

COMMENTARY

Assessing the Global Green Stimulus

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Over the past year, some of the world's leading economies have responded to the global financial crisis with large stimulus packages. Many of those packages included a significant "green" component aimed at positioning the countries to be competitive in the carbon-constrained global economy of the twenty-first century. In all, approximately half a trillion dollars of stimulus money was allocated across the globe to climate change related investment areas. The green stimulus plans vary in both the amount and focus. China, the United States, Korea, and Europe have proposed the largest green packages, although the "green" credentials of each stimulus differs significantly.

The notion that investments in environmentally friendly technologies and infrastructure will yield significant and more sustainable economic growth opportunities has come to be known as the "Green New Deal."¹ In the context of the global financial downturn the green new deal concept was applied to stimulus spending with the hope that a properly devised stimulus package can benefit both financial recovery and environmental goals simultaneously. The conceptual formula is clear: successfully directed green stimulus dollars would create new economic opportunity while improving the environment and creating more sustainable infrastructure and systems. Of course the stimulus funds can only advance the clean energy sector so much, and climate-related policies will need to be in place in order to secure the transition to a low-carbon economy.

As the one-year anniversary of the U.S. stimulus package approaches and countries all over the world look to extend the green stimulus concept into future growth and competitiveness strategies, it is important to take a closer look at the green stimulus experience in several other countries thus far. Key questions include: Are countries executing stimulus plans in different ways? How do countries gauge success or prioritize investments? Is the timing and scope of the green stimulus crafted in a way that will transition these countries to a low-carbon economy? Will the emphasis on "green" be effective in bringing about economic recovery and building jobs? Talking points delivered by government officials around the world discount these questions by suggesting the economic recovery and a green revolution are intrinsically connected and without contradiction. A careful examination of green stimulus investment to date and some of the key questions surrounding its effectiveness in stimulating the economy, creating jobs, and improving the environment will help determine its success and highlight future policy options.

Breaking Down the Global Green Stimulus

The most obvious question to start with is: what is green stimulus? Estimates of global green stimulus spending vary widely depending on the definition. For example, according to the latest estimates from HSBC Global Research, one of the leading research and investment firms looking into global green stimulus trends, governments around the world have committed over \$512 billion of stimulus to green projects (approximately

¹ See Edward B. Barbier, *Rethinking the Economic Recovery: A Global Green New Deal*, (Laramie, WY: University of Wyoming prepared for UN Environment Program, April 2009), <http://www.unep.org/greeneconomy/portals/30/docs/GGND-Report-April2009.pdf>

16 percent of the total stimulus). HSBC, however, has a very broad definition of green stimulus and includes several categories of spending such as low carbon power generation (broken down into renewable and CCS/other), energy efficiency investments in buildings and vehicles, rail and grid infrastructure, and water/waste investments. HSBC also adopts a broad definition of stimulus that includes not only funds from stimulus packages but also FY2009–FY2010 budgets. If only the energy-related green stimulus funds are included (leaving out water/waste investments and investments made through the budget process), the total green stimulus number is closer to \$348 billion (closer to 11 percent of the total stimulus).²

By comparison other similar studies count only “clean energy” stimulus and come up with a much smaller number. New Energy Finance, for example, estimates total clean energy stimulus at \$177 billion among the 13 largest spenders.³ Their definition only includes renewable energy, energy efficiency, advanced transportation, smart grid and other core clean energy technologies.⁴ Under the broader definition China has the largest overall green stimulus package with the United States in second place. If only clean energy funding is counted the United States is the largest spender with China in second place (see table on pages 13 and 14). The HSBC data shows the majority of the global green stimulus going to rail, followed by electricity grids and building efficiency in a close second and third place. New Energy Finance data shows a more equitable split between renewable energy, efficiency, grid, and R&D spending, with renewable and energy efficiency receiving almost 45 percent of the total. It seems fair to include budget spending in as part of the green stimulus calculations when that spending will happen over a time period that is relevant to providing global economic stimulus. The more inclusive definition for “green stimulus,” however, depends upon what environmental objective each country is trying to address and whether those categories of spending meet the objective (see later sector on how to judge the “greenness” of stimulus spending). Some categories of spending satisfy local pollution or poverty alleviation goals, while others are specifically targeted towards areas that reduce emissions.

The timing of the stimulus also varies across countries. Some countries enacted stimulus programs in 2008, others in 2009. Some countries passed multiple packages while others extended stimulus efforts through their regular budget process as well as specialized stimulus program. Speed of execution depends upon the date when the stimulus package passed, the types of projects financed, the type of financing (loans versus grants), and the amount of time needed to set up programs to review proposals and disperse funds. Some of the countries were slow to draft the rules and begin distributing the grants, tax credits, and loan guarantees. HSBC estimates that 22 percent of the total global green stimulus money will be spent in 2009, leaving a lot to be awarded and spent in 2010 and 2011.⁵ New Energy Finance estimates that 14 percent of the clean energy stimulus was delivered in 2009 and anticipate 34 percent to be spent in 2010 and again in 2011.⁶ According to the U.S. Department of Energy, which controls the majority share of the green stimulus money to be dispersed, only 6.4 percent of the stimulus money has been spent.⁷

Global stimulus data is difficult to track across countries. While the United States has very effective stimulus tracking websites that provide detailed progress reports, data for the rest of the countries, along with detailed justification for how projects are prioritized and executed—China in particular—has been less accessible. According to official public statements, each of the countries examined below see green stimulus as part of a

² Nick Robins, *A Global Green Recovery? Yes, but in 2010*, (London: HSBC Global Research, August 2009). <http://www.research.hsbc.com>

³ Part of the discrepancy in numbers can also be attributed to the fact that HSBC includes a wider range of countries and therefore a larger total pool of stimulus spending.

⁴ Michael Liebrich and Chris Greenwood, et al., *Green Investing 2010*, (New York: New Energy Finance for the World Economic Forum, January 2010). <http://www.weforum.org/pdf/climate/greeninvesting2010.pdf>

⁵ Nick Robins, *A Global Green Recovery? Yes, but in 2010*, (London: HSBC Global Research, August 2009). <http://www.research.hsbc.com>

⁶ Michael Liebrich and Chris Greenwood, et al., *Green Investing 2010*, (New York: New Energy Finance for the World Economic Forum, January 2010). <http://www.weforum.org/pdf/climate/greeninvesting2010.pdf>

⁷ U.S. Department of Energy website, “Recovery and Investment,” <http://www.energy.gov/recovery>.

larger strategic goal to be a leader in clean energy and climate-friendly technologies in the years to come. Given the nature of the current economic crisis, green job creation and green technology manufacturing are also important objectives for many of the global green stimulus packages.

United States

Green spending by the U.S. government falls into three separate categories: the Emergency Economic Stabilization Act (EESA) passed in October 2008, the American Reinvestment and Recovery Act (ARRA) passed in February 2009, and the 2010 budget. Stimulus spending in the United States is relatively transparent and information on most aspects of spending is readily accessible.

Of the \$787 billion committed under the February 2009 U.S. American Recovery and Reinvestment Act, between \$67 and \$80 billion was committed to green or clean energy investment, which includes government spending and tax breaks.⁸ In addition to allocating government funding to green investment areas, the ARRA also extended investment incentives and made them more flexible in response to the altered investment environment of the financial crisis and economic slowdown. This included extending the production tax credit (PTC) expiration by an additional three years beyond what the EESA had extended, permitting the PTC to be converted into a 30 percent investment tax credit (ITC), and establishing the popular federal cash grant program which can be used instead of the ITC.

The stated objective was to stimulate economic growth and create (and offset loss of) jobs. The administration estimated that some 3 to 4 million jobs would be created by the stimulus, many of those jobs in the new green sector. As of September 2009, the U.S. Congressional Budget Office estimated between 600,000 and 1.6 million jobs were saved or created as a result of the stimulus package (they did not provide estimates for green jobs).⁹ In designing the ARRA, the U.S. government focused on building efficiency in part because of a belief that energy efficiency projects would be a great source for domestic job creation in a short amount of time.

Most of the grants, cash grants, and tax credits committed under the ARRA will be distributed in 2010 and 2011. One program that has received a lot of attention from the renewable energy sector is the cash grant program managed by the Treasury Department and the Department of Energy. The program provides grants covering up to 30 percent of the cost basis of qualified renewable energy projects that are commenced or placed in service in 2009-10. The program runs until late 2011 but many of the projects funded by the program have until 2017 to come into service. The other major segment of ARRA funding is executed by the Department of Energy and goes to fund a wide range of projects and programs from home weatherization to state energy programs to government research and development.

There were three key criteria for distributing the green portion of the stimulus funds. First, projects had to be “shovel ready,” meaning that construction will be (or has been) started in 2009 or 2010. The second criterion for the funding was that the renewable energy projects be located in the United States in order to reduce U.S. emissions and grow the domestic market for renewable energy. The third emphasis was on leveraging private sector funding. Applicants had to demonstrate that they were able to raise private capital. There were some “buy American” provisions, but they only applied to public works projects in the stimulus, not for private ventures. There was also separate funding for R&D to support emerging technologies such as CCS.

China

In late 2008, China launched a \$586-billion stimulus package. In March 2009, the government revised the allocation of stimulus funds, decreasing overall the amount of money going to environmentally oriented projects, while leaving the total amount unchanged. The new package included a stronger focus on rural

⁸ Based on data provided by New Energy Finance and HSBC.

⁹ “Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output as of September 2009.” Washington, DC, Congressional Budget Office, November 2009. <http://www.cbo.gov/ftpdocs/106xx/doc10682/11-30-ARRA.pdf>.

development, social welfare projects, and technology advancement.¹⁰ While it is difficult to identify exactly how much of that stimulus was tapped for climate related investment and what percentage of the package was newly allocated money, HSBC estimates that approximately \$200 billion was set aside for climate change related projects (\$177 billion not including water/waste investments). About half of that “green” money (or \$100 billion) has been set aside for massive infrastructure projects, specifically rail systems and only \$8 billion is planned for energy efficiency investment. China plans to invest \$70 billion in its grid, including a project to build up to 450 miles of ultra-high voltage power lines. The stimulus funds are planned to be dispersed over two years. New Energy Finance estimated China’s clean energy spending at closer to \$47 billion, with \$19 billion going to grid infrastructure and advanced technology. Part of the discrepancy in the grid figures may come from the difference between conventional grid infrastructure and grid infrastructure designed to link renewable energy power sources to the grid or promote new grid technologies.

While China did not allocate much of its stimulus dollars directly on low carbon power generation, China is pursuing policies outside the scope of the economic stimulus that have nurtured and advanced China’s green credentials and positioned the country to be a leader in renewable energy manufacturing. China’s National Reform and Development Council (NDRC) has stated that the majority of the stimulus package will come from local government and the private sector. There are indications that Chinese stimulus spending, especially early on was executed very quickly and mostly through bank lending, but that many of the stimulus projects were already “on the books” and merely accelerated as a result of the stimulus. There is also growing concern about the nature and validity of some of the projects being put forth for funding at the provincial level.¹¹ China’s goals and priorities for green stimulus spending are not transparent or readily available but it can be broadly assumed that green stimulus spending falls in line with the government’s previously stated priority to ensure continued economic growth, improve the environment, and promote structural economic reform.

South Korea

South Korea’s green stimulus spending and larger strategy for fostering economic competitiveness in green industries is perhaps the most well-developed and articulated.¹² In January 2009, South Korea announced a stimulus package that included plans to invest \$31 billion towards a “Green New Deal.” The government’s aim was to create future growth drivers and new jobs in an effort to recover from the economic recession. The funds will be used to support 36 projects and create 960,000 jobs building infrastructure, increasing energy efficiency in homes and buildings, and environmental protection.¹³ South Korean officials are seeking raise their country’s global market share of renewable technologies from 2 percent to 8 percent by 2013.¹⁴ Energy efficiency received the majority of these funds, with an emphasis on buildings and advancing LED technology.

In July 2009, South Korea expanded its Green New Deal from \$31 billion to \$60 billion over the next five years, with the added money focusing on clean energy research and development.¹⁵ As part of the new addition, the Korean government plans to double current public funding levels in clean energy R&D to \$6.7 billion over

¹⁰ “China’s Stimulus Package: A Breakdown of Spending,” *Economic Observer*, March 7, 2009, http://www.eo.com.cn/ens/finance_investment/2009/03/07/131626.shtml.

¹¹ Wu Chen, *China’s Stimulus Package: A Six-Month Report Card*, London, Economist Intelligence Unit, July 2009, http://www.bcecc.be/docs/200908079807_Stimulus%20new%20main%20July2009.pdf.

¹² In addition to the stimulus package, Korea has developed multiple action plans designed to make it the greenest country in the world by 2050 and a competitive leader in green manufacturing. Korea is also working closely with the United Nations to develop these policies and programs (see <http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=594&ArticleID=6277&l=en>)

¹³ “President Lee drives eco-friendly growth with ‘Green New Deal’ project,” press release from President Lee’s office, February 17, 2009, http://www.korea.net/news/issues/issueDetailView.asp?board_no=20445&menu_code=A.

¹⁴ “Asia’s green-tech rivals: Clean-energy competition in the region will be intense,” *The Economist*, November 13, 2009.

¹⁵ Nick Robins, *A Global Green Recovery? Yes, but in 2010*, (London: HSBC Global Research, August 2009). <http://www.research.hsbc.com>

five years and make \$5.6 billion in loan guarantees available for renewable energy starting in 2013.¹⁶ Compared to the United States and China, Korea's overall investment in green or clean energy stimulus is small, but the percentage of overall stimulus devoted to climate-related investments is much higher.

Europe

Like Korea, the European green stimulus spending is part of a well-articulated strategy to become a leader in clean energy technology, though their green stimulus spending is comparatively small. The European Commission adopted the European Economic Recovery Plan in November 2008. As part of the plan the Commission will launch three public/private sector partnerships focused on green cars, an energy-efficient buildings initiative, and the use of advanced technology in manufacturing. Europe's green stimulus might be considered small compared to the big stimulus projects in the United States, China, and Korea, but that is in large part because Europe has already invested a lot in renewable energy and efficiency and has a fairly advanced clean energy technology manufacturing industry.¹⁷ Of the total European Union stimulus, 64 percent is dedicated to energy issues (this figure is closer to 10 percent for EU plus member country stimulus in aggregate). Currently, the European Union and its member states invest about three billion Euros a year in renewable energy.¹⁸ The biggest focus in Europe is on building efficiency, with about a third of the green stimulus in Europe directed to those projects. Most of the money is distributed by individual EU member state stimulus plans. Over half of the European Union stimulus package is focused on carbon capture and storage and low carbon power generation.¹⁹

Of the European countries, France, Germany, and the United Kingdom have put forward the most significant green stimulus initiatives. Germany's focus is on the car industry, where transportation initiatives will encourage the purchase of lower emissions vehicles, and promote technology innovation. France's priority sectors for the green stimulus are energy efficiency retrofits in public buildings, high speed rail links, public transport, and renewable energy development. According to reports done for the French government, the green stimulus is expected to create 600,000 jobs by 2020.²⁰ The United Kingdom had similarly focused on job creation for stimulus, with some officials stating the goal of 1 million green jobs by about 2015.²¹

Gauging Success: Not as Easy as it Looks

Green stimulus programs have a variety of goals and objectives which makes gauging success difficult. The two most obvious objectives are to create near-term economic growth—provide stimulus—and spur investments that have environmental benefits. Since any good stimulus should be “targeted, timely, and temporary” speed of execution and return on investment – how much GDP is generated for each dollar spent—are critical factors. Second, just because spending is categorized as being green does not guarantee its environmental credentials. A number of factors determine how “green” stimulus investments will be, including the definition of green benefits, as well as local laws and regulations governing infrastructure projects. Finally, several countries have identified job creation, renewable energy manufacturing, and creating a competitive advantage in energy R&D,

¹⁶ Kim Hee-sung, “Govt unveils plan to be among the top green nations,” press release, July 7, 2009, http://www.korea.net/News/Issues/issueDetailView.asp?board_no=20963.

¹⁷ “The Destination of Green Stimulus Dollars,” *The World*, September 21, 2009, <http://www.theworld.org/2009/09/21/the-destination-of-green-stimulus-dollars/>.

¹⁸ Commission of the European Communities, “Investing in the Development of Low Carbon Technologies (SET-Plan),” Brussels, October 2009.

¹⁹ Nick Robins, *A Global Green Recovery? Yes, but in 2010*, (London: HSBC Global Research, August 2009). <http://www.research.hsbc.com>

²⁰ Boston Consulting Group, a study commissioned by the Ministry for Sustainable Development, June 2009, <http://www.lesechos.fr/medias/2009/0616//300355922.pdf>.

²¹ Nick Robins, *A Global Green Recovery? Yes, but in 2010*, (London: HSBC Global Research, August 2009). <http://www.research.hsbc.com>

as core aims of the stimulus program and longer-term economic growth strategies. Each country has taken a different approach and has experienced different levels of success for these disparate goals.

Is This a Good “Stimulus”?

Green stimulus alone is not enough to yield a full economic recovery. Each country included in its stimulus package a much broader array of incentives for stimulating near-term growth (from tax cuts and expanded unemployment benefits to direct grants to states and local governments). Some of the funds directed toward green investments are better at stimulating economic growth than others. For example, investments that change the longer term disposable income of households (especially low-income households) can have a greater stimulative effect than one-time grants or temporary measures.²² For this reason, and because they can be executed quickly, energy efficiency investments are particularly well-suited to stimulus spending. Not to mention, energy efficiency investments also create additional economic stimulus and jobs (or at least job retention) for those workers and companies involved in the energy efficiency goods and services supply chain.

Other green stimulus spending has been criticized for being too difficult to implement quickly or having a relatively low return on investment. Some of the green stimulus geared toward energy research and development falls into this category. Many innovative and capital-intensive projects are much more difficult to execute in a timely manner because of regulatory hurdles or project timelines.²³ Indeed, much of the energy R&D funds, like those administered in the United States or European Union have been announced but the money has yet to be dispersed. According to the Department of Energy (DOE) Web site, of the nearly \$33 billion allocated to the DOE for energy-related investment under the ARRA, as of December 25, 2009, \$23 billion has been awarded (70 percent) and but only about \$1.7 billion has actually been spent (5.4 percent). Approximately \$1 billion of the \$3 billion in cash grants have been distributed by the Treasury Department. If these programs stay on track most of the money will be spent by 2011 but delays are still possible.

Opponents of green stimulus object to the expenditures on two grounds. The first objection is that much of the money for green stimulus comes through government spending which many claim is a less productive use of funds than keeping that money within the private sector. The second and a related claim is that many of the environmental priorities funded by green stimulus are un-economic. Renewable energy technologies for example must be heavily subsidized to compete with conventional energy technologies and sources and is therefore a less productive outlet for stimulus dollars.²⁴ Both objections deal with core disagreements within the realm of political economics and will no doubt persist long after green stimulus spending has all been spent. There is also a trade-off between near-term stimulus investments that can and will have a short-term impact and those that create new industries and opportunities that can fuel longer-term economic growth. For the most part, those who consider the market barriers to introduction of green technologies and infrastructure and the external environmental costs of all economic activity have a different perspective on green investments than those who do not.²⁵ Either way, it is clear that green or clean energy investments have an important role to play but cannot achieve all the desired aims of any stimulus package.

Is This a Good “Green” Stimulus?

When it comes to stimulus spending, green is in the eye of the beholder. Green stimulus projects range from the obvious, investments in renewable energy technologies and infrastructure, to the less straight-forward categories

²² “Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output as of September 2009,” Congressional Budget Office, November 2009. <http://www.cbo.gov/ftpdocs/106xx/doc10682/11-30-ARRA.pdf>

²³ Alex Bowen et al., “An outline of the case for a ‘green’ stimulus,” Policy Brief, London, Grantham Research Institute, London, February 2009. <http://www2.lse.ac.uk/GranthamInstitute/publications/PolicyBriefsandPapers/PBGreenStimulusFeb09.pdf>.

²⁴ Ben Lieberman, “Green Stimulus: Tying Economic Package to Energy and Environmental Plan Is Not Workable,” WebMemo #2245, (Washington, DC: Heritage Foundation). <http://www.heritage.org/research/energyandenvironment/wm2245.cfm/>

²⁵ Adam B. Jaffe et al., “A Tale of Two Market Failures: Technology and Environmental Policy,” Discussion Paper RFF DP 04-38, (Washington, D.C.: Resources for the Future October 2004).

of infrastructure spending in waste and water, electric grid, and transportation. The environmental community has been both a vocal promoter and critic of green stimulus spending. Early on the environmental community saw stimulus packages as a way to encourage large influxes of money into all sorts of projects to improve the environment. As stimulus plans were proposed and are now being executed, however, this same community is eager to point out ways in which the green stimulus could be greener. Stimulus spending has been criticized because not enough of the stimulus is put toward green investments.²⁶ Countries are loosening environmental restrictions and guidelines in order to expedite green investments. Some green investments are better than others—transportation infrastructure cannot be called green unless it has a defensible improvement on what type of transportation would have been built otherwise. And the benefits generated by green investments may be overshadowed by the environmental damage caused by other parts of the stimulus.

If properly designed and complemented by effective energy policies, the green stimulus spending has the potential to yield real and significant environmental benefits. For example, the green stimulus dollars are predicted to make a small but directionally important impact on U.S. emissions. According to the U.S. Energy Information Administration's latest outlook, stimulus spending is expected to yield a 1.3 percent reduction in energy related carbon dioxide emissions in the United States by 2013 (0.6 percent by 2030).²⁷ Global emissions reduction figures attributable to stimulus spending are difficult to discern largely due to the lack of information and transparency of stimulus spending itself. Since emissions reductions are such an important part of combating climate change this is a major shortcoming in being able to estimate the impact these policies will have on global climate change goals. On the other hand, adaptation is another critical element of any global effort to combat climate change. Stimulus money directed to infrastructure that provides greater resilience or funds adaptation measures should also count as a contribution toward the climate effort. To date, neither of these metrics has been carefully calculated. Clean energy stimulus seems to have had, however, an overall positive effect on clean energy investments. After being expected to drop by nearly one-fifth between 2008 and 2009, clean energy investment only dropped 6.5 percent (\$145 billion). Much of this spending can be attributed to the direct and indirect effects of stimulus spending and the falling level zed cost of renewable energy.²⁸

On the other hand, in China the bulk of the stimulus has been funneled into energy-intensive sectors and large infrastructure projects. Furthermore, the Chinese infrastructure projects are not entirely “green” in nature, especially since the emissions-intensive steel industry gets a boost from it. While China's investment in railways under the stimulus plan is impressive, it is important to put it in context of spending going on in other infrastructure areas. Environmental groups are encouraging China to promote environmentally friendly practices and priorities in all of their stimulus spending while at the same time tracking ways in which stimulus efforts run contrary to environmental goals.²⁹ According to China's Ministry of Transport, investment in railways is only half the size of the investment the government is putting toward building roads for cars.³⁰

Finally, stimulus money can only go so far towards achieving longer range environmental goals. The transition to a low-carbon economy will require a longer time horizon and significantly larger amounts of money. To put the global green stimulus in perspective, the International Energy Agency reported in their *World Energy*

²⁶ Nicholas Stern, “Calling for a green stimulus plan,” McKinsey & Company, March 9, 2009, http://whatmatters.mckinseydigital.com/climate_change/calling-for-a-green-stimulus-plan.

²⁷ “An Updated Annual Energy Outlook 2009 Reference Case Reflecting Provisions of the American Recovery and Reinvestment Act and Recent Changes in the Economic Outlook,” U.S. Energy Information Administration, <http://www.eia.doe.gov/oiaf/servicerpt/stimulus/summary.html>.

²⁸ Michael Liebrich and Chris Greenwood, et al. *Green Investing 2010*, New Energy Finance, World Economic Forum, January 2010. <http://www.weforum.org/pdf/climate/greeninvesting2010.pdf>

²⁹ Barbara Finnermore and Alex Wang, “Sticking to a Truly ‘Green’ Stimulus,” *China Dialogue*, January 20, 2009, <http://www.chinadialogue.net/article/show/single/en/2696>

³⁰ 管理员, “China plans to build its way out of crisis, Chongqing Lebao, March 19, 2009, http://www.cnliebao.com/Eng_news_info.asp?id=688.

Outlook that between 2010 and 2030 there will need to be an additional cumulative investment of \$10.5 trillion to reach the 450-parts-per-million climate scenario. Of this spending, \$6.6 trillion will need to be spent on low-carbon power generation globally. When the global stimulus packages were being finalized in early 2009, the UN Environment Program released a report recommending that 1 percent of global GDP (\$750 billion) needs to be invested in green technologies over the next few years in order to begin addressing the challenges of climate change, and the global green stimulus goes only part of the way in achieving that.³¹

The highly advertised smart grid investment provisions within the ARRA are a perfect example of the significant cost of transitioning to a low-carbon economy and the difficulty of using the stimulus to do so. The U.S. stimulus allocates around \$15 billion toward investments in transmission and the grid. This is a significantly larger amount than was invested by the government before the stimulus, but there is no indication that funding levels will continue at this level once the ARRA money has run out. Since it is estimated that just digitizing the grid will cost up to \$400 billion to \$500 billion, the stimulus funds are a good start but nowhere near adequate for getting the entire job done. Another problem for the grid is the shovel-ready requirement, since it takes between 7 and 10 years to cite a new transmission line. Funding is therefore most likely to be directed to fixing existing lines.

It is clear that green stimulus spending can yield important environmental and societal benefits such as bringing clean water, modern day sewage systems, and clean energy to communities around the world. Green stimulus spending, however, is not a panacea for meeting the mitigation or adaptation needs associated with global climate change, nor for solving local environmental pollution issues associated with modern day societal practices and development. Longer-term policy goals and commercial frameworks play a critical role in determining the future success of society to build on the good work and aims of the green stimulus initiatives. Several countries have in place the types of policies and incentives to drive further investment in environmentally beneficial projects.

Programs like “Golden Sun” and “Solar Roofs” have promoted solar and wind energy demand by backing and subsidizing up to 50 percent of projects and promising to buy the renewable energy at a favorable price. China has also established policy certainty by setting the goal of generating 15 percent of its energy supply from renewable sources by 2020,³² as well as technology specific targets of 150 gigawatt (GW) in wind and 20 GW in solar capacity by 2020.³³ South Korea has also set ambitious renewable targets for solar and wind. The government is aiming for 2.25 GW generated from wind and 1.3 GW from solar photovoltaic (PV) by 2012. The government has also expanded solar and wind feed-in tariff.³⁴ The European Union is on a long-term track to reduce emissions and transition to a low-carbon economy as part of its domestic programs and policies that were put in place to meet its Kyoto Protocol emissions reduction targets. The domestic goals set for renewable power generation and transportation fuels in addition to the economic incentives induced by the European Emissions Trading System (regional cap-and-trade program) provide the region with a great deal of long-term certainty and incentive for low-carbon investments.³⁵

³¹ UN Environment Program (UNEP), *Global Green New Deal: Policy Brief*, (Geneva: United Nations Environment Program, March 2009), <http://www.unep.ch/etb/publications/Green%20Economy/UNEP%20Policy%20Brief%20Eng.pdf>.

³² On December 28, 2009, China amended its Renewable Energy Law with a mandate to utilities to produce 15 percent of its energy from renewable sources by 2020. This is up from the previous 10 percent. China currently generates about 9 percent renewables in its electricity mix.

³³ Julian Wong. “Green Hops: 3 trillion reasons to stop what you are doing now and do a little different,” GreenLeapForward.com, June 3, 2009, <http://greenleapforward.com/2009/06/03/green-hops-3-trillion-reasons-to-stop-what-you-are-doing-now-and-do-a-little-dance/>.

³⁴ Wind generation is eligible for a tariff of \$.09/kWh for the first 15 years of plant operation.

³⁵ European Commission, “The EU climate and energy package,” http://ec.europa.eu/environment/climat/climate_action.htm.

The United States on the other hand, does not fair quite as well in terms of its low-carbon investment environment.³⁶ The U.S. market for green investments has history of fits and starts. Traditionally, tax incentives for renewable energy investments had to be renewed every year, leaving the industry with very little long-term certainty. The three year extension of the production tax credit under the ARRA will expire in 2012 for wind. With the majority of U.S. stimulus funding awarded in 2010 and 2011, and no national renewable energy standards or carbon price in place, the renewable energy industry's viability in the United States will face a significant challenge. The United States has fared well in attracting investment despite its reliance on volatile market incentives because of its large capital and energy markets. Going forward countries like China and entities like the European Union have a lower-risk profile for climate-related investments because of strong policy incentives and a consistent approach.³⁷

The Focus on Green Jobs³⁸

Even as the economic recovery starts to take hold the unemployment rates around the world continue to be a cause for concern. The so-called jobless recovery has become a prime consideration for many countries whose populations are tired of seeing economic growth rise while more and more people are out of work and even those with jobs are less able to care for the needs of their families. The Green New Deal has become one of the most popular political vehicles for promoting job creation. In President Barack Obama's recent State of the Union speech, he used the "clean energy future" as his main example of a source of new economic opportunity, job creation, and new area of competitiveness for U.S. industry. President Obama claims the United States will "create nearly half a million jobs by investing in clean energy—by committing to double the production of alternative energy in the next three years, and by modernizing more than 75 percent of federal buildings and improving the energy efficiency of 2 million American homes."³⁹ President Obama is not alone. Almost every other country that announced a green stimulus package seeks to generate a substantial number of new jobs from these investments.

The first important thing to note is that measuring net job creation, or any type of job creation for that matter, is difficult. Economies and societies lose and gain jobs each and every day. The loss of one job can create or destroy economic opportunity and jobs in a number of direct and indirect ways. Green jobs numbers encounter the same amount of criticism as other types of job creation claims for these reasons. For example, to the extent that green jobs are created by encouraging use of renewable energy as opposed to fossil-based alternatives, green job creation may be offset by job loss in the oil, gas or coal industries.

The second but related consideration is whether or not green jobs are better quality (higher paying, better work environment, more secure, etc) than other jobs. This is also a very difficult question to answer though many proponents of clean energy jobs claim that most green investments yield more jobs than alternative investments due to high domestic content.⁴⁰ The truth is that the term "green jobs" covers a wide variety of employment types. Some green jobs are seasonal construction jobs, some are manufacturing jobs, others are high-tech development or service jobs, and a whole range of other categories in between. Some industries looking to

³⁶ Deutsche Bank Climate Change Advisors, "Global Climate Change Policy Tracker: An Investor's Assessment," Deutsche Bank Climate Change Advisors, October 16, 2009, http://www.dbcca.com/dbcca/EN/investment-research/investment_research_1780.jsp.

³⁷ Ibid.

³⁸ See discussion of green jobs in forthcoming related CSIS publication "Green Jobs" A special thank to Leigh Henderix for her research into green jobs.

³⁹ President Obama's Remarks on Jobs and Clean Energy Investments on January 8, 2009. <http://www.whitehouse.gov/the-press-office/remarks-president-jobs-and-clean-energy-investments>

⁴⁰ In an op-ed in the *Philadelphia Inquirer*, Vice President Joe Biden writes: "According to the Council of Economic Advisers, green jobs pay 10 to 20 percent more than other jobs. They also are more likely to be union jobs. Building a new power grid, manufacturing solar panels, weatherizing homes and office buildings, and renovating schools are just a few of the ways to create high-quality green jobs that strengthen the foundation of this country." Ron Pernick et al., *Clean Tech Job Trends 2009*, also provides information about the cost advantages of green jobs over regular jobs in similar industries.

capitalize on the current popularity of green jobs seek to brand jobs in their industry as green while others might reject that characterization. The nuclear industry, for example, can claim that they foster green job growth because nuclear energy provides a low-carbon source of energy. Others might reject this claim because nuclear power also comes with unresolved nuclear waste issues that are of great concern to some within the environmental community. Similarly, policies that aggressively promote jobs in the renewable energy sector could also have a negative impact on employment in the conventional oil and gas sector and the revenue generated by those industries. The oil and gas industry points out that the focus on green jobs in particular is misplaced given the need for conventional energy resources and that these are difficult trade-offs to make in a time where both revenues and jobs are key political and economic issues. The environmental community, on the other hand, views continued investment in the conventional energy sector as lacking the transformative vision and larger competitiveness aims of the “green new deal.”

Finally, some green jobs are held in higher esteem than others because of the employment needs in a given country or region. For example, many developed economies have lost a significant portion of their manufacturing base as low-cost labor in developing countries caused manufacturing facilities to move overseas. Communities that valued good paying and secure manufacturing jobs often want to see new manufacturing opportunities as the source of job creation (as opposed to changing to a new sector of the economy). Much of the criticism surrounding the long-term stability of green jobs is targeted at these types of manufacturing opportunities. While most people believe that jobs in construction and maintenance are likely to remain in-country, manufacturing jobs are the most likely jobs to be lost to countries with a competitive advantage in manufacturing absent continued government subsidy.

Each of the countries reviewed earlier claim to want to create new jobs and manufacturing opportunities, including the United States. Most of U.S. stimulus has gone, however, not to creating manufacturing jobs, but to build wind farms and solar parts using equipment made outside the United States. The ARRA allocations place a heavier emphasis on investors than manufacturers. According to Investigative Reporting Workshop findings, the 11 U.S.-based wind farms that received cash grants have imported 695 of the 982 wind turbines for these projects, and estimates suggest those purchases have created 4,500 jobs overseas.⁴¹ The U.S. jobs created are mainly in construction, assembling the turbines, installing solar panels.

The recent cash grant allocations have drawn criticism on Capitol Hill, with Senator Charles Schumer (D-NY) at the helm. Schumer has called for prohibiting any stimulus dollars from going to projects that use foreign manufactured projects. The project he has focused his attention on is a wind farm in Texas run by the Spanish energy company Iberdrola, which is using Chinese wind turbine manufacturers to supply the wind farm. Senator Schumer wrote to Secretary Steven Chu, “The purpose of the Recovery Act was to jump-start the economy to create and save jobs—American jobs. Yet, the Texas wind farm project would create an estimated 2,000–3,000 clean energy manufacturing jobs—in China.”⁴²

Senator Schumer raised alarm after discovering that of the \$1 billion allocated through the cash grant program to support renewable energy projects in the United States, 77 percent of the funding that went to wind projects was given to foreign companies (92 percent of the funding went to wind). Iberdrola won 57 percent of the total wind funding, in large part because the company had the most shovel-ready projects. Schumer’s recommendation has no legal ground, however, since the eligibility criterion only requires that the project be located in the United States.⁴³

In a recent report released by Vice President Joe Biden’s office, it was predicted that the stimulus money will go toward boosting America’s renewable manufacturing capacity, from 6 GW on January 1, 2009, to over 12 GW

⁴¹ Investigative Reporting Workshop at American University, interactive wind project map and Renewable Energy Policy Project report.

⁴² Letter from Senator Charles Schumer to Secretary of Energy Steven Chu, November 5, 2009.

⁴³ Calculated based on data from DOE and Treasury Web site listing awardees for the 1603 cash grant program.

by 2012. The report also presented the U.S. administration's goal of reaching a total of 55.6 GW renewable energy generation capacity by 2012. This rising demand will certainly serve as a catalyst for a domestic manufacturing sector for renewable energy equipment, but the gap between the U.S. manufacturing capacity and demand will continue to result in importation from abroad.⁴⁴

Who's Winning the Green New Deal?

For the most part, the green new deal is promoted as a win-win opportunity for hurting economies and a deeply troubled environment. The competitive dynamics, however, are quickly threatening to overtake the common interest usually associated with environmental endeavors. Each and every country that has announced a green stimulus plan has, to varying extents, expressed a desire to be a "leader in the new clean energy economy."

President Obama frequently states: "The national that leads the clean energy economy will lead the global economy."⁴⁵ Indeed, the United States has a long and successful history in developing next generation energy technology solutions. The Korean government saw the stimulus as an opportunity to gain competitive ground in what it considered a twenty-first-century carbon-constrained economic reality. "The aim is for South Korea to become the world's seventh-most competitive country by 2020 in terms of energy efficiency and ability to adapt to climate change," South Korean president Lee Myung-Bak stated in a press release about the Green New Deal.

South Korea is quickly becoming a leading world manufacturer of light-emitting diode (LED) technologies, and its domestic solar market and manufacturing base is booming. The government also aims to become the fourth-largest producer of green cars by 2020 and build 1 million green homes run completely on renewable energy. The European Union and many of its member states have long pursued clean energy technology as one of the core elements of its economic competitiveness strategy. To this day, Germany is one of the largest producers and exporters of wind turbines, and Spain a strong producer of solar panels. Finally, Chinese policies to promote renewable energy manufacturing and use its rapid growth and low-cost manufacturing base all serve to fuel its competitive advantage as the clean energy technology producer of the future.

According to some estimates, three of the four top countries allocating funding to renewable energy are in Asia. China, Korea, and Japan are positioning themselves to be leaders in the clean energy economy by making large government investments to support clean technology research and innovation, build manufacturing capacity, creating a domestic market, and providing enabling infrastructure for the deployment. By being "first movers" in the clean technology sector these countries are positioned to benefit from economies of scale, learning by doing experience, building supply-chain efficiency and a greater market power advantage.⁴⁶ Using this strategy China is experiencing rapid growth in wind and solar capacity additions and manufacturing. Chinese companies are now among the top four in global wind providers and account for about 30 percent of the global supply of solar panels, while the United States accounts for only 10 percent of global solar manufacturing.⁴⁷ Turbines in China can be manufactured for as little as \$900,000 per installed megawatt, which is about half the cost of their European competitors.

Countries that have been traditionally strong innovators but have lost the competitive edge in manufacturing still have an important leadership role to play in the clean energy economy. The transition will make these

⁴⁴ A good deal of work is being done to identify areas where the United States has a competitive advantage in certain industries or supply chains. One example is the work being conducted by the Center on Globalization Governance and Competitiveness at Duke University. For more information visit <http://www.cggc.duke.edu/>.

⁴⁵ State of the Union, January 27, 2010, <http://www.whitehouse.gov/the-press-office/remarks-president-state-union-address>.

⁴⁶ Rob Atkinson et al., *Rising Tigers, Sleeping Giant*, (Oakland, Calif.: Breakthrough Institute and the Information Technology and Innovation Foundation, November 2009).

⁴⁷ Lorraine Yin et al., *China's Clean Revolution II: Opportunities for a Low Carbon Future* (London: The Climate Group, August 2009).

innovations, as well as the domestic jobs that go along with transforming the economy's infrastructure and practices, good sources of economic growth and job creation.

The recent debate over the green stimulus dollars lays bare the inherent tension between stimulating the economy and transitioning to a low-carbon economy. Stimulating economic growth and job creation means incentives for lower energy prices and creating new domestic industry. Most of the lowest cost estimates for meeting meaningful global emission reduction goals rely on the world being supplied by the lowest cost producer of low carbon goods and services. One of the core questions surrounding the competitive angle adopted by many of these countries is whether or not the focus on green job creation at the national level (specifically green jobs that are not a natural competitive advantage for that country) raises the overall cost of emission reduction. Even more troubling are some of the protectionist sentiments that accompany these green stimulus programs which threaten to damage cost-advantage trade in renewable goods and services.

The policies China is pursuing outside the scope of the economic stimulus have nurtured and advanced China's green credentials and positioned the country to be a leader in renewable energy manufacturing. Until recently, the Chinese government has imposed local content requirement on renewable energy projects. These "buy Chinese" provisions had required that 70 percent of the equipment needed for installed wind power plants be sourced domestically. China dropped these requirements in November 2009 under U.S. and European pressure. This does not mean, however, that U.S. and European manufacturers will soon flood the Chinese market. The Chinese manufacturers (in part because of subsidies, cheap land and labor) are still making the cheapest, most competitive products. Similar protectionist sentiments in other stimulus packages or economic policies going forward, however, threaten to hamper the free trade of green goods and services if countries seek to promote domestic job creation above global emissions reductions.

Proponents of these policies do not necessarily recognize these goals as mutually exclusive. Given the economic transition that must take place across the globe to bring about a low carbon society, there may be ample opportunity for many countries to take a leading role in creating and manufacturing the clean energy technologies of today and tomorrow.

A Green Success?

Green stimulus cannot alone solve the world's economic or ecological crises. During a time of weak financial markets and struggling private investment, green stimulus can go a long way to provide some much needed momentum for the economy as a whole and for environmentally sound projects as well. But a full economic recovery will take a great deal more than strategic investments in emerging industries like clean energy technology and transforming to a low carbon economy will require a much longer time horizon, the right long-term policy framework, and significant amounts of sustained investment.⁴⁸ Green stimulus suffers from many of the same shortcomings and controversies as any other aspect of the stimulus bills or green movement, but the strong political need to create jobs, economic growth, and future areas of competitive advantage while addressing our pressing environmental challenges, have combined the two into a powerful, though sometimes overstated, strategic political aim. In many ways it is too early and too little is known about green stimulus spending to gauge its true success. Greater transparency about stimulus spending in general and further analysis about the strategies being employed by each of these countries will help to improve both the economic and environmental policies and programs put in place to drive economic growth and address climate change. To date, countries have had varying degrees of success in implementing their green stimulus programs with many of the most successful likely to be the ones who have strong policy incentives and commercial frameworks to catalyze future green investments long after the green stimulus is gone.

⁴⁸ James Manyika and Byron Auguste, "Five Myths about How to Create Jobs," *McKinsey Quarterly*, February 2010.

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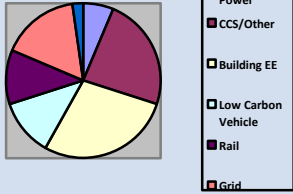
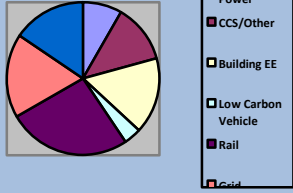
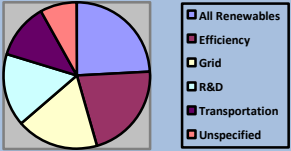
COMMENTARY



Table 1	HSBC Data*			New Energy Finance Data			Spending Goals and Project Criteria
	Green Stimulus (Billion \$US)	% of Total Stimulus Package	Division of Spending	Clean Energy Stimulus (\$US)	% of Total Stimulus Package	Division of Spending (Total)	
U.S.	118	12%	<ul style="list-style-type: none"> Renewable Power CCS/Other Building EE Low Carbon Vehicle Rail 	67	9%	NA	Goal is to stimulate economic growth and create jobs. Project criteria: -Shovel ready -Leverage private sector \$ -Renewable energy projects in the U.S.
China*	218	34%	<ul style="list-style-type: none"> Renewable Power CCS/Other Building EE Low Carbon Vehicle Rail 	47	8%	NA	Ensure growth. Promote domestic consumption. ⁴⁹ Active development of a green economy and promotion of green growth. ⁵⁰
Korea	60	79%	<ul style="list-style-type: none"> Renewable Power CCS/Other Building EE Low Carbon Vehicle Rail 	16	21%	NA	Goal is to create economic growth drivers and job creation

⁴⁹ <http://www.reuters.com/article/idUSPEK2551>

⁵⁰ <http://websearch.mep.gov.cn/was40/detail?record=1&channelid=24398&searchword=stimulus>

<p>EU**</p>	<p>55</p>	<p>10%</p>		<p>31.1</p>	<p>14%</p>	<p>NA</p>	<p>Green stimulus goals among EU members differs depending on their economic focus</p>
<p>World/Total</p>	<p>512</p>	<p>16%</p>		<p>177</p>	<p>7%</p>		<p>NA</p>

**HSBC estimates are much larger because they include a wider category of spending activities under their definition of “green stimulus,” a larger group of countries and money allocated through both stimulus package and budget expenditures, NEF data, on the other hand, includes only 13 countries (including the EU), does not include budget expenditures, and has a much more targeted definition of “clean energy” spending which does not include spending on traditional waste, water, grid and transportation infrastructure.*

***Includes money allocated by the EU and EU member states as included in HSBC and NEF data. HSBC included more EU countries than NEF which included the EU, France, Germany, Spain, and the UK.*

Source: Calculated using HSBC Global Research, July 31, 2009, New Energy Finance, January 21, 2010