E3G

Delivering a Sustainable Low Carbon Recovery

Proposals for the G20 London Summit

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About E3G

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Low carbon stimulus is the most effective way to drive economic recovery

> As the world faces its worst economic crisis in two generations, policymakers' attention is focused on delivering short term economic stimulus and future financial stability. However, a sustainable economic recovery must manage the immediate crisis of weak demand as well as lay the foundations for stable growth. Rapid recovery will be threatened by a lack of consumer and business confidence in developed countries, and resurgent oil prices. A return to 2008 levels of $140/bbl would pull $800bn per year out of the US, EU and Japan - half of their current total stimulus packages.

> A focus on driving growth in low carbon markets can help tackle both these risks. Concerted G20 investment in energy efficiency and new energy sources will reduce oil price rises and save money in every country. Spending on low carbon infrastructure leads to a stronger short term impact on demand than tax cuts, generates high levels of jobs, and will kick-start markets with strong growth potential.

> Low carbon markets are driven in the medium term by government regulation and incentives. They are partially insulated from general falls in market confidence. Governments can use their power as "public consumers" to give confidence to businesses through immediate fiscal measures and by committing to future incentives based on carbon pricing and consumer charges. A successful Copenhagen climate change agreement in December 2009 can also help build confidence in a growing demand for low carbon goods and services. Aggressive growth in low carbon markets could account for 2-3 percentage points of sustained global growth from 2011-2015.

Failing to kick-start low carbon investment will lock in dangerous climate change

> The urgency of the economic crisis is matched by the imperative to tackle climate change. The global energy economy is at a crossroads. In order to prevent catastrophic climate change, global carbon emissions need to peak by 2015 and then reduce by 5% per year. This is a radical change from

business-as-usual which foresees emissions rising at 2-3% per year. Put simply, the world needs to move to a virtually zero carbon energy system by 2050, and in developed countries well before this.

> Stimulus packages could provide the necessary jump start to low carbon industries to quickly achieve this structural transformation. Investing in business-as-usual projects will merely delay necessary expenditures to a time when public spending will be very tight, risking locking economies into high carbon infrastructure. This transformation is also affordable. Estimates put the cost at only 1-2% of global GDP, and reduced dependence on oil and gas use means that this cost falls to zero if oil prices remain above $120/bbl.

Low carbon stimulus plans are too small and dwarfed by high carbon spending

> Delivering growth in low carbon sectors requires policy packages which combine immediate fiscal measures with sustainable medium term policies. Countries are already implementing packages covering energy efficiency, renewable energy, carbon capture and storage, grid infrastructure, public transport, efficient vehicles, water systems and RD&D. However, current spending is too small to achieve the level of change required.

> Current stimulus packages will amount to 3.25% of global GDP over 2008-2010, with two thirds in direct government spending. The IMF expects this total to increase as more countries finalise their policies for 2010-2011. On a generous assessment around $436bn, or 23% of the total stimulus, has been allocated to low carbon investment. However, if investment with uncertain carbon reduction gains (e.g. infrastructure) is excluded, direct spending on improved efficiency, low carbon energy, transport and R&D is only $140bn or 8% of the total. This is almost half of the $272bn allocated to road-building in the same stimulus packages.

> These averages also mask strong differences between countries. South Korea has dedicated 80% of its stimulus spending on low carbon investments. China also ranks highly (37%), dedicating around $200bn to low carbon investments – although a substantial amount of this is committed to rail and grid infrastructure with uncertain climate benefits. Amongst developed countries only the US, France and Germany have allocated over 10% of their stimulus to low carbon investment. All countries have scope to increase the

range and size of low carbon stimulus spending, especially on energy efficiency and low carbon energy. Europe and Japan are lagging behind the average, despite their strong climate change policies and leadership in low carbon industries.

> A large scale expansion of investment is possible in these dynamic sectors. For example, global renewable energy investment grew by 60% annually from 2004-2007. Given current financing problems, sustaining scale-up of production in these sectors in the coming years may require short term industrial support (e.g. loans, tax holidays) perhaps clustered in Low Carbon Innovation Zones. Additional finance can be generated using innovative mechanisms such as green bonds backed by public or private funds, and can be distributed through low carbon infrastructure facilities which leverage private finance.

At least 50% of stimulus packages should be focused on low carbon investment

> Moving to a low carbon economy requires higher levels of investment, as fossil fuel use is replaced with new clean technologies. The IEA estimates that $1.7 trillion of investment each year to 2030 is needed to put the world on a path to avoid the worst impacts of climate change. Much of this investment will come from the private sector, but given current private sector weakness it is critical that public sector spending puts the world onto the right investment trajectory over the next two years.

> Using IEA estimates of the investment needed to avoid the worst impacts of climate change, there is a need for $1,680bn of low carbon investment over the next two years. This could be delivered through direct government spending, but it will often be possible to leverage a substantial quantity of private sector investment through the provision of partial government loans and/or risk guarantees.

> If countries devoted 50% of their stimulus packages to low carbon areas this would deliver $911 - $1,215bn of low carbon investment under different stimulus scenarios. Given other commitments, this is probably the highest realistic level of commitment and is consistent with the investment levels needed to shift to a low carbon trajectory. Most countries still have flexibility to shape the structure of their stimulus packages, and even on current

projections it is likely that further stimulus measures will be announced for spending in 2010-2011. Therefore there is still an opportunity to increase the focus of this spending on low carbon recovery, and through coordination improve its impact on delivering a sustainable economic recovery.

The G20 Summit can play a vital role in delivering a low carbon recovery

- **Prioritising Low Carbon Spending:** agreeing to prioritise low carbon action in their stimulus packages, with an aim of increasing the global proportion of low carbon actions to 50%.
- **Committing to Grow Global Low Carbon Markets**: increasing business confidence in the strong future growth of low carbon markets by recommitting to deliver existing national policies in key sectors such as renewables, energy grids, low carbon vehicles and public transport. The IEA could be tasked with assembling these commitments, and estimating the impact of early policy delivery on oil price levels.
- **Avoiding Wasteful Subsidy Competition**: maximising the impact of stimulus spending and avoiding wasteful competition by making support to high carbon industries conditional on improving energy efficiency and low carbon innovation. To ensure "low carbon recovery" is not used as a mask for distorting subsidies, G20 countries should report on the delivery of environmental conditions for fiscal restructuring support to key trading industries (e.g. car manufacturers, steel). The OECD and UNEP could act as the analytical clearing house for this data.
- **Develop Proposals for International Low Carbon Financing Mechanisms**: a robust Copenhagen climate change agreement in 2009 will help guarantee the sustainable growth of global low carbon markets. The Copenhagen agreement will need to design effective international financing mechanisms for driving low carbon investment in developing countries, giving efficient and effective incentives to countries and companies to scale up investment. The G20 should establish a Task Force involving finance and other relevant ministries to develop practical proposals on the required quantity, sources, mechanisms and governance for such low carbon finance. The Task Force should develop its recommendations to feed into the UNFCCC negotiations by October 2009.

1. The Challenge of Delivering a Sustainable Economic Recovery

The world is facing an unprecedented economic crisis. Bold action is needed to stimulate the economy, generate jobs and lay the foundations of a sustainable recovery. An economic road map is needed which navigates through immediate economic problems, as well as lays the foundations for a sustainable and resilient recovery over the next decade.

Jobs are needed now, but medium term economic recovery cannot be delivered by simply inflating consumption or subsidising sunset industries. Such an approach is ineffective in delivering sustained growth, and if badly managed could spark a protectionist war of global subsidies.

There are two main challenges to achieving a sustained recovery: firstly, raising economic confidence in consumers and businesses in the developed world in order to build the foundations for future growth and jobs. Secondly, avoiding the negative macroeconomic impact of an oil price rise, once modest growth resumes.

The International Energy Agency (IEA) projects that under a business-as-usual scenario, reductions in supply side investment in oil production will leave economies exposed to the type of energy price shocks seen in 2008[1]. The IEA chief economist, Fatih Birol, was quoted in January 2009 as saying "We hear almost every day about a project being postponed. This is a major problem." Estimates are that oil supply could decline by up to 20 million barrels a day over the next three years if the oil industry stops investing.

If oil prices rise to 2008 levels as global growth revives in 2011 then the oil import bill of US, Europe and Japan alone will rise by over $800 billion a year. This is equal to nearly a half of their total planned stimulus spending (tax cuts and public spending) from 2008-2010[2]. Any stimulus package must prioritise investment in energy efficiency in transport and housing to reduce the debilitating impact this would have on recovering economies.

In an uncertain world some things are clear: the era of cheap energy is over and there is an urgent need to move to a global low carbon economy to prevent catastrophic climate change. The policy imperative to achieving energy and climate security in the next decades gives a unique opportunity for governments

[1] IEA 2008, *World Energy Outlook 2008*, Paris, November 2008.
[2] All estimates of fiscal stimulus expenditure used are taken from: IMF 2009a, *Note to Group of Twenty Deputies meeting January 31- February 1 2009*, HSBC January 2009; HSBC 2009, *A Climate for Recovery*, London, February 2009.

to intervene efficiently to tackle the economic crisis. Directing investment towards critical low carbon infrastructure will help lever economies out of the current crisis and stabilise them against future shocks.

Fiscal stimulus spending on low carbon measures gives a strong short term impact on economic demand, high levels of job creation and will kick-start markets with strong growth potential in the medium term. An IMF review of the economic literature (see Figure 1 below) suggests that infrastructure spending generates three times as much short term growth as tax cuts, and nearly twice that delivered by policies such as social spending, small and medium sized enterprise (SME) support and housing market support. These other policies may however deliver other social benefits beyond the immediate growth impact.

Figure 1: Estimates of Economic Multipliers (IMF 2009a)

Fiscal Multipliers

	Lower Bound	Upper Bound
Tax cuts	0.3	0.6
Infrastructure Investment	0.5	1.8
Other 1/	0.3	1.0

1/ Includes additional spending on safety nets, transfers to state and local governements, assistance to small and medium enterprises, and support for housing markets.

Low carbon markets will be driven in the medium term by government regulation and incentives. They are therefore partially insulated from general falls in market confidence and uncertainty. Governments can use their power as "public consumers" to give confidence to businesses to invest through immediate direct fiscal measures and by committing to sustainable market incentives based on pricing and/or consumer charges from 2011. As this

investment is driven by public policy goals it will not "crowd out" private activity – as is often feared – but provide a set of predictable and expanding markets against which private firms will have the confidence to invest, innovate and grow.

The additional investment needed to prevent catastrophic climate change is estimated at around $500bn per year to 2030, but this does not include changes to underlying energy system investment of $1.1 trillion per year. Global investment in clean energy - renewables, energy efficiency and carbon capture and storage (CCS) - increased from $34 billion in 2004 to around $150 billion in each of 2007 and 2008. A fundamental change will be needed to scale up industries to meet the next stage of the low carbon investment challenge. Economic stimulus packages could provide this impetus. Investing in business-as-usual infrastructure would leave economies locked into a high carbon future.

Investments in energy and climate security will continue to provide long term economic benefits. The cost of reducing global emissions at levels consistent with limiting global temperature rises to 2°C[3] is estimated to be between 1-3% of global GDP[4]. However, these net costs are the balance of economic savings from better energy efficiency (accounting for around 50% of emission reductions to 2050) and the economic costs of building cleaner power, transportation and industry. The net economic cost is highly sensitive to assumed oil prices and drops to around zero when prices reach $90-$120/bbl in most studies. For example, at $120/bbl decarbonisation delivers $682bn in net global economic benefits in 2030 in the McKinsey 2009 Cost Curve study. The IEA 2008 WEO has an average oil price of $100/bbl from 2010 and projects $5.8 trillion in energy savings to 2030 from a programme with $9.5 trillion in additional costs. This implies a net annual cost of only 0.2% of global GDP over the period.

Though net economic benefits exist at the global level, their distribution will differ between countries. At the national level there will still be a need for incentives and policies in all sectors to drive clean investments as individual investors and consumers do face real upfront costs and market failures.

[3] The target of limiting climate change to 2C is based on IPCC studies (Fourth Assessment Report, 2007) and has been adopted by the EU, South Africa and Australia with Small Island States arguing for a lower 1.5C target. Though not explicit the G8 2007 agreement of reducing global emissions by at least 50% by 2050 was intended to be consistent with a 2C target. However, new evidence suggests this is too weak and global emissions will need to decline by 80% by 2050 to hit the target (Parry et all, 2008, "Climate Policy: Squaring Up To Reality", *Nature Reviews: Climate Change*, 29th May 2008.)

[4] For a comprehensive review of costs see IPCC 2007, *Working Group III: Fourth Assessment Report*, 2007.

Governments should structure their approach to a sustainable recovery in three phases: a short term, 18-24 month economic stimulus to provide jobs and raise demand; a medium term 2-5 year recovery strategy to grow out of recession, strengthen economic confidence and build the basis for future productivity; and a longer term market development strategy for sustained and resilient economic growth which delivers broader public policy goals of energy and climate security.

This paper looks in more detail at the components of each stage. Section 2 analyses the low carbon elements of existing stimulus packages and estimates the necessary scaling-up of measures needed to put the economy on a low carbon trajectory. Section 3 looks at the medium term recovery scenario and how clear policy frameworks can build economic confidence and maintained sustained growth through the recovery. Section 4 gives a brief description of the role the Copenhagen climate change agreement can play in setting a long term framework for continued growth in low carbon markets. All sections suggest how action at the G20 London Summit (2 April 2009) could provide a supportive framework for maximising the effectiveness and impact of national low carbon stimulus packages.

The climate change imperative creates a unique opportunity for smart and sustainable economic policy that integrates short-term stimulus objectives with medium to long-term goals such as energy security. This requires a different approach to economic policymaking which goes beyond finance ministries to involve a wider range of policymakers and economic actors. The G20 Summit can play a critical role in maximising the effectiveness and impact of national low carbon stimulus programmes, and reducing the risk of damaging medium term oil price rises.

2. Low Carbon Stimulus: Driving Short-Term Growth and Job Creation

The economy can be stimulated by digging holes roads, or subsidising consumption – but this is by far the least effective policy solution. A sustainable recovery package should increase investment in the foundations of future productivity and growth, support basic consumption for the poorest, and help maintain spending on innovation which is always hardest hit in a recession. The IMF argues that the economic evidence for most countries shows public

infrastructure spending produces a larger economic stimulus than similar sized tax cuts[5]; and that the impact can be further magnified by the signalling effect of focusing stimulus around a high profile public purpose, such as energy security and climate change.

Assessing the record to date on Low Carbon Stimulus

The economic pattern of the next decade will be set in the coming months. Major economies have already committed to spend $1.8 trillion[6] on fiscal stimulus expenditure and financial guarantees over the coming years. This amounts to around 3.25% of global GDP over 2008-2010, with two thirds of this as direct government spending. The IMF estimates that stimulus probably needs to rise to at least 4.5% of GDP, and there is significant risk that it needs to rise even higher.

On a generous assessment only $430 billion, or 23% of global fiscal stimulus, has been allocated to funding low carbon infrastructure and investments. However, if investment with uncertain carbon reduction gains (e.g. infrastructure) is excluded, **direct spending on improved efficiency, low carbon energy, transport and R&D is only $140bn or 8%**. More has been allocated in funding for conventional infrastructure such as roads - at least $272 billion - which arguably make economies more, not less, vulnerable to future economic shocks and provide no direct foundation for future growth.

Optimistic scenarios suggest that global growth may rebound fully in 2 years time, but the financial debts in the private and public sector will take at least a decade to pay-off. This period will see strong constraints on public spending and a reluctance to commit public investment. Unless investment in a low carbon economy is committed immediately, there will be little room for doing this in the future.

Unless a much higher proportion of the fiscal stimulus is directed to clean investment there will be no chance of keeping global temperatures below 2°C. A ten year delay in serious climate action will lock in a new generation of dirty power stations and long lived infrastructure, which between them make up 50% of CO2 emission reduction opportunities. This would make a 3-4°C rise in

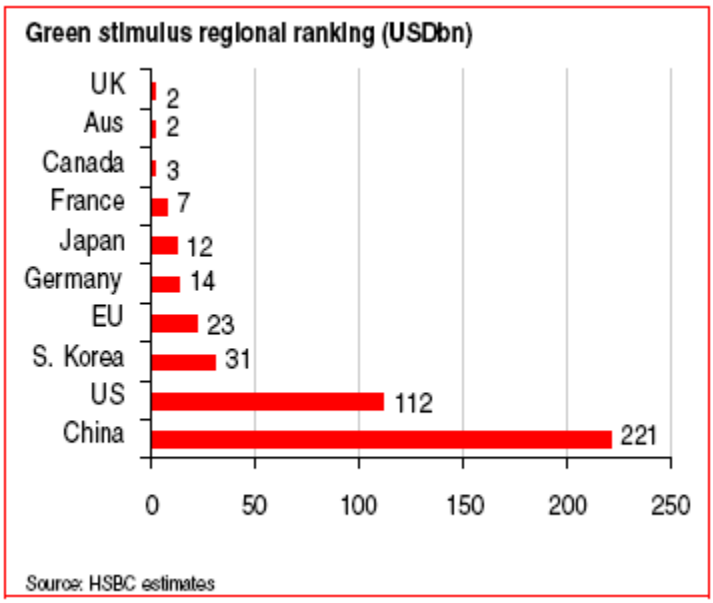
[5] IMF 2008, *Fiscal Policy for the Crisis*, IMF Staff Position Note, December 2008

[6] This figure is averaged from IMF (2009) and ILO (2009) analysis of stimulus packages which removes financial stabilisation spending and relocation within annual budgets. Discrepancies remain between sources based on use of PPP factors, exchange rates, interpretation of national policies and other assumptions over the impact of measures.

temperature almost certain[7]. This level of temperature rise is consistent with the higher end of the 5-20% range of global GDP costs from climate change described in the Stern Review.

Average figures on low carbon stimulus spending mask strong differences between countries. South Korea has dedicated 80% of stimulus spending to low carbon investments. China also ranks highly (37%), dedicating around $200bn to low carbon investments – although a substantial amount of this is committed to rail and grid infrastructure with uncertain climate benefits. Of developed countries only the US, France and Germany have allocated over 10% of their stimulus to low carbon investment.

Figure 2: Low carbon Stimulus Spending (HSBC, 2009)



For a region leading on climate change policy Europe has invested just 5% of stimulus packages in its low carbon recovery[8]. Japan is the only major economy with a lower proportion of spending at 2.6%. However, as Japan invested a large amount in its infrastructure as part of its economic stimulus programme in the

[7] McKinsey& Company 2009, *Pathways to the Low Carbon Economy*, January 2009

[8] For the detail of EU packages see: Saha, and Von Weiszacker, *Estimating the Size of the European Packages: an update*, Breugal, Brussels, February 2009; EREF 2009, Economic Crisis, Rescue packages in the EU 27 and Renewable Energy, European Renewable Energy Federation, Brussels, February 2009.

1990s ($6.3 trillion from 1990 to 2008), and is more energy efficient than the EU, this perhaps reflects unique national circumstances rather than a lack of commitment to decarbonisation.

With the exception of South Korea, no country has committed the scale and scope of spending needed to put itself onto a truly low carbon trajectory. However, most countries still have the flexibility to shape the structure of their stimulus packages, and even on current projections it is likely that further stimulus measures will be announced for spending in 2010-2011. Therefore there is still an opportunity to increase the focus of this spending on low carbon recovery, and to coordinate spending in a way that improves the overall impact on delivering a sustainable economic recovery.

Estimating the Size of an Effective Low Carbon Stimulus

Various estimates have been made of the correct size of a low carbon stimulus based on both top-down and bottom-up methodologies.

Top down estimates look at this funding as a proportion of total stimulus spending. Stern et al (2009) suggest an aggregate level of 20% of stimulus packages delivering around $400bn over the next two years, and emphasising that levels will differ between countries depending on their current levels of energy efficiency[9]. For example, it would be expected that the US would have more low cost options available than Japan which is three times more efficient in terms of energy use per unit of GDP. UNEP has proposed 1% of global GDP based on the South Korean example, which equates to around $540bn over 2 years[10].

There are also different "bottom-up" estimates of the investment required to place the global economy on a low carbon trajectory. The McKinsey 2009 study estimates additional investment costs per year of $392bn per year would be needed by 2015, amounting to $2 trillion over the next 5 years. The IEA estimates an annual additional investment cost of $465bn to 2030 for the same target. Both studies calculate these additional investment levels as supplemental to the business-as-usual level of energy investment which the IEA estimates at $26 trillion to 2030; an annual rate of $1.1 trillion. These definitions can be confusing as the extent of low carbon investment goes well beyond the "additional" investment costs they identify.

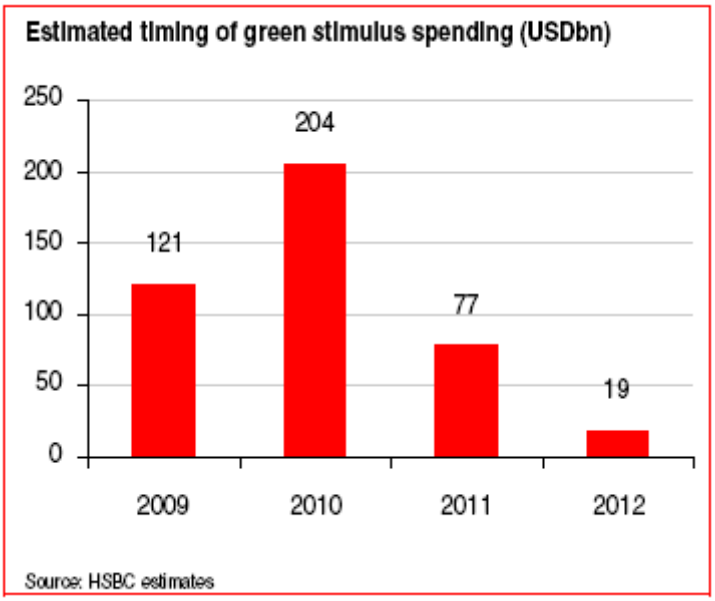
[9] Stern et al 2009, *Outline of the case for a "green" stimulus*, Grantham Institute Policy Brief, London, February 2009.
[10] UNEP 2009, A Global Green New Deal, Nairobi, February 2009

The low carbon transformation also requires increasing amounts of the $26 trillion business-as-usual energy sector investment to be shifted into new technologies, for example, away from gas pipelines and coal supply infrastructure towards renewable energy. Given current weakness in private sector lending to all energy projects, including low carbon projects, the stimulus packages will have to make up for some of this baseline investment; not just cover incremental investment levels.

Using this research the annual level of low carbon investment needed to place the world onto a safe climate trajectory can be estimated at around $500bn per year of incremental low carbon investment *combined* with a proportion of annual business-as-usual $1.1 trillion energy investment. This investment increment must be provided over the whole of the recession period, which based on the design of stimulus packages covers at least a 24-30 month period of depressed economic activity (mid-2008 to end-2010). Spending is dispersed over a longer period covering at least until 2012 (see Figure 3).

The deficit in total low carbon investment over the stimulus period can therefore be conservatively estimated as two years of additional low carbon investment plus 20% of business-as usual energy investment. **This would give a total of $1,680bn in low carbon investment which is needed to move the economy onto a low carbon trajectory**.

Figure 3: Timing of Low Carbon Stimulus Spending (HSBC, 2009)



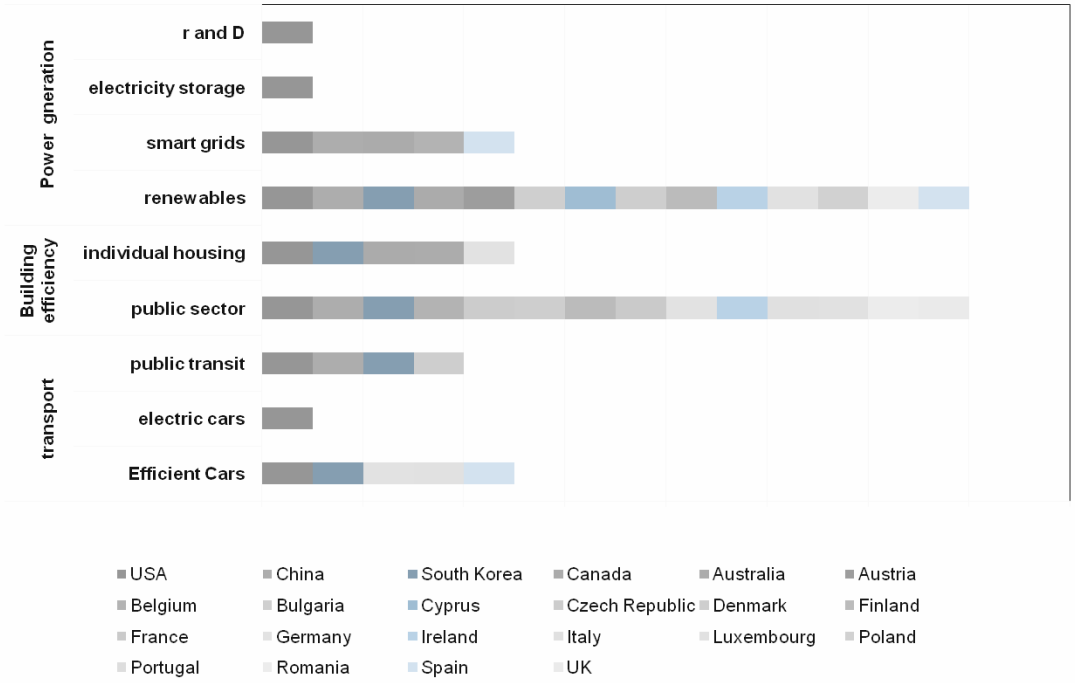
Fully funding this increment from public finances would represent over 90% of current stimulus packages, which is far more than their total public spending elements. Fortunately this is neither realistic nor necessary. Other policy priorities such as funding for social spending, small business support and housing market support already have a significant share of stimulus packages in a wide number of countries. It is also not necessary for all investment needs to be provided directly from public spending. A smaller amount of public funds can be used to leverage private investment in low carbon sectors, for example, renewable energy projects currently stalled due to high debt costs.

A realistic target should be for G20 countries to invest 40-50% of national economic stimulus packages on low carbon action over the next two years. Existing packages could be reallocated to meet the lower targets and the additional move to 40-50% achieved as stimulus packages are increased in many countries. A 50% share would deliver $911 - $1,215bn of low carbon investment (either directly or leveraged private investment) under different IMF stimulus package scenarios. These levels would be consistent with the levels needed to move onto a low carbon trajectory.

Focus of Low Carbon Stimulus Programmes

The core elements of a low carbon stimulus programme are clear, capable of rapid delivery and examples covering all sectors are already underway in a range of countries. Figure 4 shows the wide range of sectors covered in low carbon stimulus packages and the differences between countries as to the scope covered.

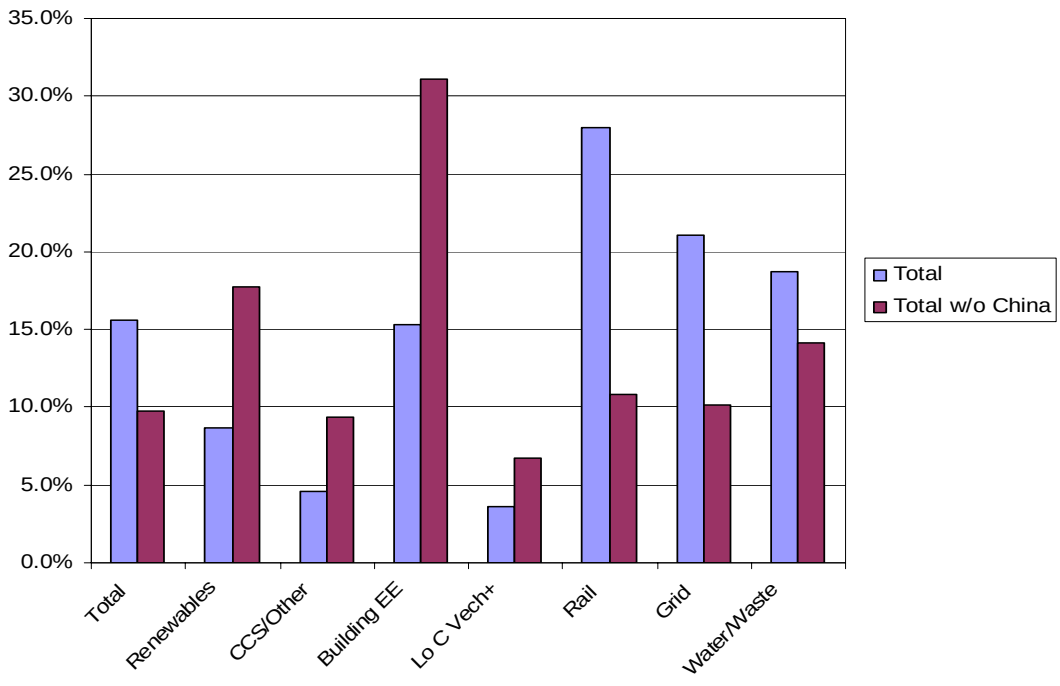
Figure 4: Scope of Low Carbon Recovery Packages (Chatham House 2009)



In terms of rapid deployment, job creation and economic benefits, energy efficiency interventions in public and private housing give the best returns, though they can be administratively difficult to deliver in some countries. Many larger infrastructure projects are less labour intensive and perhaps slower to begin due to planning and other constraints, but can be more easily administered inside a central programme. These and other national factors will alter the mix and balance of programmes in each country, but all countries will need to increase investment in each one of these sectors to meet their climate change and energy security objectives.

Figure 5 shows the breakdown of current spending by identifiable sub-sector. China has allocated a large proportion to rail and grid infrastructure, which rather skews the overall results. Outside China, 50% of spending is on energy efficiency and low carbon power, mainly renewable energy. Around 5% of spending has been allocated to incentives to shift to smaller more fuel efficient cars and this is combined with significant low carbon R&D funding for the automotive sector particularly in the US and China. There is ample scope for increasing low carbon investments and improving the focus of R&D programmes. The IEA and others suggest a quadrupling of annual energy R&D from $10 to $40bn by 2020.

Figure 5: Low Carbon Stimulus by Sector, with and without China[11]



[11] Robins et al, 2009 'A Climate for Recovery: The Colour of Stimulus goes Green', HSBC Global Research Centre

Maximising the Impact of a Low Carbon Stimulus

Investment in direct emissions reduction is currently outweighed by support to high carbon sectors such as road building and vehicle manufacturing. Increasing the proportion of funding allocated to low carbon investment will help rebalance the net climate change impact of activity. China has also introduced a more direct approach which prevents fiscal spending – especially that allocated to general industry and infrastructure support – being used to support high-energy using and polluting industries. It is also likely that in all countries there will be pressure to accelerate environmental assessments in order to move projects forward more rapidly. **G20 countries should agree to follow China's lead and avoid investing stimulus packages in high carbon industries except to improve energy efficiency and reduce carbon emissions.**

Public funding for industry restructuring and innovation should be tied to strict conditionality and not just be a reward for past failures. There is a danger that the climate change imperative will be used as "greenwash" to justify highly distortive subsidies in failing industries. This would risk a wasteful international subsidy competition; a 21st century version of 1930's trade protectionism.

The G20 could agree to maximise the impact of stimulus spending and avoid wasteful subsidy competition by sharing progress on the delivery of environmental conditions for fiscal restructuring support to key trading industries (e.g. car manufacturers, steel). The OECD and UNEP could act as the analytical clearing house for this data.

Financing a Low Carbon Stimulus

Rather than increasing government borrowing on international capital markets, the stimulus programme could be funded through innovative investment instruments. The economic recession has hit different low carbon sectors in different ways. For example, energy efficiency programmes have been affected by lower energy prices, the slow down in new build construction and lack of consumer confidence to pay for improvements even when part-subsidised. Renewable energy projects appear to be suffering from the rising cost of debt as well as rising counter-party risks and falling carbon prices in Europe. Grid infrastructure investment will fall as regulators lower demand projections and increase connection delays for renewable energy projects. As in most recessions,

RD&D budgets in industry are generally falling as firms cut costs, thus lowering companies willingness to engage in shared risk in major investment areas like CCS demonstration plants, smart grids etc. The previously booming 'Cleantech' venture capital markets in the US have been particularly badly hit and many companies risk bankruptcy[12].

There are a variety of public mechanisms which can be used to stimulate activity in these markets including loan guarantees, long term debt and grants. Delivering this type of support requires a sophisticated financing vehicle which can assess commercial projects and provide tailored packages of blended public and private financing. The US, EU (through the European Investment Bank) and Germany have already created and/or increased funding dedicated to infrastructure funds as part of their stimulus packages and this model could be more widely applied across the G20. These funds will have a role beyond the stimulus period in financing on-going low carbon transformation activity.

A public "**Low Carbon"** or **"Green"** bond issue could also be used to generate funds for such financing and would have significant macroeconomic benefits. Governments could issue a long term, high interest green savings vehicle to the public and /or institutional investors (for example, in the UK through the National Savings Bank or nationally majority owned banks) the proceeds of which would be used immediately to fund this package. Such a high profile initiative would have a stimulus effect by attracting savings, especially from homeowners benefiting from low interest rates, away from commercial banks who are focused on rebuilding their balance sheets and reluctant to lend. It would also engage the wider public in the project to build a low carbon economy. This type of investment vehicle would be attractive to pension funds that are looking to balance portfolio risk by securing large amounts of cash until the economy recovers and equity investment becomes attractive again.

G20 countries should explore the potential for using Green Bonds to support stimulus spending and provide longer term funding for new infrastructure funding facilities which would be able to blend and support private financing in renewables, energy efficiency and other areas.

[12] PriceWaterhouseCoopers, Cleantech Report, February 2009

3. Building a Robust Low Carbon Recovery over the Medium-Term

Building a robust recovery requires action to minimise exposure to energy price shocks, and to incentivise investment in clean growth industries where there is high confidence in future demand driven by public policy.

Fiscal incentives designed to encourage companies to increase activity and innovate will have little impact unless there is confidence in future markets for these products. There is a need for a rapid expansion of production capacity in renewable energy equipment, high efficiency construction materials and energy efficient products. Annual output in these sectors will need to expand by several orders of magnitude to meet the investment demand for rapid decarbonisation. Already the recession has slowed growth in key sectors, with wind investment dropping from an annual growth rate of 60% for the last four years to 5% in 2008[13].

Low carbon markets are driven in the medium term by government regulation and incentives. As such they can be insulated from general falls in market confidence if policymakers can give credible forward incentives. Governments can use their power as "public consumers" to give confidence to businesses to invest through immediate direct fiscal measures and by committing to future sustainable market incentives based on pricing and/or consumer charges. There may be a need to move to more direct and clear policies, where the public authorities bear greater risk, in order to give credible market signals in the short term. A successful Copenhagen climate change agreement in 2009 will also strengthen confidence in a growing global demand for low carbon goods and services.

The aim should be to move sectors away from fiscal incentives and into a sustainable policy environment (in fiscal and market terms) from 2011/2012 onwards. This approach is consistent with IMF recommendations to ensure that sustainability is built into all stimulus plans. **If demand is scaled up then aggressive growth in low carbon markets could account for 2-3% of sustained global growth from 2011-2015.**

Delivering this growth requires policy packages which combine immediate fiscal measures with sustainable medium term policies. Governments should give clear and reliable market incentives in each of the sectors identified above over at least the next 10 years, effectively "de-risking" investment in additional

[13] New Energy Finance 2009

production capacity. Reducing market risk to firms will require governments to use more direct policy instruments such as: tendering for low carbon power capacity; regulatory mandates to invest in smart grid capacity, upgrading and building new interconnectors; forward purchase commitments for innovative products through new regulation or government procurement. Examples of packages of short term and medium/long term polices in each sector are given below in Table 1.

Table 1: Sector Stimulus and Market Creation Polices

Sector	Short Term Stimulus	Stimulus Examples	Medium Term Policies
Energy efficiency - Housing	> retrofit domestic insulation > upgrade new build efficiency as part of construction sector stimulus	UK, NL, Germany, France, US, China, Canada, South Korea, Australia	> National retrofit programme funded from ETS auction revenues > Zero carbon building standard
Energy efficiency - Industry	> tax breaks and R,D&D incentives for energy efficiency investments in heavy industry	China	> Emissions trading > Standards
Distributed renewables	> increased time-limited incentives to purchase solar thermal, PV and heat pumps	None	> Feed-in tariffs > Installation grants
Centralised renewables	> support through tax credits and/or grants > reduce debt costs	EU, France, South Korea, US	> National portfolio standards
Grid Upgrading / Smart	> direct spending to deliver transmission upgrades > spending on large smart	EU, US, China, Canada	> National strategies for grid upgrading

Grids	grid demonstration > install smart meters		> Finance through consumers/ETS auction revenues
Private transport	> time limited subsides for scrapping older vehicles and purchasing low emission cars	EU, US, Germany, China, France, South Korea, Italy, UK	> Feebate system > Vehicle emission standards
Public transport	> direct investment in rail and mass transit projects	UK, China, Canada, South Korea, Germany, Italy, France	> Public infrastructure facility funded through petrol taxes/ETS auction revenues
Carbon Capture and Storage	> funding for commercial scale CCS demonstration > CCS infrastructure build	US, EU, Canada	> Emission performance standards
RD&D	> Low carbon vehicles > Nuclear > Renewables/Power storage	China, Canada, US, UK	> Low carbon R&D facility funded from ETS auctioning revenues

The amount of new productive capacity needed to deliver these goals may also require more direct **green industrial strategies** where seed funding and tax breaks are used to accelerate investment. This activity could be organised to create clusters of productive capacity in **Low Carbon Innovation or Development Zones**. These would concentrate supply chains in areas like off-

shore wind and sustainable construction to accelerate innovation and skills development. This idea is currently being piloted in China[14].

The G20 should build confidence in future low carbon markets by coordinating commitments to build forward markets for low carbon goods and services. This would demonstrate that there will be a strong growth of demand in these sectors and give companies greater confidence to invest in new production capacity. This would be particularly powerful in areas with strong global supply chains such as vehicles, renewable energy and industrial equipment where common standards would facilitate global market growth. The IEA could be tasked with assembling these commitments and estimating the impact of early policy delivery on future oil price levels.

4. Delivering Long Term Energy and Climate Security

Bold action to build an efficient, low carbon energy economy is necessary as a major component of any sustainable economic recovery plan. However, to deliver their full economic and public value these investments need to take place inside a long term framework for global decarbonisation.

The Copenhagen climate change negotiations in 2009 aim to agree global commitments for decarbonisation from 2012 to beyond 2020. The outcome will define the scale and pace of growth in global low carbon markets; success is critical to maintain expectations of continued momentum towards decarbonisation.

A centrepiece of achieving success at Copenhagen is agreement on a package of financial and technology support from developed countries to facilitate decarbonisation in the major emerging economies. Estimates of the scale of support needed are between $90-120bn per year in the period 2013 to 2020. Around 30% of this is likely to come through private sector carbon market transactions funded by developed country energy consumers. The remainder would need to be supplied through various forms of public sector financing and additional funding of at least $50bn a year will also be needed to fund adaptation in poorer developing countries[15].

[14] See Chatham House and E3G 2008, *Low Carbon Zones: A Transformational Agenda for China and Europe*, London, December 2008.
[15] Oxfam, December 2007 'Financing adaptation: why the UN's Bali Climate Conference must mandate the search for new funds', available at http://oxfaminternational.files.wordpress.com/2007/12/note.pdf

Even before the current recession there was reluctance in many developed countries to commit to major additional climate change funding beyond existing overseas development aid. The need to raise taxes to replenish public finances from 2012 onwards has hardened this view in developed countries, but also strengthened the view in emerging economies that they require financial assistance in order to act. It is clear that without a substantial financial package there will be no Copenhagen agreement, which will result in longer term costs an order of magnitude higher in the next decades from uncontrolled climate change.

It is critical that a workable solution is found to this issue. Imaginative proposals have been developed to fund the Copenhagen agreement from outside government balance sheets by auctioning carbon emissions permits at the international level, or levying an international charge on the currently untaxed use of maritime and aviation fuel. Both methods are capable of raising sufficient finance to deliver the Copenhagen deal.

The G20 should establish a Task Force involving finance and other relevant ministries to develop practical proposals for the required quantity, sources, mechanisms and governance for low carbon financing. The Task Force should develop its recommendations to feed into the UNFCCC negotiations by October 2009.