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Green-Collar Politics: Perils and Opportunities for South Korea in the Green-Tech Race

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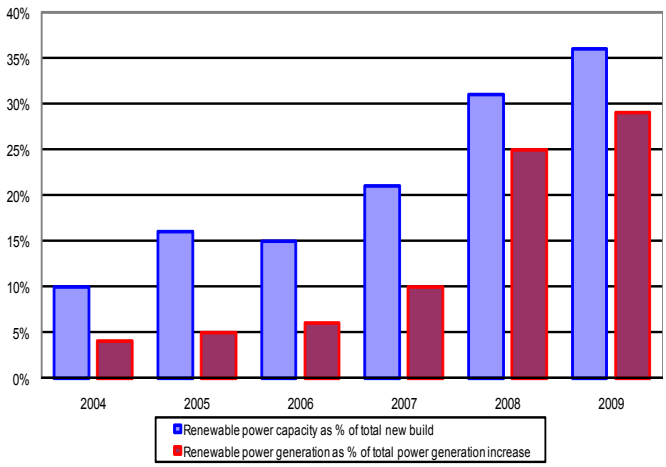
According to the United Nations Environment Program, global investment in clean energy totaled $162 billion in 2009.[1] Thanks in large part to renewable energy mandates in the EU and in many U.S. states—as well as in response to successful incentive programs in large markets such as China—renewable energy constituted just over 35 percent of all new power capacity additions worldwide in 2009 (***Figure 1***). Costs for renewable energy continue to fall as technologies and supply chains become more efficient and capable of meeting global demand.

Figure 1. **Growth of Renewable Energy**



Source: EIA, IEA, New Energy Finance

Governments worldwide have made the development of clean-energy technology and manufacturing capability a strategic priority. Broad political backing for renewables industries is often erected not primarily because of the environmental and energy supply diversification characteristics of renewable energy; instead, support is buttressed more by the potential for clean technologies to generate jobs and provide a sustainable driver for economic growth.

Although growth has been impressive and the long-term outlook promising, clean energy's emergence remains vulnerable to volatile policy risks. The lack of global agreement on how to price environmental externalities, most prominently carbon, into energy markets represents a significant and persistent risk to clean-technology industries. And with many market observers predicting a decade-long natural gas supply glut, which will suppress prices, demand for clean energy will remain almost completely dependent on government support. But, owing to the sluggish state of the global economic recovery, rising legacy costs for renewable energy subsidies, and an increased incidence of clean-technology trade disputes, this political backing for renewable energy has shown some signs of exhaustion. A continuation of this trend could derail some deployment targets while disrupting export-driven growth models in others.

Washington remains the focal point for the future of climate policy. A confluence of economic and political factors stalled U.S. climate policy in 2009 and 2010, eviscerating hopes of reaching a meaningful and binding accord at Copenhagen. With the Democratic Party having suffered a decisive setback in the midterm elections of November 2010, hopes for U.S. climate legislation are dim through 2012. Consequently, expectations for the Cancun round of climate talks were downgraded, and any chance for a more meaningful international agreement will be punted until the summit in South Africa next year.

So, while deployment of clean energy continues to grow, several factors are putting such government support mechanisms at risk. The global slowdown has made it more difficult to extend the high costs currently associated with renewables to ratepayers, especially residential consumers of electricity. Introducing demand-side incentives such as feed-in tariffs (FiTs) or renewable energy standards raises energy costs, and they can become a political liability. To counter this, governments have linked demand-side mandates to a range of preferential policies on the supply side that promise "green-collar" job creation and long-

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term economic competitiveness. The subsidies that promote job creation and competitiveness may breach trade laws, and legal cases now emerging could add another headwind to the sector. Indeed, the U.S. Trade Representative (USTR) fired off a shot recently by deciding to investigate United Steelworkers' (USW) petition against China's policies in the clean-energy sector. A U.S. decision to take a substantive case to the World Trade Organization (WTO) could herald a new era of political tensions surrounding the industry.

Even if the trade case does not blossom into a serious threat to the industry, it does send a warning to governments around the world that designing appropriate support mechanisms for the renewable energy sector may be necessary lest it becomes mired in trade spats. Despite the myriad challenges the sector faces, governments from the United States to China are not yet prepared to reverse or eliminate policy support for the production and use of renewable energy. But that political support remains tenuous and is contingent upon the global economic environment and policy evolution in individual countries.

This paper examines policies in the renewables sector across various countries and where political tensions could generate suboptimal outcomes for the sector's development. In its analysis of supply- and demand-side strategies of the clean-energy sector, this paper will also highlight some of the perils facing Seoul—and the lessons Korea can glean from other countries' efforts to prevent "renewables fatigue"—as it places greater emphasis on supporting clean-energy industries.

Renewable Energy Development across Countries

Renewable energy policies in countries worldwide provide a glimpse of the challenges ahead for South Korea as clean-energy manufacturing capacity and consumption expand. For the most part, government-backed demand incentives such as FiTs and renewables portfolio standards are two of the most commonly employed policies to promote renewable energy deployment. On the supply side, grants, tax incentives, and preferential lending practices characterize government support for the production of renewable energy technologies.

The extent and scope of state support differ across and within countries. Several European countries emerged as early movers in promoting the supply and demand of clean energy, and EU policies have reinforced member-state programs. As a result, many leading clean-energy companies are based in Europe. Yet, as the EU is mired in a protracted battle for economic recovery and over severe budget deficits, some signs of backsliding on renewable energy support have appeared, primarily targeting solar photovoltaics (PV).

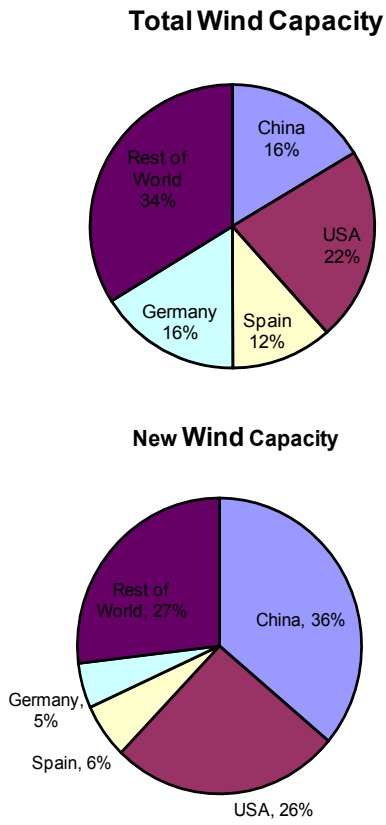
In Asia, numerous countries are determined to cultivate a globally competitive clean-energy industry. In addition to South Korea, China and Japan have embarked on a set of industrial policies that seek to expand market share and vie for technology leadership, igniting an intense competition among the players that has only just begun. Unlike the existing "integrated Asian production" model—where China largely serves as the final assembly destination for a product with higher value-added parts that are imported from Japan, South Korea, and elsewhere—Beijing does not appear willing to play that role much longer, particularly in clean energy. China, too, wants to create an integrated, high-value supply chain within the country.

The United States, although endowed with immense innovative capacity, technological prowess, and private capital, has suffered from the lack of a coherent national energy policy and effective legislation that clearly creates incentives for renewables development. However, federal-level inaction has not prevented individual states from implementing policies to catalyze clean-energy industries.

Europe

Through a combination of favorable demand-side policies and incentives and first-mover advantage, the EU emerged as the global leader in clean technology. Germany, Spain, and Denmark house some of the world's leading wind and solar firms (***Figure 2***). This is a clear testament to the impact that European renewable energy policies, rather than climate policy per se, have had on the sector's growth.

Figure 2. **Installed Wind Capacity by Country, 2009**



Source: World Wind Energy Association, "World Wind Energy Report 2009"

Effect of government policies. Two policies have mattered greatly in spurring demand for renewables. One is EU's mandate that 20 percent of energy supply must come from renewable resources by 2020, a Brussels directive that established individual renewable energy plans for each member country.[2] The other is the introduction on the member-state level of FiTs that guarantee a set price for the purchase of electricity generated from renewables. Government incentives such as tax deductions and preferential lending or renewable energy investments have also played a major role in cementing the EU's front-runner status.

Although the considerable policy drivers have resulted in the creation of a slate of venerable EU-based renewable energy companies, the path has not been without pitfalls. In fact, the European case offers numerous lessons about the political and economic costs associated with forging a leadership position in the renewables sector.

Driven in part by falling technology costs—a long-term necessity for the market—governments across the EU slashed solar PV FiTs in 2010. Europe's solar PV FiTs were designed to be cut gradually, but they did not keep pace with falling costs of production. This resulted in higher profit margins for investors and several overheated solar PV markets. Yet technology improvements are only part of the story. As FiTs are cut and investment margins trimmed, European firms are losing out to lower-cost manufacturers in Asia, namely China. At a time when European governments are intent on reviving their economies after the financial crisis, political and popular will to subsidize higher-cost PV power with imported solar panels is waning.

The following accounts of the German and Spanish responses to the rising costs of renewable energy deployment programs provide a snapshot of the cost implications of focusing on offshore wind and solar power on the demand side. In addition, the sharp cuts in incentives for solar PV power are an ominous sign for export-driven growth models in the clean-energy sector.

Two cautionary tales on cost: Germany and Spain. Among the EU member countries cutting PV FiTs in 2010, Germany was the most significant. In light of estimates that Germany's FiTs would cost taxpayers a total of €50–€75 billion (around $65–$100 billion) over 25 years, Germany's parliament on 9 June 2010 voted to reduce the FiTs. The German government estimates that 9.5 gigawatts (GW) of new solar capacity will come online in 2010—nearly tripling the previous record for annual installed capacity. As a result, according to an announcement by Germany's Federal Network Agency on 15 October 2010, domestic electricity prices will rise by 10 percent in 2011.[3]

Moreover, the trade dimension to the German price hike could further test public support. Over half of the 9.5 GW expected to be installed in 2010 will be powered by lower-cost solar panels imported from China. Indeed, the German Ministry of Economics and Technology indicates that more than 75 percent of solar capacity will come from imports. Germany will subsequently pay over €13 billion ($18 billion) for renewable energy next year, with much of the money flowing indirectly from ratepayers to foreign firms. The higher cost of solar alone would be enough to shake solar support, but the added element of rising import reliance has further dampened enthusiasm for the sector.

Germany's new Energy Concept, issued in September 2010, indicates a transition to more extensive support for offshore wind as part of an intensified drive to increase the share of renewables to 35 percent of total power generation by 2020, up from 17 percent now.[4] Offshore wind is another expensive renewable energy resource, indicating that further price increases are forthcoming. For the first time, German consumer groups are raising concerns over the price tag for renewable energy resources. Any sign of consumer backlash in Germany would send a very negative signal for rising costs elsewhere, as few countries can boast the kind of domestic clean-energy industry that Germany can.

Another early mover in renewable energy, Spain has emerged as a leading market for wind and solar technologies and touts a roster of multinational giants such as Iberdrola, Acciona, Abengoa, and Gamesa. In 2008, however, the Spanish government demonstrated the perils of imposing FiTs on the renewables market. After introducing an overly generous solar FiT that caused the market to overheat, the government sharply curbed incentives.[5]

The tariff issue remains problematic for Spain. As the government grapples with its debt crisis, there is concern about the sustainability of subsidizing more costly renewable energy technologies. Renewable energy power generators in Spain will receive more than €6 billion ($8.4 billion) in 2010 and, under the existing subsidy scheme, are scheduled to receive nearly €125 billion ($174 billion) through 2025. The government recently pulled back from a threat to institute a retroactive 30 percent reduction in payments for existing solar PV projects but, nonetheless, has reduced by 14 percent its projections for solar power deployment in the country's June 2010 renewable energy plan.[6]

Japan

Along with the EU, Japan was an early clean-tech mover. On the demand side, Japan promotes the consumption of renewables via European-style FiTs, although government support has not been as consistent. On the supply side, development of renewable energy resources has benefited from strong state support and continues to be led by major integrated manufacturers.

Japan has established aggressive greenhouse gas reduction targets during the past two years. The "low-carbon revolution" proposed in April 2009 was aimed at supporting economic growth and addressing climate change challenges by promoting solar power and electric cars. In September 2009, former prime minister Yukio Hatoyama announced a target of reducing

Japan's greenhouse gas emissions by 25 percent below 1990 levels by 2020—a target reaffirmed by the current prime minister, Naoto Kan.

In December 2008, the Japanese government announced a $486 billion stimulus package that included a small allocation for green investment. A second stimulus package of $154 billion announced in April 2009 made a more significant investment in climate-related projects, funneling $23.6 billion to clean technology.

Although Japanese firms benefit from a well-oiled industrial policy machine, they are mostly dependent on export markets and highly sensitive to market barriers that discourage foreign imports. As an example of this sensitivity, Japan is currently mounting a WTO challenge against the Canadian province of Ontario for its preferential renewable energy policies.

United States

Unlike in Europe and Japan, development of the renewable energy sector in the United States has lacked a clear policy direction, depending instead on a combination of state programs and federal financing support mechanisms. President Barack Obama entered office promising to jump-start a transition to a clean-energy economy. He pledged to introduce a series of headline policies, including a climate change bill, a federal renewable energy standard (RES), and the creation of a green energy bank. Although early efforts to establish these policies stalled, green components of the 2009 federal stimulus package helped bolster the renewable energy sector during the so-called Great Recession.[7] The U.S. renewables market continues to grow, but it is vulnerable to political risk at both the federal and state levels. Given the outcome of the midterm elections, federal support for renewables will likely be limited over the next two years. Further, if the recent USW case against China means that the United States is becoming a leading instigator of clean-tech trade spats, retaliatory filings may eventually undermine the country's efforts to promote its own clean-tech industries. In sum, the United States presents several risks to foreign firms hoping to capitalize on the sheer size of its market.

Federal programs. A Republican-led House of Representatives under John Boehner (R-Ohio) will not be supportive of climate and clean-energy policies as it was under outgoing Speaker Nancy Pelosi (D-Calif.). A split Congress will struggle to implement headline energy policies like a federal RES or the Clean Energy Deployment Administration without putting substantially more support behind nuclear energy. Even in the event that a federal RES does not materialize, federal funding mechanisms will continue to be instrumental in financing renewable energy projects in the United States.

One of the most prominent stimulus package programs was the 1603 grant in lieu of tax credits scheme, which catalyzed the construction of renewable energy programs—in the wind industry, in particular. The program has proved to be extremely controversial, however, and it may be allowed to expire at the end of the year.[8] Even though hundreds of renewable energy projects broke ground under the program, controversy emerged over the fact that a large portion of the funds went to foreign companies. Most of the money flowed to European firms, but opposition from Congress spiked after the Chinese firm, A-Power, announced in October 2009 that it intended to develop a project in Texas using government grants. As a result, Senator Charles Schumer (D-N.Y.) called on the Department of Energy to ban stimulus dollars from funding projects that used foreign-manufactured projects. Although Schumer failed to attract significant support for his "Buy American" clean-tech proposal, he was successful in effectively establishing a domestic-content requirement for the A-Power project. Incidentally, such content requirements were one type of trade barrier that the USW highlighted in its case against China (see more details in the final section).

Another major component of the federal stimulus package was the 48c manufacturing tax credit—a $2.3 billion program for clean-tech facilities based in the United States. The Obama administration explicitly stated that this program, which in effect provides a 30 percent subsidy to clean-tech manufacturing facilities, is intended to increase the competitiveness of U.S. companies in overseas markets.[9] Trade lawyers have stated that, if the receivers of the tax credit subsequently attempt to export the facilities' products, the U.S. companies would be exposed to a countervailing duty under WTO law since the administration has touted this preferential policy so publicly.[10]

State policies drive demand. State-level renewable portfolio standard (RPS) programs have been implemented in 29 states and the District of Columbia.[11] But large variations exist in the percentage of renewables the mandate imposes on utilities and in the cost of the alternative compliance penalty payments levied on utilities that fail to reach their targets. Overall, state programs have been successful at providing positive market signals where the federal government has failed. But policies on the state level will continue to be exposed to extreme policy shifts, especially as governments grapple with fiscal deficits.

China

China rivals the United States in clean-energy potential, but Beijing's efforts to become a leading manufacturer of clean-energy technologies have far surpassed those in Washington. As a result, Chinese firms are taking an increasing piece of global market share, particularly for solar PV panels (***Table 1***). For South Korea, China will be the obvious and formidable competitor in clean energy.

China's plans for the coming decade. Beijing is determined that the sector's development will play a leading role in China's energy strategy in the 12th Five-Year Plan (FYP) that begins next year and ends in 2015.[12] But China's energy-related targets are primarily focused on 2020, indicating a decade-long push to expand an indigenous renewable energy industry that is competitive globally.

To meet these ambitious targets, the Chinese government must introduce a host of demand-side incentives to significantly increase consumption of renewable energy and reduce the share of coal in the energy mix. These targets speak to Chinese policymakers' recognition of the central problem that has characterized the development of the renewables sector: the mismatch between supply and domestic demand. Two major and interrelated factors pose barriers to domestic consumption of renewable energy. One is an acutely price-sensitive public in a relatively poor country where tolerance for high energy costs is low, making it a politically sensitive issue. The other is the existence of a dominant coal industry with abundant resources that can generate power at a much lower cost than renewables.

A brief illustration of the wind sector is instructive in understanding the undesired consequence of "sprinting ahead of demand." China's wind turbine industry now faces overcapacity after several years of doubling year-on-year growth in installed capacity. At the end of 2009, China already had some 25 GW of installed wind power—more than double the 10 GW originally planned for 2010—because of lower-than-expected labor and equipment costs and attractive FiTs for onshore wind. By 2020, China aims to have at least 100 GW of installed capacity although most expect China to overshoot that target.[13]

The installation of turbines has outpaced grid interconnections, however, a problem experienced in many markets attempting to increase wind power market penetration. Although estimates vary, the China Electricity Council reckoned that in 2009 only about two-thirds of installed capacity was being used for power generation. China's ability to drastically increase the consumption of wind power will ultimately depend on the expansion of the transmission and distribution system during the next five years.[14] Additional power pricing reforms that allow more pass-through of the cost for both wind energy and transmission upgrades to end users will therefore be critical to encouraging renewable energy consumption. Beijing's willingness to impose more stringent resource-based taxes on traditional energy sources such as coal and oil will also have a positive impact on renewable energy development and usage.[15]

Given that the growth of the domestic market will be determined in part by midstream investments, China's wind turbine manufacturers are beginning to focus more on the export market, especially given overcapacity issues in the home market. But Chinese turbines are still viewed as lower quality than their international competitors, and China continues to seek innovation externally. Exporting turbines may also prove difficult because many foreign markets—particularly U.S. markets—are acutely opposed to Chinese renewables exports.

The Chinese solar sector faces a different set of problems. In an industry where some 90 percent of PV panels are exported, Chinese solar manufacturers are exposed to policy risks in importer countries and the contraction of global demand in general. Export dependency is due to Beijing's reluctance to introduce demand incentives that would encourage domestic installation of solar power. Until a system of FiTs is introduced, China will continue to take advantage of its cost advantage to export its solar products.

As the latest USW case filing attests, however, Chinese solar producers' export strategy could face rising trade barriers that curtail exports. While Beijing will fight these types of cases at the WTO to defend its strategic clean-tech sectors, Beijing may be forced to finally introduce demand-side policy via favorable solar FiTs if the U.S. case turns out to be substantive.

Technology, innovation, and jobs. Underlying the flurry of targets is Beijing's belief that renewable and sustainable energy technologies should be a strategic new growth area and a major driver of its so-called indigenous innovation push. In a recent complementary policy to the 12th FYP, China identified seven

Table 1: Top 10 Manufacturers of Photovoltaics, 2005 and 2010

2005			2010		
Company	**Country**	**MW**	**Company**	**Country**	**MW**
Sharp Electronics	Japan	375	First Solar	United States	1,322
Kyocera	Japan	142	Suntech	China	1,090
Q-Cells	Germany	131	Q-Cells	Germany	1,000
Schott Solar	Germany	95	JA Solar	China	800
BP Solar	United States	86	SolarWorld	Germany	710
Mitsubishi Electric	Japan	85	Sharp Electronics	Japan	695
Sanyo	Japan	84	Trina Solar	China	600
Shell Solar	United States	55	Yingli	China	600
Motech	Taiwan	45	Gintech	Taiwan	600
Isofoton	Spain	39	Kyocera	Japan	440

Source: Bloomberg New Energy Finance.

"emerging strategic industries" that will receive state backing: clean energy is one of those industries.[16] Moreover, China is expected to officially incorporate an investment package of as much as $740 billion (recent rumors suggest a doubling of the amount to $1.5 trillion, akin to a "green" stimulus), from both the public and private sectors, to be spent during the next decade, likely coinciding with a new energy development plan that will span the same time frame.[17]

All is not rosy for China's renewable energy sector, however. And the much-hyped rise to dominance in industries such as wind and solar may prove to be overstated and short-lived. For one, the state-led model of innovation could face diminishing returns as the private sector is squeezed out by larger and more powerful state-owned enterprises (SOEs). Such dynamics may already be emerging in the electric-vehicle sector as powerful SOEs recently forged an "alliance" to develop standards and deploy electric-vehicle technologies.[18] This has led some to refer to the alliance as a "technology cartel" intended to squeeze out private-sector players.

In addition, China is expected to derive 15 percent of its primary energy consumption from nonfossil fuels rather than renewables specifically. This indicates that in China there are strong advocates of hydro and nuclear, both of which will see substantial expansion over the next five years. Nuclear capacity alone is expected to triple in the 12th FYP.[19] Some industrial bureaucrats seem to feel that the 15 percent target cannot be realistically reached by relying so heavily on renewables; hence, they back nuclear, natural gas, and hydro.

South Korea

Until recently, South Korea has been a relatively small player in the global clean-technology market. The country's record on energy intensity and overall clean-technology manufacturing sales placed South Korea at a low ranking compared with others. During the past two years, however, Seoul has taken significant steps to advance green industrial policies that could place the country on a path toward being a leader in clean-technology manufacturing. The government is pushing South Korea in several research-and-development (R&D) areas, including solar PV, high-efficiency fuel cells, hybrid electric cars, smart grids, LED lights, and offshore wind.

South Korea's policy signals were clearly articulated with a broad vision of becoming a world leader in clean technology. South Korean government officials have been promoting the notion of a "Green New Deal" since 2008, when President Lee Myung-bak announced his Green Growth Plan.[20] Since then, a series of government programs have added government funding for the clean-technology sector.[21]

In 2010, the government-led foray into renewable energy continued. In March, South Korea passed an RPS, requiring that utilities generate 4 percent of their electricity from renewable sources by 2015, 10 percent by 2022, and 11 percent by 2030. And in October, Seoul unveiled an ambitious $36 billion plan aimed at making South Korea a leading exporter of wind and solar technologies. Like many other nations promoting renewable energy, South Korea has linked the investment to economic growth, with authorities pledging to create 110,000 green jobs through the plan. During the next five years, the government envisions grabbing 15 percent of the global wind and solar market. But clean-technology exports, particularly for solar PV, face headwinds from increasingly protectionist policies and possibly more legal challenges against subsidized clean-technology programs. To that end, Seoul will consider augmenting domestic demand-side incentives for renewable energy, as it did on 1 November 2010, when the Ministry of Knowledge Economy announced a domestic deployment target for 2.5 GW of offshore wind capacity by 2019.

Looming Challenges for South Korea's Clean-Energy Sector

South Korean intentions to emerge as a leader on the supply and demand sides of the clean-technology sector will have several implications. On the supply side, companies worldwide will closely observe the country's trajectory, given the rise of South Korea's state-backed nuclear industry in the past two years that has proven to be globally competitive. However, there are signs that governments will place greater emphasis on domestic job growth, which could disrupt export-driven growth models for sectors like solar. On the demand side, rising costs associated with renewable energy could diminish government willingness to continue providing consumption incentives. This pattern could certainly extend to South Korea as deployment of more expensive solar and offshore wind takes off. Exports of these technologies could face further constraints if other countries cut incentive programs.

This concluding section highlights three areas that could derail renewable energy growth in the years to come: the trend toward trade conflicts emanating from protectionist renewable energy policies, cost-driven backlash to renewable energy incentives, and policy volatility risks to investors.

Protectionism on the Rise

Renewable energy has been identified as a strategic growth industry in many countries, and the industry has been tapped by several governments as an engine for jobs growth that can help economies emerge from the global economic crisis. Increasingly, countries are instituting preferential subsidies to encourage domestic manufacturing capacity for renewable energy while also raising the criteria for foreign entry into domestic markets. The fallout from more protectionist policies that are deemed to cause "serious prejudice" against other WTO members could include a rise in trade cases related to clean-technology subsidy programs.[22]

On 15 October 2010, the USTR acknowledged that it will initiate a 90-day investigation of the 301 petition filed by the USW in September, a decision motivated by the midterm elections.

The Chinese government responded in expected fashion by claiming that if the U.S. case moves forward it will consider a reciprocal case against the U.S. government for its clean-energy subsidies. Those subsidies, many of which were in the U.S. $787 billion stimulus package, are designed to encourage domestic manufacturing in the sector and create green-collar jobs. The case could be an isolated U.S.-China trade issue or it could be the start of global scrutiny on green tech subsidization, which could have negative cost implications for renewable energy.

So far, it is uncertain whether all the far-ranging charges in the USW petition hold legal water and whether the Chinese subsidies highlighted are in fact WTO noncompliant. Whether or not the USTR takes up this petition in its entirety, the potential for clean-energy trade disputes is clearly present. Some potential scenarios that could materialize include:

Flash in the pan. Following the USTR announcement, a settlement between the United States and China could be reached either before or during the WTO consultation stage. In this case, the administration could hold another round of talks with Beijing, similar to President Obama's visit in November 2009, and announce another series of nonbinding clean-technology cooperation agreements, using this "progress" to stand down on the threats of a WTO case. Other countries also avoid resorting to WTO action as domestic industrial capacity is nurtured. Although USW and other labor organizations would be disappointed in such an outcome, firms with global ambitions would prefer this outcome.

Prolonged bilateral issue with no clear resolution. The USW issued five areas of WTO violations in its petition. Some of these charges, such as those on domestic-content requirements and export subsidies as well as subsidies to manufacturers of clean-energy manufacturing, have substance and are likely actionable under WTO law. But the United States is highly exposed on the issue. For one, the aforementioned 48c manufacturing tax credit for clean-technology facilities based in the United States could expose any of the U.S. companies that received the tax credit to possible countervailing duties under WTO law since the government has been so public with this preferential policy. China's case could be made easier should the 48c program be extended before the end of the year, as some in Congress are pushing for with USW support.

Tip of the iceberg. In this scenario, the USW case would proceed and be followed by a flood of other clean-technology trade cases worldwide. As a result of additional trade conflicts, governments could either pull back from support of the renewables sector or seek to change existing international laws pertaining to clean-tech subsidies.[23]

To reiterate, nearly every country engaged in promoting clean-energy industries has linked demand-side mandates to job creation. The preferential policies that help create these jobs could expose governments that espouse them to WTO challenges. Indeed, the U.S. biodiesel sector has already been the target of dumping charges from the EU and Australia.

Beyond the United States, more renewable energy supplier countries could seize upon recent programs to promote indigenous renewable energy industries. Japan's challenge of the Canadian province of Ontario for its domestic-content requirements as part of renewable energy mandates underscores the widespread adoption of preferential policies, the focus on job creation, and the exposure to legal challenges. The Canadian government was also being pressured by the Europeans to drop the domestic-content requirements in the current rounds of trade negotiations that took place in Canada in October. In the negotiations, Canadian officials told their European counterparts that the country has no intention of altering the requirements. Ironically, the Ontario Power Authority has already run into problems with the domestic-content requirements and has delayed implementation, most likely because the local manufacturing capacity cannot meet the new demand.

Renewables Incentives Backlash

Regardless of whether renewable energy equipment is imported, manufactured, or domestic, the subsidy costs borne by electricity ratepayers in the residential, commercial, and industrial sectors must eventually be eliminated to maintain public support. While a carbon price will be necessary, at least in the near to medium term, technology costs must also continue to fall. As FiTs and other subsidies are reduced, competition will grow fierce as margins are squeezed, likely leading to consolidation across the sector. Compounding the problem are low natural gas prices caused by the global supply glut. Renewable energy incentive programs are designed to be phased down and eventually eliminated, based on the assumption that prices for fossil fuels and carbon will continue to rise**.** But if cheap gas prevents renewables from reaching grid parity, then governments will need to maintain incentive programs for longer than expected. As legacy costs rise, popular and political support could disintegrate.

In addition, higher-cost renewable energy resources, such as solar PV and offshore wind, will add further costs to incentive programs. For solar, declining cost competitiveness of Western solar firms compared with Chinese firms will likely weaken government support. Already, the German and Spanish governments have indicated a frustration with the high cost of solar power despite boasting of leading indigenous renewable energy industries. Elsewhere in Europe and further afield, the high price tags associated with renewables will prove more problematic in coming years as most other countries lack manufacturing capability and the economic upside that comes along with it. As customers become exposed to steeper electricity prices, government support for renewable energy, and particularly solar PV, will be tested.

Policy Volatility an Ongoing Risk

The absence of a strong carbon price in energy markets relegates promoting renewable energy to a patchwork system of

mandates and subsidies. Changes in political leadership or an exhaustion of political will in the face of various industry headwinds could drastically change the investment outlook for renewables in any of the leading global markets.

Few sectors are as dependent on state support as renewable energy, and developments in Spain underline growing concerns about the optimal way to encourage and sustain investment. Investors have traditionally preferred FiTs, which guarantee a set payment for an extended period of time. Because of improving technologies and volatile market conditions, however, it is difficult to set optimal FiTs. In some cases, governments have been drastically wrong, resulting in either underinvestment or, in the case of Spain's PV market, an overheated domestic market because of overly generous subsidies. While retroactive changes to renewable energy contracts may or may not be unique to Spain, the Spanish case underscores the heightened level of political risk in the renewables sector globally.

Alternative Schemes Wanted

Wary of following a Spanish model that causes overheating of domestic markets, governments are considering the reverse-auction method. Such a financing structure is intended to more closely align renewable energy subsidies with the true costs of power generation, which could help sustain popular support. Under a reverse-auction program, the project developers, who in theory should have a clearer sense of project costs, establish prices for renewable energy. Last year, Brazil held what was widely considered a successful reverse auction, resulting in 71 new contracts to build 1.8 GW of wind power plants. The California Public Utilities Commission is set to introduce a reverse-auction model for solar PV facilities with a capacity of 1 to 20 megawatts. India and China are also seeking to develop reverse auctions for solar programs.

Although the reverse-auction method appears logical, the system is not foolproof. One problem in countries where tender-offer systems have not worked is that bidding companies have often underestimated costs and subsequently were unable to complete the project. In the future, more sophisticated financial evaluation of project bids may alleviate this problem.

Conclusion: Seoul-Searching on Renewable Energy Policy

As various countries' experiences so far attest, there is no silver bullet in ensuring the sustainability of a renewable energy industry. For South Korea, hedging against the looming risks detailed above, as well as relying on policy flexibility, will be important in preventing huge disruptions in the clean-energy sector. A few potential lessons may be instructive in guiding the formulation of policy going forward.

1. Overly aggressive demand-side incentives could eventually become fiscal liabilities (as in Spain and Germany, for example) that undermine the economic logic behind pushing renewable energy. In the current economic environment, a more gradual but progressive approach to demand-side incentives might be more palatable and help conserve political capital.

2. Viewing the clean-technology industry primarily through the prism of jobs risks triggering mutually reinforcing protectionist barriers in markets worldwide (the USW case, for example), which would ultimately have the effect of raising costs for renewable energy. The focus should be on lowering technology costs and deploying on a commercial scale, which would establish a country's leadership position in the industry and naturally create jobs.

3. China has a national strategic plan for clean energy, but it faces a slew of problems like fragmented industry, overreliance on the state, and limited innovation. The United States relies more on a Silicon Valley model for clean energy, but its lack of a national-level focus has resulted in a meek government and considerable political risk surrounding the change of administrations. Therefore, establishing a national strategic plan that is immune to political changes (credible and enduring political support in the absence of a climate change regime), coupled with extensive participation by the private sector in financing and R&D, might prove a good combination in the near term.

4. An export-led strategy will be exposed to a high degree of political risk (as in China, for example). A balance must be struck between creating domestic demand for renewable energy and building an industry that can contribute to economic growth. Even though clean-technology markets are often highly politicized, investment in physical manufacturing plants in developed markets like the U.S. market will help diffuse trade concerns, while many other growth markets will remain open to imports. A diversified approach to clean-tech manufacturing, with an underlying emphasis on quality and cost, will hedge against protectionist impulses abroad and also help to ensure longer-term competitiveness.

Like many other countries worldwide, South Korea is seeking to diversify energy resources and respond to air- and water-quality degradation resulting from years of unchecked industrial practices. Political threats to the industry come from a variety of sources—such as a lack of agreement on pricing emissions costs into energy markets, government-led market overheating via the introduction of overly attractive demand-side incentives, or protectionist impulses for clean-technology industries during episodes of sluggish economic growth. Each of these issues poses significant risks to market growth during the next decade, but they are unlikely to derail the strategic importance of clean-energy technologies. As a result, the ostensible durability of market growth in the years to come will likely reward near-term investment of capital—both real and political—in the industry.

Endnotes

1. Global Trends in Sustainable Energy Investment 2010 (Paris: United Nations Environment Program; London: Bloomberg New Energy Finance, 2010).

2. "Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion and the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC," Official Journal of the European Union, 6 May 2009, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF.

3. "Bundesnetzagentur comments on increase in the EEG surcharge" (Berlin: Bundesnetzagentur, 15 October 2010), http://www.bundesnetzagentur.de/cln_1912/SharedDocs/Pressemitteilungen/EN/2010/101015IncreaseInEEGSurcharge.html?nn=48242.

4. "Energiekonzept [in German]" (Berlin: Bundesministerium für Wirtschaft und Technologie; Bundesministerium für Umwelt, Naturschutz, und Reaktorsicherheit, 28 September 2010), www.bmu.de/files/pdfs/allgemein/application/pdf/energiekonzept_bundesregierung.pdf.

5. Again, the decline in solar prices is a positive sign for the long-term health of the sector, but solar PV remains much more expensive than traditional fuels or other renewable energy technologies and is, as a result, more exposed to FiT cuts.

6. Plan de Acción Nacional de Energías Renovables de España (PANER) 2011–2020 [in Spanish] (Madrid: Ministeria de Industria, Turismo y Comercio, 30 June 2010), www.idae.es/index.php/mod.documentos/mem.descarga?file=/documentos_20100630_PANER_Espana_version_final_[1]_cdb842de.pdf.

7. American Recovery and Reinvestment Act of 2009, Public Law 111-5, 111th Cong. (February 2009).

8. A lapse would revert support to the investment tax credit and production tax credits that were introduced during the Bush administration. But, given the prolonged slump of tax equity markets in the United States, such an outcome will lead to a decrease in renewable energy projects in the United States in 2011.

9. It is worth noting that several foreign firms also received these tax credits.

10. "President Obama Awards $2.3 Billion for New Clean-Tech Manufacturing Jobs," press release, White House, Office of the Press Secretary, 8 January 2010, www.whitehouse.gov/the-press-office/president-obama-awards-23-billion-new-clean-tech-manufacturing-jobs.

11. Database of State Incentives for Renewables & Efficiency, North Carolina Solar Center and the Interstate Renewable Energy Council; project funded by the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, 2010, www.dsireusa.org/.

12. See "Opinion on the 12th Five-Year Plan on China's Economic and Social Development," issued on October 18, 2010. Central Committee of the 17th Chinese Communist Party; PRC State Council. —No English version is currently available as far as I know.

13. Li Junfeng, Shi Pengfei, and Gao Hu, "2010 China Wind Power Outlook" (Global Wind Energy Council, Chinese Renewable Energy Industries Association, and Greenpeace China, October 2010), www.greenpeace.org/eastasia/press/reports/wind-power-report-english-2010.

14. The grid build-out has lagged behind the phenomenal growth in generation capacity across the power sector, a trend that poses a considerable challenge for renewables because most renewable supplies are in western China while approximately 75 percent of demand (and wealthier end users who can better afford the cost of renewables) is along the coast and in central China. And, given the higher price of intermittent renewables, grid companies have less incentive to connect to renewable capacity than to coal, especially given caps in end-user power prices.

15. John Garnaut, "Now China Is Set to Go Ahead with Its Own Resource Tax," Sydney Morning Herald, 9 July 2010.

16. "Decision on Accelerating the Cultivation and Development of Emerging Strategic Industries," China State Council, Beijing, 18 October 2010.

17. "China to Unveil $739b 'New Energy' Plan Soon," China Daily, 9 August 2010.

18. "16 SOEs to Form Electric Vehicle Association," 21st Century Business Herald, 19 August 2010.

19. "China Mapped Out Energy Program during 12th Five-Year Plan," Caijing, 22 October 2010.

20. "UNEP Launches Green Economy Initiative to Get the Global Markets Back to Work," press release, United Nations Environment Program, 22 October 2008, www.unep.org/Documents.Multilingual/Default.asp?DocumentID=548&ArticleID=5957&l=en.

21. These programs include the First National Basic Energy Plan (2008–30) in August 2008, a stimulus program in January 2009 that included $17 billion for clean-energy technologies, and a second stimulus package in July 2009 that was rolled out under the framework of the Five-Year Green Growth Plan that will direct another $22.3 billion to green industries. Also see Rob Atkinson, "Rising Tigers, Sleeping Giant" (Oakland, Calif.: Breakthrough Institute and Information Technology and Innovation Foundation, November 2009), http://thebreakthrough.org/blog/2009/11/asia_beats_us_31.shtml.

22. Bernd G. Janzen, "The Cleantech Subsidy Wave: A New Source of Trade Conflicts?" International Law News, September 2010.

23. Ibid.

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