

Green stimulus: case studies from 2008-2009

COVID-19 will very likely tip the already teetering global economy into a recession, the first comprehensive financial shock since 2008, and potentially the biggest disruption for many decades. This briefing provides a background on the concept of a green stimulus, and four case studies of the impacts of green stimulus in response to the 2008/9 global financial crisis.

What is a green stimulus?

In response to global economic crises, governments release [stimulus packages](#) to prevent economic recession, stimulate employment and speed up recovery. Fiscal stimulus plans [boost](#) public spending, which could increase employment and income. Monetary stimulus are measures undertaken by central banks, such as interest rate cuts and direct market interventions (asset buying). In recent years there are [clear signals](#) that central banks such as the [European Central Bank](#) will make climate change a priority, which makes central banks' interventions potentially a [transformative force](#) for the green transition.

Green stimulus offers [financial support](#) in the form of direct energy efficiency and environmental improvements. Such measures include a range of [categories of spending](#), including renewables, energy efficiency measures, transport and grid infrastructure. They differ from traditional infrastructure stimulus packages that favour carbon intensive activities, such as building roads and coal power plants, with long-lasting environmental impacts. 'Green stimulus' efforts provide a [better alternative](#) by generating clean jobs and sustainable economic growth. The [World Bank](#) describes the most beneficial green stimulus programmes as those that can "stimulate employment, in the short-term, and lead to large 'learning curve' effects via lower production costs in the longer term".

Green stimulus in response to the 2008 global financial crisis

In the year following the crisis, [economic activity declined in half of all countries](#) in the world. The world's largest economies announced stimulus packages with a green fiscal component. Over \$3.3 trillion of the fiscal stimulus was released in 2008-2009, of which an estimated [\\$522 billion](#) went to green measures and investments. China (\$221 billion), the US (\$112 billion), South Korea (\$31 billion), and Europe (\$23 billion) were the [top four in green stimulus spending](#) globally.

Advocates believe that a [well-designed green stimulus plan](#) can offer "millions of family-sustaining green jobs, lifts standards of living, accelerates a just transition off fossil fuels, ensures a controlling stake for the public in all private sector bailout plans, and helps make our society and economy stronger and more resilient in the face of a pandemic, recession, and climate emergency in the years ahead".

The following case studies show that there are different views on the effectiveness of the stimulus packages deployed in 2008-2009. Economists believe that green stimulus plans alone [cannot support](#) a global green transition. Without tackling fossil fuel subsidies and implementing strong policies and regulations, the environmental benefits may be short-lived.

The United States

The US economy plunged as a result of the 2008 financial crisis, exacerbated by the economic slowdown that started in 2007. As the economy went through a deep recession, the GDP experienced the sharpest [decline](#) since 1958, falling by 5.4% in the last quarter of 2008 and by 6.4% in the first quarter of 2009. 4.6 million jobs were [lost](#) between the start of recession and February 2009.

The stimulus package announced during the 2008 global recession aimed at reviving the economy. Green spending included [three 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. The 'green' component of the stimulus package [constituted](#) about one-eighth of the total.

First, the [ESSA](#), also known as the bank bail-out, was a law passed by the US Congress in response to the subprime mortgage crisis, allowing the Treasury secretary to buy up to [\\$700 billion of troubled assets and restore liquidity](#) from banks. This was followed by the [ARRA](#) announced by the Obama administration in February 2009, boosting the economy with \$787 billion which helped the US economy out of recession in July 2009. This amount was later revised to [\\$831 billion](#).

The ARRA bill released [\\$92 billion](#) to clean energy technologies, of which renewables accounted for \$21 billion. The act focused on [four categories of energy-related investments](#): energy efficiency, the electric grid, transportation, and clean energy. ARRA created about [900,000 jobs](#) in clean industries from 2009 to 2015. Stimulus package [allocated](#) money to state agencies and NGOs to retrain unemployed or incumbent workers in clean energy. The act [included](#) tax incentives, loan guarantees and subsidies for research and development in clean technologies. It [leveraged](#) more than \$100 billion in private capital in manufacturing and generation of wind, solar, and other low-carbon sources.

Obama's stimulus plan is considered "[the biggest clean energy bill in history](#)", because it strengthened the clean energy economy in the US. Overall, the US 'green stimulus' response had a [positive impact on the renewable energy sector](#). Since 2008, wind power [installations](#) have almost quadrupled and solar power increased more than 50-fold. The [cost](#) of utility-scale solar fell by 60% between 2008 and 2016, with solar becoming cost-competitive with fossil fuels in 20 states. 270 million tonnes of CO2 emissions were [avoided](#) due to the uptake of renewables between 2008 and 2012.

The package also [jumpstarted](#) the electric vehicle and battery manufacturing, strategically building a competitive industry. Lithium-ion battery [prices](#) went down from \$1,000 per kilowatt-hour in 2008 to under \$300/kWh in 2014. The Recovery Act [helped](#) the rebirth of electric vehicles in the US, supporting 16 auto manufacturers to offer 28 new electric vehicle models and increasing the number of EVs on the road from a few thousand in 2008 to 400,000 in 2015. The US is the third-largest electric vehicle market, with 320,000 EVs sold in 2019, according to BNEF.¹

According to the Council of Economic Advisers, the ARRA [increased the country's GDP about 2 to 3%](#) from late 2009 through mid-2011. In 2015, the [Council of Economic Advisors estimated](#) the stimulus had created between 2 million and 10.9 million jobs between 2009 and 2012, with the majority of the increase occurring in 2011.

While the public-private investment in the clean energy package was unprecedented, the ARRA [focused](#) on short-term supply side investments. Regulatory certainty on energy and climate legislation could have [driven](#) more investment into clean energy companies. The loan guarantees programme [received](#) negative publicity due to bankruptcies (ie. Solyndra), even though the programme reached its stated objective of reducing the cost of clean technologies. With this loan programme, the Obama administration [aimed](#) to position the US as the global leader in developing and manufacturing clean energy technologies, yet undercut by competition from China.

China

The spillover effects of the 2008 financial crisis were felt in China. Although the country managed to sustain the economic [growth](#) of 9.6% in 2008 and 9.2% in 2009, it was a substantial contraction from the 14.2% growth in 2007. In the last quarter of 2008, 20 million rural migrant workers [lost](#) their jobs and many factories closed down,

¹ BNEF. 2020. EV Sales database. Accessed via Bloomberg Network.

leaving the laid-off workers without compensation. A total of [26 million](#) people were out of work by the first quarter of 2009, a figure higher than the population of Australia.

The Chinese government responded with an [RMB 4 trillion \(USD 586 billion\)](#) stimulus package over 2008-2009, equivalent to [12.5%](#) of the country's GDP in 2008. The 'green' component of China's stimulus plan totalled about [\\$221 billion](#) - about a [third](#) of China's entire stimulus package. These [included](#) energy efficiency, environmental improvements, rail transport and new electricity grid infrastructure. Of the RMB 4 trillion economic stimulus package, RMB 210 billion (5.25%) was [invested](#) in energy savings, pollution control and ecological improvement, and another 9.25% was used for technical and structural upgrades in energy intensive industries.

The stimulus [included](#) investments by the central government (about RMB 1.2 trillion) and supporting investments from local governments, state-owned enterprises and banks (nearly RMB 3 trillion). These investments were predominantly financed by loans provided by policy banks and commercial banks.

The World Bank [considered](#) China's fiscal stimulus largely successful, "about the right size, included a number of appropriate components, and was well timed", adding that it had significant effects on output at both the national and subnational level, through strong local spending that matched the earmarked funds from the center. However, the World Bank also noted that local governments' investments were largely financed from bank borrowing to [support investment in property construction and infrastructure](#), which contributed to a significant rise of local government debt.

The crisis response also led to governance issues. One [study](#) described the frenzy, "ready or not, many of these projects were quickly rolled out and brought forward, and new projects were hastily put together to meet the calls for new spending in environmental and green technology areas. Within less than a month [...] local governments, in aggregate, had proposed a staggering total of RMB 18 trillion in investment projects. Soon after, the figure rose further to RMB 25 trillion for the first 18 provinces reporting their plans." The supply side such as the state-owned bank also responded with "frenzied enthusiasm". This led to what was described as "a tsunami of credit expansion".

By the middle of 2014, China's total debt [quadrupled](#) from about \$7 trillion in 2007 to \$28 trillion. Moreover, due to the excess capacity in real estate and heavy industries like steel and cement, it left Chinese banks with a large and rising portfolio of non-performing loans, exposing China to the risk of financial instability, warned the [IMF](#) in 2015.

Although the renewable energy sector was not the main recipient of the stimulus program, it continued to receive generous support through a whole raft of policies aiming to stimulate the development of the sector, that was part of the 12th Five-Year Plan.

The wind industry was able to continue its dramatic growth in 2009, with grid-connected wind capacity grew to 17.6GW, up 110% year on year, according to the [Chinese Electricity Council](#). Analysts attributed this to the amendments to the Renewable Energy Law, which released additional subsidies for renewable generation, as well as the establishment of a renewable energy development fund.²

Domestic solar PV deployment was still in its infancy then, with the domestic solar manufacturing mainly selling to foreign markets. The collapse of demand in Europe and the US [triggered](#) the government to take decisive action to stimulate domestic demand. In 2009 the government [initiated](#) two national solar PV subsidy programs to boost its domestic solar industry: the Solar Roofs Program which provides subsidies for building-integrated PV systems,

² BNEF. Report: China grid connects 9GW of wind capacity in 2009 and China H1 2009 renewable energy subsidies: more power but also more costly. 2010. Accessed via Bloomberg network.

and the Golden Sun Demonstration Program which provides subsidies for on-grid and off-grid systems. This was followed by the introduction of the national feed-in-tariff scheme.

These policies made a significant difference on green jobs - a [study](#) looking at the green economy development in China found that cities located in a province with clean energy policies have 54.3% more green jobs and 61.8% more green businesses, compared with cities located in a province without such policies. Another [study](#) looking at the relationship between the green economy and green jobs in China found that, in 2010, for every 1% increase in the share of solar PV generation there could be a 0.68% increase in total employment in China, larger than any other power generation technology.

The country's stimulus package contributed to [financing the start of China's green economy transition](#), but the infrastructure growth actually led to a medium term sharp increase in coal consumption and emissions. Between 2000 and 2013, China coal consumption increased almost [three-fold](#). This rapid growth saw the country become the [largest net importer](#) of coal in 2009, and by the end of 2013 was responsible for half of the global coal consumption. China's stimulus investment expanded its energy-intensive industries including steel and iron, [increasing energy consumption](#) and as a result, increased emissions. [A study](#) looking at China's emissions pattern from 2005-2012 found that more than 70% of China's carbon emissions growth from 2007 to 2010 was induced by this capital investment. The carbon emissions of the construction sector rose by 27% from 1762 Mt in 2007 to 2246 Mt in 2010.

South Korea

The 2008 financial crisis had dramatic impacts on the South Korean economy. In the final quarter of 2008, GDP [declined](#) by 4.5%, the second-largest contraction on record worldwide. The country [suffered](#) a capital deficit of USD 42.6 billion, equivalent to 20% of the GDP. The [unemployment](#) rate fell below 1% during 2008-2009, reaching its peak of 4% in March 2009.

In response, the government launched its 'green stimulus' plan, touted as the '[Green New Deal](#)' internationally, to help stimulate job creation and revive the economy. The package totalled [\\$38.1 billion](#) - about 4% of the GDP - to be implemented over 2009-2012. Of this, South Korea dedicated nearly [80%](#) to green measures such as [renewable energies](#) (\$1.80 billion), [energy efficient buildings](#) (\$6.19 billion), [low carbon vehicles](#) (\$1.80 billion), [railways](#) (\$7.01 billion), and [water and waste management](#) (\$13.89 billion).

Fast implementation of these measures meant the country's economy and the financial market began to [stabilise during the first half of 2009](#). From December 2008 to January 2010, the Korean stock market index (KOSPI) increased by about [42.5%](#). Between 2008 and 2010, the government's fiscal stimulus package included public spending and tax cuts, equivalent to [6.9%](#) of the country's GDP.

In July 2009, the government introduced the [Green Growth Five-Year Plan](#) which aimed to invest 2% of the country's GDP on green growth between 2009 and 2013. The plan focused on nine key projects and 27 linked projects with an investment of [KRW 50 trillion \(\\$44 billion\) up to 2012](#), intended to create 950,000 jobs. Additionally, the government introduced [measures](#) such as reducing greenhouse gas emissions from businesses, increasing its market share of renewable energy, and introducing an emissions trading scheme.

The South Korean Green New Deal, despite its claims, attracted a lot of criticism. A [study](#) that analysed the process and contents of South Korea's green job policy found that, out of the Green New Deal budget of KWR 50 trillion, the largest share (KWR 15 trillion) was allocated to the controversial Four Major Rivers Restoration Project, as well as expansion of nuclear power plants. It also found that under the Korean classification of "green jobs", it was impossible to distinguish among wind, solar PV, solar thermal power, nuclear power, and coal-fired power generation. Green jobs in traditional environmental protection and pollution reduction received only limited

support. Thus, the study argued, the government's claim of 611,000 people being employed in "green industries" in 2008 was likely to be an overestimate.

Another 2015 [study](#) also found that the green new deal promoted by the government has failed to deliver a green growth and emission reduction. As a proportion of the country's total employment, jobs in South Korea's green industry [only rose from 1.2% in 2008 to 2.2% in 2015](#). Despite the efforts towards cleaner power mix, the share of renewable sources in generation grew only [2.2%](#) from 2006 to 2016 - well below the country's 2030 goal of 11%. There was also no significant reduction in [coal dependence](#) over this period. Coal [dominated](#) the electricity mix with a 41% share, whereas renewables only accounted for 4% in 2017. As a result, the CO2 emissions of South Korea [increased](#) by 35% from 2005 to 2018, accounting for 1.8% of global emissions in 2018.

Analysis of South Korea's Green New Deal suggests the stimulus package was misunderstood by those outside the country. This was a result of the very attractive figures on the country's growth, but local experts suggest the government's policies on green growth focussed on the "growth" aspect whilst sacrificing the environment. It was portrayed as "[high carbon, grey growth](#)".

Europe

The 2008 crisis caused the fall of several sectors in the EU including the banking system, business investment, and household demand and output. In response to the financial crisis, central banks implemented a major monetary policy stimulus while national governments implemented a series of fiscal packages. Combined, they amounted to about [5%](#) of the bloc's GDP. In the EU the unemployment rate [jumped](#) from 6.8% in early 2008, to 9.4% by the end of 2009. For under-25-year-olds the loss was larger, increasing from 15.2% to 21.1% in the same period.

The crisis [impacted regions differently](#), influenced heavily by their pre-crisis situation, economic strengths and weaknesses, and their sectoral structure, and how their policymakers responded. In 2009, GDP across the EU territory fell by [4.5%](#) per capita and industrial production declined by [20%](#).

In November 2008, the European Commission adopted the [European Economic Recovery Plan](#) (EERP) in response to the crisis, and aimed to encourage member countries to [promote green technologies](#) through the 'European energy-efficient buildings' initiative supported by €1 billion and the 'factories of the future' initiative supported by €1.2 billion. In April 2009, the [European Energy Programme for Recovery](#) was adopted with a dedicated €4 billion to support new energy infrastructure, including offshore wind and carbon capture and storage demonstration.

The EU-wide stimulus package was worth [€200 billion](#) - about 1.5% of the bloc's GDP. Of the total green stimulus [about a third](#) was dedicated to addressing [energy efficiency](#) and other green stimulus initiatives in the EU. Across the EU, green investments accounted for 13.2% of the total stimulus and [prioritised climate protection and energy efficiency](#), with the majority of spending on energy efficiency of buildings (75%) and the remainder on rails (20%) and vehicles (5%).

Focus [varied](#) by country, for example Germany encouraged purchases of lower emissions vehicles, while France focused on energy efficiency and public transport. Of the member states, Germany's stimulus was the [largest fiscal recovery programme](#) in the EU - contributing to over 20% of the bloc stimulus. The [€81 billion \(\\$104.8 billion\) plan](#) included tax cuts and investments in infrastructure and climate change.

The EERP resulted in a rise in GDP in many EU countries in 2010 and 2011, but [in half of them GDP fell again in 2012](#). Unemployment in the EU increased from 9.4% of the population in late 2009 to 9.6% in 2010, peaking at 11% in early 2011.

The assessment of effectiveness of the EERP was not straight-forward, as the EU was soon hit by the subsequent [sovereign debt crisis](#). According to a [study](#) by the European Central Bank, if implemented as initially enacted, the EERP's effects would be sizable, but short-lived.

This briefing was compiled by researchers in Europe and the US. For more information or questions, please contact info@mission2020.global, or visit mission2020.global.

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