GREEN STIMULUS or SIMULUS?

What is the government doing that is new and additional to stimulate the economy by spending on the environment?

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Briefing researched and written by: Andrew Simms, Dr Victoria Johnson and Sargon Nissan of **nef** (the new economics foundation) for Greenpeace UK.

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Executive summary

The government could be missing a huge opportunity – the chance to boost the economy, ensure energy security and act on climate change, by directing new and additional resources into the environmental transformation of the economy.

In the context of the economic recession, the increasingly urgent challenge of climate change, and calls for a Green New Deal, this report asks: what is the government doing that is new and additional to stimulate the economy by spending on the environment?

The report reveals that:

- New and additional green spending included in the green stimulus package of the government's Pre-Budget Report (PBR) is astonishingly small compared to other recent spending commitments, at just 0.6% of the UK's £20bn recovery plan. This key element makes up just 0.0083% of UK GDP, but in the wake of the banking crisis nearly 20% of UK GDP has been provided to support the financial sector.

- New and additional green measures could save just 0.128 million tonnes of carbon dioxide ($MtCO_2$) per year from the atmosphere and will only delay the accumulation of UK carbon emissions by six and a half hours by the end of 2011.

- Just over £100m is being allocated to spending that is genuinely new and additional; this is a fraction – less than 13% – of the annual bonus package given to staff at the failed Royal Bank of Scotland (RBS) which is estimated at approximately £775m. £100m represents just 0.0083% of UK GDP. Estimates for necessary new annual spending on environmental economic stimulus and transformation range from £11bn to £50bn.

- Figures from HSBC and the IMF indicate that among the major economies, the greater the proportion of GDP spent on bailing out banks coincides with a lower proportion spent on green stimuli.

- Several of the government's measures are, in fact, in conflict with the environmental stimulus. By comparison with the new and additional spending of the PBR's green stimulus, £2.3bn – around 22 times – has been put aside to assist the car industry. If spent on energy efficiency measures this would save about 3 $MtCO_2$ annually.

- £27m has been put aside specifically for development of a new Land Rover vehicle, the Land Rover Group are one of the most climate-unfriendly manufacturers in Europe. The potential CO_2 savings of the proposed vehicle have not been specified. This is not encouraging, particularly given that this financial support is likely to delay a shift to greater use of public transport and that historically much of the gain in efficiency in vehicles has been negatively counter-balanced through a gain in weight of the vehicle concerned.

- There has been a further commitment to spend on building 520 lane miles of road expansion. Research indicates that the provision of new lanes leads to relative increases of between 30 and 50% in the number of vehicle miles travelled on that road – in other words, more car use. This happens due to the phenomenon known as induced traffic: building new roads merely encourages more traffic.

Introduction

The UK economy faces a triple crunch: a recession triggered by a major credit crisis, the looming reality of runaway climate change and critical resource depletion. As a result we face serious challenges to our livelihoods and increasing threats to our fuel and food security.

Whatever the mistakes that allowed this situation to arise, there is growing international consensus that the best way out is via a Green New Deal policy package. Parts of the UK economy are in freefall with unemployment rising rapidly. At the same time, with less than one hundred months to go before the world enters a new, more dangerous phase of global warming, there is an urgent need for the rapid environmental transformation of the economy.

A Green New Deal demands a comprehensive array of new checks and balances on the finance sector and a range of new economic instruments ranging from new bonds to business incentives and taxes. At its heart is an environmental stimulus package designed to begin the rapid environmental transformation of UK businesses, whilst simultaneously softening the worst impact of the recession, creating countless jobs in the environmental and renewable energy sector – often referred to as green-collar jobs – and laying the foundations for a truly green recovery.

Possibly for the first time in history, the Green New Deal could propel environmental measures to the heart of economic policy and decision making. The way that the UK government handles this challenge will reveal its aptitude for crisis management.

This briefing aims to test that aptitude. Of the myriad of initiatives in response to the economic crisis, it asks simply: what is the government doing that is new and additional to stimulate the economy by spending on the environment? Beyond that, the briefing looks at the difference that any action taken will make towards reducing the UK's greenhouse gas emissions.

1. The triple crisis

- **Economy**

The after-effects of the banking crisis continue to topple financial institutions like dominoes throughout the economy. The result is a vast process of de-leveraging, much like floors collapsing in a house of cards, the end point of which is hard to predict. Towards the end of 2008 there was a surge in missed credit card payments. Many bonds are backed by credit card debts and as a result of rising missed payments, the delinquency rates in such bonds reached record levels.[i] The Office for National Statistics recently announced that official unemployment figures passed two million in January 2009. Meanwhile the TUC estimates that for every job advertised in the UK's job centres, there are 10 unemployed people searching for work.[ii] One estimate suggests that the number of UK businesses failing will rise by 59% during 2009.[iii]

- **Climate**

Almost every day, new research indicates that global warming is getting worse. With each new piece of evidence the case grows for faster and deeper emissions reductions. However, worldwide greenhouse gas emissions continue their upward trend.[iv] And there are suggestions that the threat posed by even small rises in global mean temperature is greater than previously thought.[v] It is no longer only the rainforests of Africa and Latin America that are in danger, with Spain's glaciers now disappearing, evidence of climate change is also becoming increasingly visible in Europe.

- **Energy**

Even though the global recession has seen the price of oil plummet from its spectacular heights in 2008, the UK economy's dependence on oil is still a

critical weakness. There are significant obstacles to oil production meeting demand in the short term, and the imminent prospect of a global peak, plateau and long term decline. An official advisor to most of the major economic powers, the International Energy Agency (IEA), published The Medium Term Oil Market report last year. The report, which is about world oil production, said there will be, ‘a narrowing of spare capacity to minimal levels by 2013’. Since the previous year alone it had made, ‘significant downward revisions’ on ‘both non-OPEC supplies and OPEC capacity forecasts’.[vi] Beyond that, the IEA publicly conceded that the peak of global production could occur by 2020, several years later than a range of other oil industry estimates. In practise this means that despite the recession, the fuel price rises of the last year are likely to be minimal in comparison to the far bigger crunch that will follow as global oil demand increases faster than supply.[vii]

The energy crunch provides further impetus for stimulus measures to reduce fossil fuel energy use. The energy dependence factor describes the ratio of net energy imports to demand. When it becomes positive, it means that a country is obliged to import energy to meet its demand – in other words, energy independence declines and meeting domestic demand is subject to the complexities of global geopolitics. The UK lost its energy independence in 2004 and by 2006 the energy dependence factor had risen fourfold.[viii]

2. The global reaction

In July 2008, anticipating the worst of the banking crisis, a group of UK experts in finance, energy, and climate published a proposal for a Green New Deal.[ix] Since then, a variety of other similar proposals[x] and programmes have appeared from countries all over the world. Large amounts of money have been invested by governments to stabilise banking systems, notably in the UK and US, and lesser but still large spending programmes have been announced to provide counter-cyclical stimuli – in other words, injecting money during a downturn – to economies hit by the recession. However, the environmental focus of the different packages has been highly variable.

The HSBC bank recently assessed the proportion of what it considered to be low carbon or environmental investments in a variety of stimulus packages from around the world. It found that the UK performs poorly compared to a range of other countries, even when allowing for the difficulty of finding data that is fully comparable, and for the fact that some considered its definition of pro-environmental spending too loose. Nevertheless, the share of spending considered by HSBC to be environmental in the US was up to 12%, while South Korea reached 80%, Germany 13% and the international average was over 15%. In contrast, HSBC found the UK planned to invest less than 7% of its stimulus package in green measures.[xi]

Inversely, the UK government provided much higher support for financial sectors in response to the crisis. It should be noted that these figures are of a much larger order of magnitude than those above as they are given by the International Monetary Fund as a percentage of overall GDP.[xii] Here, in terms of upfront government financing, as of mid February 2009, the US has committed 6.3%, Germany 3.7%, and the UK 19.8%.

3. The UK's response

> *'I admire what President Obama has announced for America and I think it is true that about 10% of this fiscal stimulus will go to environmentally important technologies and potentially jobs in the green industries. I think you will find that the percentage of our expenditure is as high – that we are investing a great deal in environmental technologies.'*
>
> Gordon Brown, 12 February 2009.[xiii]

The UK's response was outlined in the Chancellor, Alistair Darling's 2009 Pre-Budget Report (PBR). The government quotes an overall figure of £50bn, a mixture of public and private investment over the next three years that represents: 'future investment we are putting into greening our economy as a whole,' according to Angela Eagle MP, Exchequer Secretary to the Treasury.[xiv]

The House of Commons Environmental Audit Committee comments that much of this figure relates to existing programmes, while nearly half is accounted for by central government spending on public transport. It criticises government measures for lacking coherence and having no sense of their net environmental impact. Specifically it states: 'much of this spending is not necessarily contributing towards the development of transformative technology and the transition to a low carbon economy.'[xv]

In contrast to the government's estimate of its own stimulus package, the HSBC bank estimates that the amount attributable to direct government intervention in the UK is a more modest £20bn – just 1.4% of GDP.[xvi]

That figure quickly shrinks further, however, to the £535m that makes up the specific green stimulus package in the PBR. The latter figure mainly consists of future spending commitments brought forward from the existing Comprehensive Spending Review. New and additional spending comes to around £105m and goes almost entirely to the Warm Front programme, an initiative focused on improving household energy efficiency through supporting insulation and heating improvements, with a little extra toward climate change adaptation measures. This, as a share of GDP, falls to the very small amount of 0.0083% of GDP.[xvii] For comparison, Lord Stern called for green stimulus spending of 0.8% of GDP which would work out as around £11bn over the course of the next year.[xviii]

Table 1 on page 10, gives a full breakdown of the PBR's green stimulus package, including the costs of spending brought forward, although these are generally small.

It shows that the overall size of the environmental stimulus package is small and the amount of new and additional spending smaller still. The degree to which the package can be described as a stimulus to the UK economy is further diluted by the fact that it is considered a relatively open economy. This means that there is no guarantee that the benefit of additional spending, or spending brought forward will actually remain in the UK. For example, a very substantial amount of the package is to be spent on railway carriages. Under international procurement rules the contract for delivering these has to be open tender. So, while a lower-carbon form of public transport will obviously bring benefits to the country, the stimulus from spending cannot be guaranteed.

Table 1: the UK's green stimulus package

Programmes to receive accelerated capital spending	**New**	**Brought forward**	**Description**		**Cost of spending brought forward**	**Total new spending plus cost of bringing forward**
Warm Front programme	£100m	£50m	£100m new and £50m brought forward in the Warm Front program	60,000 low-income households to benefit earlier from better heating and energy efficiency	£1.7m	£101.7m
Decent Homes programme		£60m	£60m accelerating Decent Homes programme	16,000 social houses with energy efficiency	£2m	£2m
Rail transport		£300m	£300m on accelerated delivery	200 new rail carriages delivered earlier	£10.1m	£10.1m
Adaptation measures		£20m	£20m to achieve adaption measures earlier, originally scheduled by 2011	27,000 homes to be protected by flood defences sooner	£1.3m	£1.3m
Adaptation measures	£5m		British Waterways Network Infrastructure			£5m

The Treasury uses a rule of thumb based on how well UK businesses are positioned to compete for contracts and the extent of the UK's economic openness. It believes that around half of the value of spending will stay in the UK, and re-circulate having a stimulus effect for manufacturing, services and jobs overall.

So from the original figure of £535m, there might then be a stimulating economic effect of around £267.5m from the PBR's green stimulus. But, we posed a slightly different question: when all the rhetoric is peeled away, how much is the government doing that is new and additional by investing in a green stimulus?

From Table 1 on page 10, it seems clear that the total amount of new spending comes to £105m – to be more generous, adding in the cost of bringing spending forwards increases the figure closer to £120m. New and additional green spending accounts for 0.6% of the government's £20bn recovery plan for the UK economy.

But by applying the Treasury rule of thumb on retained value in the UK, that could cut by half the amount which is actually stimulating UK businesses – although the full value would, of course, be retained in terms of the benefits to better insulated homes. This is a highly speculative assessment as the value retained from so-called big ticket items, such as purchasing new railway carriages, could be close to zero if contracts go abroad and, conversely, more than half when installing labour-intensive home insulation.

The next section of this briefing assesses the worth of the spending that is new and additional to the challenge of reducing carbon emissions in the UK.

4. The Pre-Budget Report green fiscal stimulus[xix] and carbon emissions reductions

What carbon savings will result from the new and additional spending announced by the government in the PBR?

These calculations relate to funds given to the government's Warm Front programme. As it is a single package, to be more generous calculations have included estimates for both the new and brought forward funding for the Warm Front grant scheme. This represents £100m *additional* funding and £50m brought forward from the 2009-2012 budget.

The PBR states that £150m could help as many as 60,000 households. This assumes that each household could receive approximately £1,900 worth of measures. However this is higher than the estimate given by the National Audit Office, which estimates that the average spend per grant recipient is £1,800. The Centre for Sustainable Energy (CSE) estimates that the range of spending needed to eliminate fuel poverty in individual households is between £1,299 and £3,107 – although it is unclear whether these estimates include administration costs.[xx] A further 16,000 social houses stand to benefit from £60m brought forward under the Decent Homes programme.

These calculations assume *no* administration costs to the contractor, and therefore are simply how many measures (based on CSE estimates of cost per measure) can be installed (i.e. just the cost of labour and materials) for the total amount available. Given this, these calculations will overestimate the impact on emissions reduction.

To arrive at a reasonably robust estimate of carbon savings the funding available has been divided equally between spending on five key measures. These are: draught proofing, loft insulation (0mm to 250mm), gas condensing boilers (upgrading a boiler rating from rating B to A), cavity wall insulation, and internal wall insulation (U-value 0.45). [xxi]

Two years of carbon benefit has been calculated by adding the carbon benefits of an additional £100m spending and the benefits of bringing £100m forward, assuming that £50m from the Warm Front programme and £60m from the Decent Homes programme would have been spent in 2010-11.

The estimated carbon savings from £100m of *additional* funding and bringing forward £110m of funding from the 2010-2011 spending period is equal to 0.39 $MtCO_2$ per annum (until the end of 2010), and then reduces to 0.128 $MtCO_2$ thereafter. This represents cumulative emissions of 0.83 $MtCO_2$ saved due to the green fiscal stimulus between 1 January 2009 and 31 December 2011.

Table 2: carbon savings from additional £100m

Measures	**Breakdown for measures installed**	**Cost per unit**[xxii]	**Total spend per measure**	**Number of measures**	**Average carbon emissions reductions per unit (kgC) (estimates are net of comfort)** [xxiii]	**Total carbon saved per measure (MtC)**	**Total carbon saved per measure ($MtCO_2$)**
Draught proofing	20 %	£195	£20,000,000	102,564	28	0.0029	0.011
Loft insulation (from 0mm to 250mm)	20 %	£406	£20,000,000	49,261	377	0.0186	0.068
Gas condensing boiler (upgrade from B to A)	20 %	£2,200	£20,000,000	9,091	44	0.0004	0.001
Cavity wall insulation (average)	20 %	£400	£20,000,000	50,000	202	0.0101	0.037
Internal wall insulation (U= 0.45)	20 %	£2098	£20,000,000	9,533	318	0.0030	0.011
Total	**100%**		**£100,000,000**			**0.035**	**0.128**

Table 3: carbon benefit from bringing forward £50m of spending for the Warm Front programme

Measures	Breakdown for energy efficiency measures installed	Cost per unit	Total spend per measure	Number of measures	Average carbon emissions reductions per unit (kgC) (estimates are net of comfort)	Total carbon saved per measure (MtC) over two years	Total carbon saved per measure ($MtCO_2$) over two years
Draught proofing	20 %	£195	£10,000,000	51,282	28	0.0029	0.011
Loft insulation (from 0mm to 250mm)	20 %	£406	£10,000,000	24,631	377	0.0186	0.068
Gas condensing boiler (upgrade from B to A)	20 %	£2,200	£10,000,000	4,545	44	0.0004	0.001
Cavity wall insulation (average)	20 %	£400	£10,000,000	25,000	202	0.0101	0.037
Internal wall insulation (U= 0.45)	20 %	£2,098	£10,000,000	4,766	318	0.0030	0.011
Total	**100%**		**£50,000,000**			**0.035**	**0.128**

Table 4: carbon savings brought forward from £60m spending for the Decent Homes programme

Measures	Cost per unit	Total spend per measure	Number of measures	Average carbon emissions reductions per unit (kgC) (estimates are net for comfort)	Total carbon saved per measure (MtC) over two years	Total carbon saved per measure (MtCO2) over two years
Loft insulation (from 0mm to 250mm) + cavity wall insulation	£806	£60,000,000	74,442	579	0.058	0.316

Assuming that direct emissions continue to fall by 1.5% per year, as reported by Defra between 2006 and 2007[xxiv] cumulative emissions between 1 January 2009 and 31 December 2011 will be 1,555.761 $MtCO_2$ – although this is less than the UK's full carbon footprint, which includes the embedded emissions of internationally traded goods and services.

This means that the level of cumulative emissions that would have occurred by 00.00am on 1 January 2012 without the stimulus will now instead occur at 2.01pm on the same day.

Table 5 on page 16 shows the effect of the spending that is new and additional in the green fiscal stimulus package, plus bringing forward the £50m spending on the Warm Front and £60m Decent Homes programme, is to delay total emissions by just 14 hours.

If we go one step further and look only at that spending which is new and additional – i.e. the £100m injected into the Warm Front programme – the delay bought is just 6 hours, 30 minutes and 38 seconds.

This estimate of carbon savings excludes what will be the impact of trends in UK contributions to emissions from international shipping and aviation.[xxv] It attempts to capture, at least in part, the 'rebound effect,' which is hard to predict, and negative in terms of energy savings. The rebound effect highlights the way in which the cost and energy savings of increased efficiency frequently translate into higher consumption. Studies have found that 10-30% of energy saving in space heating are negated by an increase in heating use.[xxvi]

Table 5: relative slowing of emissions accumulation per year between 2009 and 2011 (NB the totals are not cumulative)

Emission delay from new spending and spending brought forward on the Warm Front and Decent Homes programmes			
Year	**Hours**	**Minutes**	**Seconds**
2009	5	50	28
2010	5	55	48
2011	2	15	22
Total delay	**14**	**1**	**38**
Emission delay from new and additional spending only			
Total delay	**6**	**30**	**38**

5. Coherence between spending and the environmental stimulus policy

Case study: bailouts for the car industry

On 11 March 2009, the Department for Business, Enterprise and Regulatory Reform (BERR) held a seminar for its automotive assistance programme called Open for Business. The programme has a budget of £2.3bn – over four times the size of the PBR's green stimulus package. Its purpose is to encourage investment in the vehicle sector 'that will create or sustain jobs, develop cutting-edge technology, bring special value to the UK, reduce CO_2 emissions and maintain R&D in UK vehicle manufacturing.'[xxvii] In addition, the government is subsidising a new Land Rover model with £27m. Land Rovers are among the higher emission range of cars.[xxviii]

The programme's criteria require only that grant applicants' vehicles meet existing European vehicle regulations, and that they say how carbon emissions will be reduced – they do not have to specify an amount. Furthermore, it is not made clear whether this criteria is merely desirable, or a necessary condition in the context of the other criteria. This is one of several problems with the scheme.

If the same £2.3bn was invested into retro fitting homes with a range of energy efficiency and conservation measures, it would have the potential to save an estimated 3 $MtCO_2$/ year – based on similar calculations to those used in Tables 2 and 3 on pages 13 and 14.

It should be noted that projected efficiency improvements for passenger cars are only actually the result of *voluntary agreements* in 1998 between the EU and the car industry which set an indicative target for CO_2 emissions of 130 gCO2/km in 2012.

A new Land Rover model with unspecified projected lower emissions will go into production in 2011, funded by the government. At some later date,

a lower emission hybrid is promised that will have emissions of 120g CO_2/ km. This seems a long, expensive and complicated pathway to achieve a level of emissions that the Institute for European Environmental Policy (IEEP) believes is relatively easy for car manufacturers to comply with. Especially when considering that the same £27m could pay for the equivalent of measures for 33,000 cavity wall and 34,000 loft insulations.

The IEEP also ignores the embodied carbon within cars. The lifecycle emissions of a vehicle – generated during extraction of raw materials, movement, production and disposal – add 18-43% to tailpipe emissions. Given this, while tailpipe emissions may eventually become carbon neutral, the idea of a truly environmentally sustainable car remains on the drawing board.[xxix] Assuming, generously, average age of a car being scrapped is 12 years, it means that actual lifetime emissions for a car whose emissions are normally quoted as being 120g CO_2/ km are much higher – see Table 6 below. This also excludes the fact that 120gCO_2/ km refers to optimal engine efficiency that is achieved at 50-70mph (optimal speed is 56mph). But this is influenced again by trends in safety and performance which add weight – a process known as cocooning. Cars become less efficient as the vehicle increases in weight, size and quantities of gadgets to provide greater levels of comfort, and as people spend more and more time sitting in traffic jams or travelling further distances.

Table 6: emissions per km including full lifecycle embodied carbon

Actual (low)	141.6	**g CO_2/ km**
Actual (high)	174	**g CO_2/ km**

The VW Golf can be seen as a reference case for all compact family cars. Below, Table 7 illustrates the effect that cocooning has had on vehicle efficiency. Since 1975, fuel consumption has improved by just 5%. Table 7 demonstrates that the reason for the low level improvements in fuel consumption is the increase in weight of more than 50%.[xxx]

Table 7: Volkswagen (VW) Golf fuel consumption 1975-2003

Model	Year	Engine size (litre) / horsepower	Fuel consumption (l/10 km)	Weight (Kg)
Golf LS	1975	1.6 / 70	0.70	780
Golf CL	1985	1.6 / 75	0.78	870
Golf GL	1995	1.6 / 75	0.72	1060
Golf Edition	2003	1.4 / 75	0.66	1174

The worst outcome of subsidising the development of so-called greener cars is that it could actually lead to an increase of emissions. This is likely for two reasons:

- Incentives for changing behaviour are lost. Less money could be available to spend on, for example, better public transport. This means that the double benefit of more substantial direct emissions cuts, from shifting to fundamentally cleaner transport modes and reducing the need for new car purchases would be lost.

- Due to the substantial carbon embedded in vehicle manufacture, any scheme which encourages so-called scrappage will encourage more rapid vehicle substitution and probably promote greater vehicle use. The rebound effect – previously mentioned at the end of section 4 page 15 – must also be considered. In this case, increased fuel efficiency lowers the cost of motoring, reducing the incentive to shift to other, cleaner forms of transport, and encouraging further driving.[xxxi]

However, none of this is to say that more fuel-efficient cars are not a critical part of lowering emissions in the transport sector, rather that their manufacture must be pursued alongside other measures dealing with reducing demand.

Several announcements on transport followed the PBR's commitment of £700m to road and rail projects. The Department for Transport announced £6bn spending to increase capacity on some of the nation's busiest roads: 'providing an extra 520 lane miles of road by widening and opening up the hard shoulder – as well as new plans to roll out hard shoulder running across the core motorway network.'[xxxii]

But research has established a causal link between expanding road capacity, measured in lane miles, and growth in vehicle miles of travel. This is a phenomenon known as induced traffic. Induced traffic is defined as: the elasticity of vehicle miles. It provides a rule of thumb for increasing road capacity and increases in traffic volume. Induced traffic indicates a consensus estimate that for every additional lane, an increase of 30 to 50% – more in the long term – in vehicle miles travelled can be expected.[xxxiii] This means that although hard to estimate precisely, it is highly likely that spending on new road capacity could cancel out any number of emissions savings from new and additional spending in the green stimulus, or even increase net emissions.

Conclusion: the remaining challenges

The UK is missing an opportunity to boost its economy, build its energy security and tackle climate change. The environmental content of the UK's overall economic stimulus package is poor, compared to many other countries.

New and additional green spending accounts for 0.6% of the government's £20bn recovery plan for the UK economy. The spending allocated – that is genuinely new and additional – comes to just over £100 million and represents less than 13% of the annual bonus package given to staff at the failed Royal Bank of Scotland (RBS) which has been estimated to be worth around £775m. Tax avoidance strategies pursued by RBS reportedly lost the Treasury a further £500m. Not only is RBS majority owned by the government but, ironically, it is also the UK bank with the largest portfolio of investments in the fossil fuel industries.

New and additional spending in the green stimulus package of the PBR will delay the accumulation of the UK's carbon emissions by just six and a half hours. Looked at more generously, the time delay might add up to just 14 hours. At the same time, money spent elsewhere on building roads and subsidising vehicle development could have the opposite effect and lead to an increase in emissions.

Given the state of the economy, the imminent threat of climate change and the impending energy shock from peak oil, massive investment in environmental transformation represents a strategy that is both necessary and hugely economically beneficial.

The imminent challenges of climate change are daunting, but to remember what we are capable of, we can look to our own history.

Between 1845 and 1852 – a timeframe similar to the time we currently have left to act on global warming – Victorian engineers oversaw the laying 4,400 miles of railway track. In a single weekend in 1892 engineers completed a project of breathtaking ambition. Starting on the morning of Saturday, 21 May, and finishing by 4am the following Monday morning, 23 May, workers laid a total of 177 miles of track along the Great Western route to the South West, converting the old broad gauge lines to the new standard, or narrow gauge.

In the first few months of John F. Kennedy's term of office in 1961, he announced his nation's intention to put a man on the moon. Only eight years later, in July 1969, the United States achieved its goal – another comparable timeframe. At the end of the moon missions in 1973, the US government had spent an estimated $20bn dollars.[xxxiv]

Compared to government spending today as a relative share of national income or GDP this would approximate to $200bn. A substantial sum that looks rather cheap now, compared to the money that has been thrown at the banking crisis. Estimates for necessary new green stimulus spending over the next year range from Lord Stern's 0.8% of GDP, around £11bn, to the Green New Deal group's suggestion of £50bn.

The Apollo programme spent vast amounts of money for a handful of men to become the only people in history to set foot on another celestial body. As the NASA climate scientist James Hansen points out, what price is it worth paying to preserve for the whole of humanity the conditions under which civilisation emerged?

According to Nobel Prize winning economist Joseph Stiglitz, toward the end of 2008 the Iraq war had cost the US around $3tn. Proving that when the political will is there, money can be found. This briefing asks: why are resources not being made available that are commensurate with the challenge of both cushioning the economy, ensuring energy security and preventing catastrophic climate change?

Ends

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[xviii] Bowen, Fankhauser, Stern, & Zenghellis (2009) *An outline of the case for 'green' stimulus, Policy Brief,* The Grantham Research Institute on Climate Change and the Environment & Centre for Climate Change, Economics and Policy, The London School of Economics.

[xix] All figures are for CO_2 only, not CO_2e.

[xx] Preston I, Moore R and Guertler P (2008) How much? The cost of alleviating fuel poverty (Bristol, UK: Centre for Sustainable Energy).

[xxi] The government's Fuel Poverty Strategy (2008) assumes a simple average per household saving of approximately 1.2 tonnes of Carbon (tC) per household, but this is an upper limit.

[xxii] Preston I, Moore R and Guertler P (2008) How much? The cost of alleviating fuel poverty (Bristol, UK: Centre for Sustainable Energy).

[xxiii] *Unpublished estimates for savings from EST (2002) net of comfort*

[xxiv] (DECC) UK climate change sustainable development indicator: 2007 greenhouse gas emissions, final figures.

[xxiv] The government's Fuel Poverty Strategy (2008) assumes a simple average per household saving of approximately 1.2 tonnes of Carbon (tC) per household, but this is an upper limit.

[xxvi] Greening L, Greene D, Difiglio C (2000) Energy Efficiency and Consumption - The Rebound Effect - A Survey *Energy Policy* **28** 389-401.

[xxvii] See: www.berr.gov.uk/whatwedo/sectors/automotive/aap/page50296.html

[xxviii] Department for Business, Enterprise and Regulatory Reform, (Wednesday 11 March 2009), *Government backing for new greener Land Rover model*.

[xxix] Banister D (2005) *Unsustainable Transport: city transport in the new century* (Hove: Routledge).

[xxx] Throne-Holst H (2003) The fallacies of energy efficiency: the rebound effect? *(*Paper presented at the Strategies for sustainable energy technology workshop in Trondheim, Arranged by the SAMSTEMT programme of the Norwegian Research Council, November 20-21)

[xxxi] In Germany, a related scheme created as part of their domestic economic stimulus package and aimed at supporting the car industry offers €2500 to anyone who wants to scrap their old car and buy a new one, regardless of the new car's CO_2 emissions or the fuel efficiency of the old model being scrapped. In response, a German organisation the Verkehresclub Deutschland (VCD) symbolically offered people the chance to apply for the €2500 payment when they scrap an old car and replace it with a bicycle or tickets for public transport. Thousands responded. The German federal office for economy and export control (Bafa) failed to see the funny side and reportedly threatened the VCD with legal action.

[xxxii] Quoted in: House of Commons Environmental Audit Committee, Pre-Budget Report 2008: Green fiscal policy in a recession, Third Report of Session 2008-09, The Stationary Office Limited.

[xxxiii] Goodwin P and Noland R (2003) Building new roads really does create extra traffic: a response to Prakash et al. *Applied Economics* **35**: (13) 1451-1457.

[xxxiv] See: www.hq.nasa.gov/office/pao/History/Apollomon/Apollo.html