.recoalition.com/re2010/userfiles/files/Winds%20of%20Change%20\(Full%20Text\).pdf](http://www.recoalition.com/re2010/userfiles/files/Winds%20of%20Change%20(Full%20Text).pdf) and Japan Times, "What is Beijing willing to do to secure oil and gas supplies?" (stating US Dept. of Defense predicts oil imports will amount to four-fifths of oil consumption by 2030), available at: <http://search.japantimes.co.jp/cgi-bin/ea20101227mr.html>

⁵ Based on estimates in International Energy Agency (IEA), World Energy Outlook 2010

time, it is also important to aggressively develop the most feasible alternatives for supplying sustainable fuel and power directly – through renewable energy. Some examples of renewable energy with real potential are solar, wind, hydro, biomass, biogas, and tidal. While some of these technologies have been commercialized and entered the market, none of them has yet reached anywhere near their full economic and market potential.

Such renewable energy sources cannot become commercially viable without long-term financial incentives and comprehensive pricing policies backed by national governments around the world. Just the sheer size of the capital investments required in order to develop and exploit renewable energy demands that governments underwrite part of those costs, at least initially. This includes government-backed targeted incentives and grants for research and development of these emerging technologies, funding renewable energy demonstration projects, and adopting tax regimes for renewable energy that will attract private investors over the long run. Without the right policies and regulatory incentives, renewable energy sources are unlikely to succeed in Asia or elsewhere.

Globally, investments in clean energy have quadrupled over the past five to six years, from USD46 billion in 2004 to USD173 billion in 2008, and then falling slightly to USD162 billion in 2009.⁶ And the upward trend is expected to continue, as technological developments, in combination with the policies and incentives mentioned above, boost the market for clean energy. The total expected investment in clean energy, for just the G-20 countries alone, is expected to be USD2.3 trillion over the next 10 years.

The real growth in global energy demand will occur in developing Asia — most notably China and India — which will demand access to greater and greater levels of energy over the next several decades. The overall demand for energy in the developing Asia region is expected to increase by 65 percent in the next 20 years, and electricity consumption is expected to increase by 114 percent.

Given these strong trends, we wanted to find out where key countries in Asia stand now on renewable energy as a workable alternative and what we can expect in the future.

⁶ UNEP 2010, Global Trends in Sustainable Energy Investment 2010. Sustainable Energy Initiative (SEFI), in cooperation with Bloomberg New Energy Finance

In order to find the answers, we approached 12 of the leading Asian law firms and asked each to comment on 10 basic questions about renewable energy policies and the regulatory framework in their individual countries:

- 1. What are the driving factors for increasing renewable energy production?*
- 2. Which renewable energy sources are viewed as the best opportunity for your country and why?*
- 3. What role does your government play in regulating the energy industry? Describe the regulating environment and trends in deregulation in your country.*
- 4. What agencies or bodies of government oversee the energy sector? What goals or mandates has your government set for electricity generation or fuels production from renewable sources?*
- 5. What are the opportunities for private ownership (vs. public ownership) in clean energy development and technologies?*
- 6. What is the level of government investment or what incentives are in place to support these goals and targets?*
- 7. What kind of emphasis is placed on researching and developing renewable energy technologies versus looking to outside energy resources?*
- 8. Is your country on track to be a clean energy importer or exporter from the standpoint of power production supply and manufacturing?*
- 9. How developed is your country's workforce to support innovation, development and the production of renewable energy?*
- 10. What are the key barriers to increasing renewable energy as a part of your country's energy mix?*

Each chapter of this book is devoted to insights on a specific country in Asia. Our hope is that this book will spark the beginning of an ongoing dialogue among government officials and planners, venture capitalists, individual entrepreneurs, researchers, multinational corporations in the energy sector, and NGOs as they focus their attention on how best to accelerate the deployment of renewable energy resources in Asia and elsewhere. The stakes are high for all of us. We cannot afford to step back from the challenges and ignore the great opportunities renewable energy technologies offer.

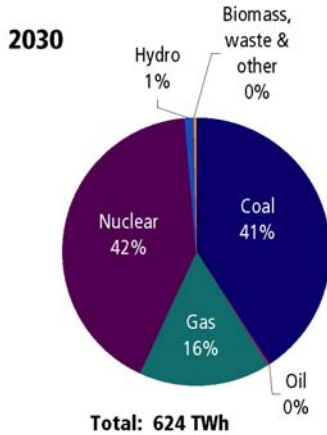
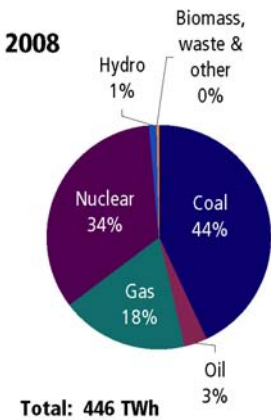
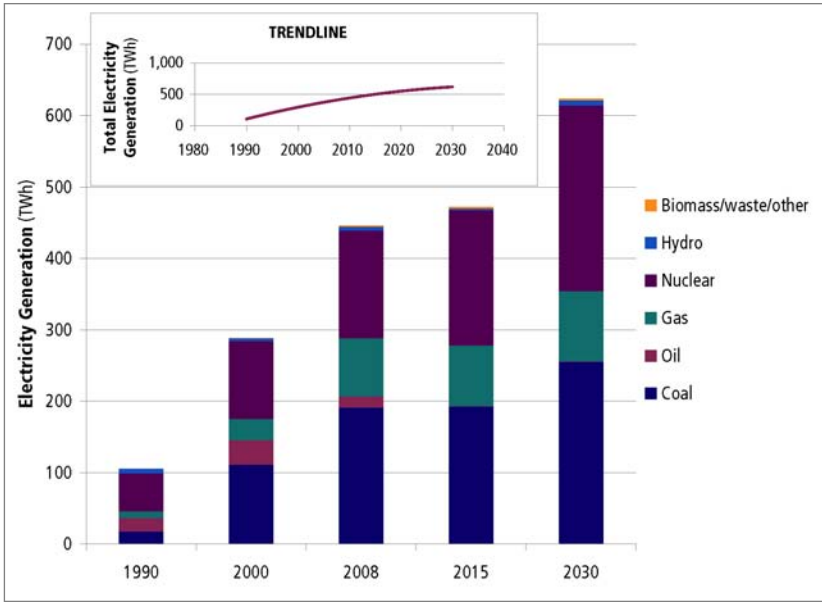
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USAID's ECO-Asia CDCP program uses policy and market interventions to promote the scale up of investment and implementation in clean energy in developing Asian economies. The program is active in China, India, Indonesia, the Philippines, Thailand, and Vietnam. ECO-Asia CDCP partnered with Meritas in the development of this guide as part of its Asia Clean Energy Policy and Regulatory Dialogue, which is aimed at building capacity in the region to design and implement effective policy, regulatory, and legal frameworks for energy efficiency and renewable energy.

Electricity Generation by Fuel Type: Korea



Source: Asian Development Bank, International Energy Agency, Asia-Pacific Energy Research Center, and The World Bank

1. What are the driving factors for increasing renewable energy production in Korea?

On 15 August 2008, President Lee Myung-Bak declared “Low-Carbon, Green Growth” as the new 60-year national vision for Korea, announcing that implementing green growth would be a top priority national policy. This vision aims to shift the current economic development paradigm toward quality-oriented growth, with more emphasis on new and renewable energy (NRE) resources. Under the Five-Year Plan for Green Growth¹, the share of renewable energy in total energy supply is expected to be doubled by 2020, from 2.7 percent in 2009 to 3.78 percent in 2013, and 6.08 percent in 2020. The three main policy drivers for this innovative renewable energy policy are as follows:

Climate Change Concerns²

In the 15-year period from 1990 to 2005, Korea’s carbon emissions doubled, making it the country with the fastest-growing rate of greenhouse gas among the Organization for Economic Cooperation and Development (OECD) countries. Korea’s energy mix is largely dominated by fossil fuels, which account for over 80 percent of total primary energy supply.³ As a non-Annex I party to the Kyoto Protocol, Korea has no obligations to reduce greenhouse gas emissions. However, President Lee announced that Korea would voluntarily reduce its carbon emissions 30 percent by 2020, which is the highest voluntary reduction level that IPCC has recommended for developing nations.

Heavy Energy Dependency and Energy Security⁴

Korea is the world’s tenth largest energy consumer and has virtually no domestic energy sources of its own. It imports 97 percent of its energy resources and is the sixth largest energy importer in the world (e.g., fifth largest importer of oil, second largest importer of coal). Korea is highly exposed to oil price shocks, as well as any secular rise in oil prices. With

¹ Presidential Commission on Green Growth, Road to Our Future: Green Growth, National Strategy and Five-Year Plan(2009~2013); www.greengrowth.go.kr

² United Nations Environment Programme, Overview of the Republic of Korea’s National Strategy for Green Growth, April 2010; Source: World Resources Institute. The Climate Analysis Indicators Tool(CAII)

³ IEA Energy Statistics, 2009; www.iea.org

⁴ United Nations Environment Programme, Overview of the Republic of Korea’s National Strategy for Green Growth, April 2010

the competitive global energy environment and given the rapid increases in domestic and foreign demand, new and renewable energy is considered to be the inevitable primary energy source for the future.

Necessity for New Growth Engines⁵

“Low-Carbon, Green Growth” is also the paradigm of the government’s economic policy, and the NRE industry is regarded as the key growth engine. Under such a policy framework, the government aims to pursue a sustainable and positive feedback loop that generates economic growth by minimizing environmental pollution, which further creates future growth. The NRE industry is also expected to solve the dilemma of “jobless growth,” and the government predicts that the industry will generate nearly one million jobs by 2030.

2. Which renewable energy sources are viewed as the best opportunity for Korea and why?

Eleven sources of new and renewable energy are defined as NRE in the government’s Act on the Promotion of the Development, Use and Diffusion of New and Renewable Energy (APDUDNRE): photovoltaic, bio-energy, wind, hydraulic power, fuel cells, liquefied/gasified coal, ocean, waste treatment, geothermal, hydrogenous, and sources of energy other than oil, coal, nuclear power, or natural gas.

Of these 11 NRE sources, the Presidential Commission on Green Growth (GGC) announced in 2009 that the Korean government will actively promote three of these 11 energy sources: photovoltaic, wind, and fuel cells.⁶ GGC is a government agency formed pursuant to the Framework Act on Low Carbon, Green Growth (FALCGG) and formulates and recommends government policies relating to, among other things, green growth and new and renewable energy.⁷ GGC has identified these three

⁵ Presidential Commission on Green Growth, Road to Our Future: Green Growth, National Strategy and Five-Year Plan(2009~2013); www.greengrowth.go.kr

⁶ Presidential Commission on Green Growth, Plans to Strengthen Industrial Infrastructure for New and Renewable Energy (With Emphasis on Photovoltaic, Wind and Fuel Cells), August 2008; www.greengrowth.go.kr

⁷ Art 14, Framework Act on Low Carbon, Green Growth

clean energy resources as having the most potential for growth in terms of (1) creating jobs, (2) international market prospects (especially after the 2008 economic downturn), and (3) national competitiveness.⁸

In terms of creating new jobs, GGC anticipates that these three types of renewable energy will create more jobs, especially manufacturing jobs, as they require sizable production facilities.⁹ Researchers estimate that for each 1 MW, 35.5 additional jobs are created under PV system, 21 additional jobs (16 additional jobs for manufacturing and five additional jobs for installation) for wind power, and 16 jobs for fuel cells.

As for international market prospects, although the clean energy industry has experienced slower growth worldwide since the economic downturn in 2008, GGC noted that these three renewable energy resources showed the highest growth rate, due in part to an increase in financial and regulatory incentives provided by many countries.¹⁰ As such, GGC has identified these three resources to have the most potential for international market expansion.¹¹

Finally, regarding national competitiveness, Korean companies are already global leaders in semi-conductors, LCD displays, shipbuilding and turbine engines, steel milling, and chemical industries. As Korean companies already possess technological capabilities in these areas, the three identified clean energy resources present the best opportunities for Korean companies to attain technological competitiveness in the global market.

3. What role does the government play in regulating the energy industry? Describe the regulating environment and trends in deregulation.

The Korean government has developed a highly regulated policy framework for the energy industry. In accordance with the Energy Act, the National Energy Committee establishes the Basic Plan of Energy, which sets the blueprint for diverse policy goals ranging from a stable and

⁸ See footnote 6, supra.

⁹ See footnote 6, supra.

¹⁰ See footnote 6, supra.

¹¹ See footnote 6, supra.

universal supply of energy to the development of alternative energy sources. Another set of legislation¹² provides the legal basis for the government to determine energy prices through taxes and cross subsidies.

In terms of deregulation, the Korean government has been slow in introducing privatization and enacting deregulatory laws in an effort to make the market more competitive.¹³ The deregulation trends in the major energy sectors in Korea are as follows:

Petroleum sector. Korea has seen significant changes in its downstream oil industry since the beginning of the Asian financial crisis in late 1990s. The petroleum industry was deregulated in October 1998, and large conglomerates have sold off petroleum refining and distribution assets that were not considered part of their core businesses.

Liquefied Natural Gas (LNG) sector. The import and wholesale sectors of the gas business are still under the monopoly of the Korea Gas Corporation. Direct import of LNG is now allowed for self-consumption, which resulted in a slight weakening of the monopoly.

Electricity sector. Korean Electric Power Corporation (KEPCO) underwent transformation from a monopolistic public company to a major market player after six power generation companies were spun off from it. However, the distribution and transmission businesses are still within KEPCO's monopoly.

Market price. The Korean Power Exchange (KPX), as an independent organization established in April 2001, has been operating the power market of selling and buying electricity under the cost-based pool (CBP) system.

In this slowly but definitely changing deregulatory environment, the Green Growth plan envisions a reform of energy pricing to reflect full cost, which

¹² Such legislation includes the Energy Use Rationalization Act (EURA), Act on the Promotion of the Development, Use and Diffusion of New and Renewable Energy (APDUDNRE), Integrated Energy Supply Act (IESA), Traffic, Energy and Environment Tax Act (TEETA), and Electricity Business Act (EBA).

¹³ A UNEP report in 2004 that examined Korea's energy pricing and taxation policy concluded that reforming energy subsidies and the system of energy taxation could yield environmental gains, with minimal potential adverse social and economic effects. (UNEP and the United Nations Foundation [2004], Energy Subsidies: Lessons Learned in Assessing their Impact and Designing Policy Responses.)

represents a step forward. However, there does not appear to be a major attempt at reforming the range of energy subsidies that distort the energy prices.¹⁴

4. What agencies or bodies of government oversee the energy sector? What goals or mandates has the government set for electricity generation or fuels production from renewable sources?

The Ministry of Knowledge Economy (MKE) is in charge of overall supervision of the energy industry. MKE is mandated to generally regulate the power industry, engage in energy cooperation projects, expand renewable energy resources and distribution networks, and craft environmentally friendly economic policies.¹⁵ Several agencies such as the National Energy Commission (NEC), the New and Renewable Energy Center (NREC), and GGC are also involved in formulating national policies on energy industry, green growth, climate change, and renewable energy. As to environment-specific aspects, the Ministry of Environment (MOE) is in charge of preparing comprehensive standards, monitoring, validating, and evaluating environmental policies that affect renewable energy.¹⁶

The Korean Energy Management Corporation (KEMCO) is a government-funded organization responsible for the implementation of energy conservation policies and energy efficiency improvement measures as well as climate change mitigation activities.¹⁷ NREC was established under the authority of KEMCO to support and promote NRE through related programs.

¹⁴ United Nations Environment Programme, Overview of the Republic of Korea's National Strategy for Green Growth, April 2010

¹⁵ MKE, <http://www.mke.go.kr/language/eng/about/responsibilities.jsp>

¹⁶ At each Ministry, a Chief Green Officer, generally at the Director General level, served as the designated focal point for interacting with the Presidential Committee on Green Growth. Those ministries with powers currently related to renewable and clean energy include: Ministry for Food, Agriculture, Forestry and Fisheries; Ministry for Land, Transportation and Maritime Affairs; Ministry of Strategy and Finance; Ministry of Public Administration and Security; Ministry of Education, Science and Technology; and Ministry of Foreign Affairs and Trade

¹⁷ Art. 62, Energy Use Rationalization Act

In December 2008, the Third Basic Plan was prepared pursuant to APDUDNRE.¹⁸ The Third Basic Plan established the medium-long term goal and targets for NRE:

Goal

Establishing a sustainable energy system based on new and renewable energy.

Target

- ♦ Achieve NRE deployment rate of 11 percent by 2030
- ♦ Industrialize NRE as green-growth engine

Strategy

- ♦ Facilitate industrialization
- ♦ Increase dissemination
- ♦ Expand infrastructure
- ♦ Introduce market functions

5. What are the opportunities for private ownership (vs. public ownership) in clean energy development and technologies?

Market-friendliness of green-growth policies has been constantly emphasized by the Korean government. However, since the cost of renewable energy technologies remains at a commercial disadvantage compared to conventional power technologies, renewable energy relies heavily on government policies to become economically viable. Korea's FIT program, which provides for different levels of subsidies depending on the renewable energy source, served as a catalyst for private companies to invest in and develop renewable energy assets.¹⁹ Private investment in NRE technology rose in 2009, evidenced by a 34 percent increase in investment by the top 350 companies in Korea. In order to increase private R&D investment, the government has also increased tax deductions on investments in new growth engines and technology to the highest level among OECD member nations.

¹⁸ MKE, Third Basic Plan for NRE Technology and Development and Deployment <http://www.mke.go.kr/community/future/futureView.jsp?code=2250&seq=477>

¹⁹ APDUDNRE

However, the FIT program will be phased out in 2012 and replaced by a Renewable Portfolio Standard (RPS). Under the RPS, major power generating companies (companies with power facilities greater than 500 MW) will be required to produce a certain percentage of their generated electricity from a renewable energy source, starting at two percent in 2012 and with increasing levels each year until 2022 when 10 percent of the generated electricity must be from NRE sources.²⁰ The RPS will also introduce carbon trading in Korean certificates of emission reduction (CERs). The Korean government hopes that the adoption of an RPS will lead to a more competitive, market-efficient growth of renewable energy.²¹

6. What is the level of government investment or what incentives are in place to support these goals and targets?

INVESTMENT

While G-20 nations spent an average of 15 percent of their stimulus budget on green growth, Korea dedicated 80 percent of its budget, ranking the highest among G-20 nations. Under the Third Basic Plan, the government will allocate funds and attract investment to increase the use of NRE sources. The initiative will cost KRW111.5 trillion between 2009 and 2030. KRW100 trillion has been allocated for the promotion of NRE, while KRW11.5 trillion will be used to develop green technologies. After 2020, when NRE sources become more economically viable, the proportion of private investment is expected to increase steadily.²²

INCENTIVES

Subsidy Programs

- ◆ Exhibition deployment subsidy: in order to commercialize developed technologies and systems, a subsidy provided for up to 80 percent of installation costs
- ◆ General deployment subsidy: subsidy of up to 50 percent of installation cost for commercialized systems

²⁰ Regulations on APDUDNRE (as amended, 2010)

²¹ MKE, Press Release, "Hearing Notice for Amendment to New and Renewable Energy Act, Regulations, and Rules In Connection with Detailed Adoption of RPS," March 29, 2010

²² MKE, Third Basic Plan for NRE Technology and Development and Deployment <http://www.mke.go.kr/language/eng/community/future/futureView.jsp?code=2250&seq=477>

Million Green Houses Distribution Policy

To promote residential houses that utilize NRE, the government supports certain portions of installation cost up to 80 percent.

Regional Deployment Subsidy Program

- ♦ Building the infrastructure: feasibility study, human resources development, and public relations for development and utilization of region-specific energy (up to 100 percent)
- ♦ Installing renewable energy systems: deployment of renewable energy systems such as PV and wind power (up to 70 percent)

Loan Program

Long-term, low-interest loans for the customers or manufacturers of commercialized NRE systems, for up to 90 percent of the total cost (50 percent for large corporations).

Tax Incentive Program

About 20 percent of total investment in installation of NRE systems can be deducted from income tax.

7. What kind of emphasis is placed on researching and developing renewable energy technologies versus looking to outside energy resources?

Based on its accumulated experience and expertise in semiconductor and heavy industries, Korea is currently putting a clear emphasis on developing its own renewable energy technologies. Although there are concerns over the high level of import dependency for core parts,²³ there has been a significant improvement in reducing reliance on foreign technologies. Both government and private-sector companies are stepping up efforts to catch up with the leaders in the NRE industry, as NRE is expected to emerge as a big export item for Korea in the future.

²³ Beginning in August 2009, the Korea Institute for Industrial Economic and Trade (KIET) carried out a two-month study on 330 South Korean solar power, wind power and fuel cell equipment companies. The results show the poor level of technology at domestic companies. (November 30, 2009, KIET);

http://www.kiet.re.kr/kiet/report/research.jsp?viewmode=read&serial=1726&keyWord=__&keyFieldALL&keyBoard=&cate_indu=&fr_yyyyymm=&to_yyyyymm=&yearGubun=&year=

The government has been encouraging local companies to develop indigenous technologies through tax incentives and low-interest loans for R&D.²⁴ In July 2010, the Ministry of Strategy and Finance (MOSF) announced plans to expand its tax breaks to cover new technologies in PV, wind, and thermal power.²⁵ In line with the government support, Korean conglomerates such as Samsung, LG, and Hyundai are joining the effort, increasing R&D investments to KRW4 trillion in 2010, up from KRW3.2 trillion in 2009 on a combined basis.²⁶

Specific examples:

Solar Power (PV)

As the world's dominant semiconductor and LCD producers, Samsung Electronics and LG Electronics are making bold investments in order to become the world's leading suppliers of PV technology. Samsung Electronics will invest KRW6 trillion in solar-cell production by 2020, and increase capacity of the current solar-cell production line for R&D to 130 MW by 2011. LG Electronics will also expand its solar-cell business by investing KRW1 trillion by 2015.²⁷ Small- and medium-size enterprises are also currently localizing PV materials and equipment at a fast rate and it is expected that Korea will graduate from its dependence on foreign PV technologies in the near future.²⁸

Wind Power

In the recent downturn of the shipbuilding market, Korea's major shipbuilding companies have started to focus on wind power. Turbine

²⁴ In line with the financial support, MKE has recently highlighted 11 NRE technologies as Core Technology Projects to be developed from 2010. The Project consists of 41 medium- to long-term R&D projects in energy industry, and the 11 NRE projects are as follows: 2 photovoltaic, 2 wind power, 2 fuel cell, 1 ocean, 1 bio energy, 1 waste-to-energy, 1 solar thermal, 1 geothermal.

MKE, Energy Technology Development Execution Plan
<http://www.mke.go.kr/news/bodo/bodoView.jsp?pCtx=1&seq=59941>

²⁵ "Expansion of Tax Deduction for Wind and Geothermal R&D," July 13, 2010, Jose Ilbo
<http://www.joseilbo.com/news/htmls/2010/07/20100713102193.html>

"South Korea more than doubles green R&D funding", Business Green. 13 Jul 2010.
<http://www.businessgreen.com/business-green/news/2266369/south-korea-doubles-green>

²⁶ GS Engineering to Construct World's Largest Tidal Power Plant, Bloomberg, 19 Jan 2010,
<http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aZQEn2Bk.FM4>

²⁷ "Photovoltaic, Rises as 'Korean National Player' Industry," June 24, 2010, Chosun Ilbo
http://biz.chosun.com/site/data/html_dir/2010/06/24/2010062401682.html

²⁸ Korean Solar Industry Speaks, InterPV,
http://www.interpv.net/magazine/mag_view.asp?idx=17&page=1&part_code=01

manufacturing technologies used in vessel engines are now being applied to develop wind power generators, and shipbuilders are expected to have a competitive edge due to their expertise in shipbuilding and marine construction. Utilizing this technological advantage, Korean shipyards such as Hyundai Heavy Industries, Daewoo Shipbuilding and Samsung Heavy Industries are investing in wind power R&D, and are scaling up development of 2.5MW wind power generators.²⁹

8. Is Korea on track to be a clean energy importer or exporter from the standpoint of power production supply and manufacturing?³⁰

IMPORTER

The Korean government has adopted favorable terms for NRE-related imports to further boost low-carbon-related industries and encourage local use of equipment for NRE generation. Imported NRE-related equipment and facilities are subject to a 50 percent tax reduction. Currently, 98 components and other equipment related to new and renewable energy are given a tariff reduction benefit, with 31 items being added to the list in September 2009. According to MOSF, future tariff revisions will include even more items for such reduction benefits.³¹ Tariff cuts are expected to reduce costs to importers by roughly KRW10.8 billion. Customs duties for renewable energy-related products have already been trimmed down by KRW13.52 billion in 2008.

²⁹ [Innovation! Manufacture] "Manufacturing Companies that Traditionally Led the Han River Miracle, Now Leads Korea's Future," June 30, 2010, Chosun Ilbo
http://biz.chosun.com/site/data/html_dir/2010/06/29/2010062901689.html

³⁰ For gross amount of energy import/export, please see
http://www.kemco.or.kr/data/e_static/energy_chart/energy_static_view_main.asp

³¹ Expansion of Customs Exemption for New and Renewable Energy, Korean Government, No. 2527, September 23, 2009,
http://www.electimes.com/home/news/main/viewmain.jsp?news_uid=69818

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According to an MKE report, exports of solar and wind power components and products rose to USD2.14 billion during the first six months of 2010.³² This is a sharp increase from the previous year when the figure stood at around USD1 billion. In particular, the total value of orders for renewable energy-related equipment received during the first half of 2010 amounted to USD8.25 billion, an increase of 6.8 times from the previous year. In order to foster NRE-related exports, the government is pursuing increased government-level cooperation with international bodies such as the IEA and OECD, as well as with industrial nations. While Korean representatives participated in 10 overseas NRE exhibitions and road shows in 2009, the number increased significantly to 90 events in 2010. The Korean Trade-Investment Promotion Agency (KOTRA) is also taking part, establishing the “Green Trade Support Group” in order to help Korean companies that are seeking business opportunities in overseas NRE markets. As for export of NRE plants, the government provides subsidies for feasibility studies while the Korea Trade Insurance Corporation and Export-Import Bank of Korea offer attractive financing packages.³³

9. How developed is Korea’s workforce to support innovation, development and the production of renewable energy?

Job Creation

The number of workers in the NRE industry is still small compared to other OECD countries, although significant government measures are being taken to increase this number. In January 2009, Korea launched the “Green New Deal” as a means of stimulating job creation and revitalizing the economy. It is expected that new jobs will be created or maintained in 2009-10 (data not yet available) with an investment of USD30.7 billion, and the NRE industry is predicted to generate nearly one million jobs by 2030. An International Labor Organization (ILO) survey of government policy notes that Korea showed a good example of creating “green jobs” in response to economic crises.³⁴

³² MKE, 10th Jul 2010, <http://www.mke.go.kr/news/bodo/bodoView.jsp?pCtx=1&seq=63069>

³³ MKE, Third Basic Plan for NRE Technology and Development and Deployment <http://www.mke.go.kr/community/future/futureView.jsp?code=2250&seq=477>

³⁴ Juan Somavía, Greening the Workforce, UN Chronicle

Human resources development program

In April 2010, MKE announced a detailed plan which specified 10 core tasks, including the “Workforce Development Innovation.”³⁵ In July 2010, the government announced more specific workforce innovation plans in the NRE industry at public hearings.³⁶ The innovative measures include the following:

- ♦ Developing business-centered curricula by engaging the private sector
- ♦ Establishing a GET-Future (Green Energy Technology-Future) Laboratory
- ♦ Supporting a global workforce with study-abroad scholarships

Overall, by investing KRW400 billion, a workforce of 100,000 will be developed in green-energy-related sectors by 2015.³⁷

Apart from these government efforts, the private sector is also actively participating in human resources development programs. In March 2010, Hyundai Heavy Industries established Korea’s first private NRE education facility in order to develop its own workforce.³⁸

10. What are the key barriers to increasing renewable energy as a part of Korea’s energy mix?

High risk concerns

Fundamental barriers for the commercialization of new and renewable energy technologies exist in Korea. Since renewable energy technologies require significant investments and a long-term outlook, high risk is inevitable. Questions have been raised about the effectiveness of Korean

³⁵ MKE, Energy Technology Development Execution Plan

<http://www.mke.go.kr/news/bodo/bodoView.jsp?pCtx=1&seq=59941>

³⁶ “Training of Energy Human Resources,” Electricity Shinmun, No. 2613 page 5, July 28, 2010.

http://www.electimes.com/home/news/main/viewmain.jsp?news_uid=77247

³⁷ “Green Energy, Training 100,000 Specialists,” Digital Times, July 27, 2010

http://www.dt.co.kr/contents.html?article_no=2010072702010351614002

³⁸ “Hyundai Heavy Industries, Establishes Korea’s First New and Renewable Energy Education Center,” Financial News, 2010.03.08.

http://www.fnnews.com/view?ra=Sent1201m_View&corp=fnnews&arcid=00000921919826&cDateYear=2010&cDateMonth=03&cDateDay=08

government support to specific NRE industries and technologies to mitigate such risks.

Pursuit of nuclear energy

Korea is the world's sixth-largest generator of nuclear electricity, accounting for 4.8 percent of global generation.³⁹ In order to respond to increasing energy demand and climate change, Korean authorities plan to expand nuclear energy supply and improve infrastructure for the development of nuclear power. However, nuclear power is not NRE (it is explicitly excluded in the APDUDNRE) and to some extent, it distracts from the unified government policy goals and investment plans for NRE.

Short-sighted R&D policy

Substantial R&D investments are required to curb the high dependency on technologically advanced countries for core NRE parts and equipment.⁴⁰ However, critics argue that no matter how much money the government spends, it will be difficult to localize components and materials if the country lacks a solid foundation in the original technology itself.⁴¹ Recent R&D investments have been criticized as being short-sighted as they focused on specific tasks rather than seeking to acquire core technology.

Environmental groups

Minimizing the environmental impact of renewable energy and negotiating with environmental NGOs are among the biggest challenges. Controversy is growing over the construction of NRE-related facilities, such as tidal or hydropower plants, because of their significant impact on the environment. Environmental groups are calling for a cautious approach, citing the concern that large scale power plants would damage ecosystems.⁴²

³⁹ International Atomic Energy Agency, April 2010. <http://www.iaea.org/index.html>

⁴⁰ "New and Renewable Energy, Balance of Transmission and Development of Technology," Digital Times, February 23, 2010

http://www.dt.co.kr/contents.html?article_no=2010022402012349660001

⁴¹ "You, Me, Everybody New and Renewable Energy...Growing Bubble," Donga Weekly, June 21, 2010; http://weekly.donga.com/docs/magazine/weekly/2010/06/21/201006210500012/201006210500012_1.html

⁴² "Green Growth: Korea's New Strategy (62), Tidal power leads Korea's green energy drive," Korea Herald, July 27, 2009

<http://news.naver.com/main/read.nhn?mode=LSD&mid=sec&sid1=001&oid=044&aid=0000083972>

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