



Tackling Climate Change

TOOLS TO FUND ADAPTATION AND MITIGATION INITIATIVES

A Re-define Policy Brief for FEPS

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MAY 2010

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Introduction

There is near universal agreement that the rapid and accelerating accumulation of man-made Green House Gases (GHGs), driven by fossil fuel consumption and deforestation, needs to be tackled urgently. Global warming is already underway and if allowed to run unchecked could trigger sudden catastrophic climate change. The international targets for reducing GHG emissions agreed at the failed Copenhagen summit in 2009 are insufficient and according to a recent study will likely lead to a three degree rise (Celsius) in temperature by 2100ⁱ. A rise of this magnitude is associated not just with significant falls in crop yields and water availability but also with a substantial rise in the number and severity of natural disasters, such as floods and droughts. Tackling climate change is fast becoming an urgent priority as ice packs melt, sea temperature rises and rainfall patterns change.

*To this end, two parallel sets of initiatives are needed: **Mitigating** carbon emissions so as to limit global warming to less than two degrees, and **Adaptation** mechanisms to help poor countries in particular to cope with the negative impacts that result from the changes to climate that accompany this two degree rise in temperature.*

The United Nations Framework Convention for Climate Change (UNFCCC) lays out the framework under which actions on both these fronts needs to be taken. The UNFCCC divides countries into an Annex 1 group of industrialized countries that have the primary historical responsibility for the substantial stock of man-made GHGs in the atmosphere, and an Annex 2 group of developing countries. The distinction is based on the principle of common but differentiated responsibilities and respective capabilities. It recognizes that countries have distinct historical responsibilities regarding global warming, varied financial and technological capabilities, and face different national development challenges.

Even when taking account of these fundamental differences between developing and developed countries, the conclusion that both groups will need to make sacrifices is inescapable. This can be gauged simply by the fact that even if all developed country emissions were to inexplicably fall to zero today, developing countries would still need to decarbonise their economies to have any hope of preventing catastrophic climate change.

However, the distinction between Annex 1 and Annex 2 groups remains important with regard to the different extent by which the groups will need to reduce emissions and the differentiated responsibilities and capacities to pay for mitigation and adaptation measures. The lion's share of GHG cuts will have to come from the Annex 1 countries, and this is likely to entail significant costs. The Bali Action Plan (2007)ⁱⁱ of the UNFCCC recognizes that the Annex 1 group of countries will also need to bear the burden of providing financial resources to developing countries for the purpose of adaptation. This, too, requires substantial resources.

The aggregate annual resources needed for climate mitigation and adaptation have been estimated to be hundreds of billions of dollars. In fact, if tackling climate change did not entail such an extensive financial cost, political consensus would have been much easier to achieve at the recent Copenhagen Summit.

Accordingly, this paper is relatively narrow in scope in order to rigorously explore options for 1) mobilizing financing for green investment, 2) redesigning the financial and fiscal landscape to incentivize green behaviour, and 3) raising funds to finance adaptation in developing countries.

Financing Adaptation and Mitigation

The question of how to finance the mitigation and adaptation strategies deemed necessary has fast become perhaps the most important issue in helping move the discussions on tackling climate change forward. The ongoing financial crisis, which has put a strain on government finances in rich and poor countries, helped contribute to the failure of the Copenhagen Summit to an extent, since countries were loath to make expensive commitments at a time of economic hardship.

And yet, given that we will not be able to completely mitigate the effects of climate change even if we act with utmost urgency, it is essential to start building up an adaptation fund which would help poor developing countries tackle the worst impacts of global warming. Further, funding should be raised with the long term goal of enabling developing countries to switch to a low-carbon development path; a substantial proportion of the global mitigation potential is in developing countries. The obstacle remains, however, that many developing are already struggling with financial constraints to meet development targets, as well as lacking the technological capacity to implement these initiatives.

At present, most of the additional funding for developing countries to tackle climate change, excluding the proceeds to the Kyoto Protocol Adaptation Fund, comes in the form of donor contribution. Nonetheless, as clearly illustrated by the inadequate fulfilment of the Millennium Goals, money for international purposes is not easily extracted from national budgets: finance intended for global causes often tends to be supplanted by other urgent national concerns. This is illustrated by the fact that the EU as a whole is off-track to meet its 2010 commitment on ODA.

As a result, the failure to adequately finance strategies to tackle climate change has given rise to detrimental global environmental consequences. The lack of mitigation thus far has increased the pace of global warming and is already contributing to falling crop yields, loss of portable water, and an overall shift to more extreme weather patterns. While this is a global problem, developing countries are disproportionately affected, not just because of their more vulnerable geographic location but also because of their heightened vulnerability to economic and other exogenous shocks, in addition to their lack of domestic resources available to cope. Clearly, mitigation alone is not enough to tackle the adverse consequences of climate change, and urgent steps also need to be taken to help developing countries adapt to the necessity of a low-carbon future.

It is for these reasons that it is urgent to explore and present ways through which mitigation and adaptation efforts could best be financed. With this in mind, this paper brings together ongoing initiatives to address climate financing, in addition to outlining some new ideas on how this could best be done.

Box: Adaptation Financing

These countries, despite their limited historical responsibility for climate change, face the highest costs regarding its impacts. This, along with the fact that adaptive capacity to climate change is uneven across countries, requires enhanced international cooperation to face increasing adaptation needs. Clearly, a central feature of this international action is the provision of new and additional financial resources. Under the Copenhagen Accord, developed countries committed to providing “new and additional” resources approaching \$30 billion in the period of 2010-2012, with an increase to \$100 billion annual starting from 2020. However, the Copenhagen agreement is non-binding, and the money has yet to be put on the table.

Estimates of annual adaptation needs in developing countries	
<i>Agency</i>	<i>Annual financing requirements (US\$)</i>
UNDP	86 bn.
World Bank	9bn. – 41bn.
UNFCC	8 – 130bn.
Oxfam	50bn. +
OIES	28bn.

The table above lists some estimates which most commentators now agree are too low since both the speed of global warming and its negative impact in recent years exceed the levels experts had assumed while making these calculations.

The Stern Reviewⁱⁱⁱ made the point that ‘investing’ today to move the economy onto a low-carbon footing or mitigation financing would certainly be expensive, but far less so than would dealing with the economic consequences of the level of climate change resulting from ‘business as usual’. There is a strong case on purely economic grounds for acting now, and the costs of failing to do so will increase on a year-by-year basis.

Box: Mitigation Financing

Tackling climate change through mitigation is thus economically efficient in the long term. However, no matter how favourable the long term cost-benefit analysis of mitigating climate change looks, it will entail significant upfront costs. Public sector money for this is essential but hard to come by at a time when the financial crisis and associated recessions have left governments with near record fiscal deficits. Governments would need to look at the best route to raise this money through their tax systems. This will entail two main steps 1) reducing tax evasion and avoidance and 2) introducing new taxes or raising existing taxes.

Any amount of public money we might be able to allocate towards tackling climate change would simply not be enough and mitigation actions would clearly need much larger amounts of private investment. For

this investment to take place, we would need a well-functioning financial system that supports the real economy and encourages, rather than penalizes green investment. Such a financial system would need to have a long-term orientation since climate investments are short term expensive but long term economically beneficial.

McKinsey, a consulting firm, has estimated that the world-wide investment needed for mitigation measures would be Euro 530 billion per year in 2020 or Euro 810 billion per year in 2030^{iv}. This is about 5%-6% of normal business as usual annual fixed investments in the world so seems to be achievable through additions to the fiscal and private sector financing capacity. McKinsey concurs with the assumption in this paper that many of these investment opportunities would be long term profitable with future energy savings more than compensating for upfront costs.

Adaptation measures will need cash investments, technology transfer and insurance mechanisms.

Mitigation means reducing GHG emissions. This is best handled through a combination of making GHG emission expensive so as to encourage behaviour that reduces emissions, and the allocation of resources towards the development of greener technologies that are less GHG intensive.

The reduction of GHGs arise mainly from 1) fossil fuel based energy use 2) deforestation and 3) agriculture.

So, bringing about mitigation entails:

1) Switching to low carbon energy supply through a) Modifying or scrapping old GHG intensive technology b) Replacing scrapped or end of useful life 'dirty' technology with 'green' technology c) Ensuring that new energy production is green.

2) Increasing Energy efficiency through a) Reducing energy waste b) Increasing the energy efficiency of consumption through initiatives such as insulating buildings, using more energy efficient white good appliances such as refrigerators and driving greener vehicles.

3) Locking in carbon through a) Tackling deforestation b) Reducing agriculture related GHG emissions c) The use of sequestration technologies.

4) Reducing energy consumption through a change in behaviour.

The extent of mitigation today will strongly influence the future trajectory of climate change, and so will also be a major determinant of future adaptation needs. The more we mitigate now, the less will we have to fund adaptation in the future.

That said, the atmospheric concentrations of GHGs are now at a level where no amount of mitigation can prevent the climate from changing. Estimates of future financing needs are thus inherently contingent: at one extreme, continuation of 'business as usual' would lead to the most greenhouse gas emissions, the

sharpest increases in temperature and changes to climate, and so to the greatest adaptation needs and funding requirements. At the other extreme, rapid and total mitigation – in the sense of a global shift to low or zero carbon economies – would see the minimum possible change in climate and so the lowest possible adaptation needs and funding requirements. These would still be significant, however, because of the climate change that is already in the system^v.

Also, a substantial part of the mitigation potential is in developing countries, estimated to be 65-70% of emissions reduction in 2030. Yet, as many developing countries are already struggling with financial constraints to meet development targets, also lacking vital technological capacity, additional funding should be raised to enable these countries switch to a low-carbon development path.

Mobilizing financing for green investments^{vi}

As we have seen in the previous section, hundreds of billions of dollars are required annually to finance urgent mitigation measures in both developing and developed countries. For developed countries, the financing for meeting their mitigation commitments would need to be mobilized primarily from domestic public and private sources or from other rich country institutional investors. Developing country mitigation investments would need to be financed through domestic sources of finance supplemented extensively by external public and private sources of financing from rich countries and international institutions.

Industrial Investments

Green investments are clearly not happening on a sufficient scale. This is true in both developed and developing countries. The paucity in green investments is driven by the fact that the incentives for economic actors to make such investments are currently not powerful enough. Some of these problems are:

- Green investments entail private costs but the benefits in terms of mitigating GHG emissions will accrue globally, so, while they may be socially profitable, this profitability may not extend to the private sphere. The exact inverse is true of 'dirty' investments where private benefits exceed social ones.
- Many green investments, for example in renewable energy, entail significant upfront costs but the benefits only accrue in the long term.
- While almost everyone agrees the penalty levied on GHG emissions will have to rise significantly in the medium term, the current price on such emissions in the form of carbon taxes or the price of carbon in the emissions trading market remains very low. This means that the cost benefit analysis of investment decisions is distorted away from green investments.
- Even when investors may want to put money into green investments, they face serious hurdles in channelling their money, not least 1) which financial mechanism to invest through 2) what kind of green investments to focus on 3) how to make sure that the money is effectively deployed and

that the investments actually help tackle climate change. This means that green investments are effort intensive and beset with uncertainties.

Aligning private costs and benefits with social ones

In order to deal with the first problem, we need mechanisms that help better align the private costs and benefits of investments with those faced by the society. This can be done through two broad types of measures:

- *Penalizing polluting behaviour through taxation or quantitative restrictions.* Carbon taxes of the kind that countries such as Sweden levy on fossil fuels are an example of the first, and the EU Emissions Trading ‘cap and trade’ scheme is an example of the second. Under this scheme, the total level of GHG emissions allowed is capped by fiat. Governments then issue or auction a limited quota of ‘permits to pollute’ which are allowed to trade in a market so the private sector can reduce emissions in the most economically efficient way. It is possible, and in some cases prudent, to combine the two wherein a tax can provide a floor to the effective penalty for GHG emissions and the emissions quota can ensure that the total emission levels are consistent with effectively tackling climate change.
- *Rewarding green investments through the use of subsidies or minimum quantitative quotas.* A minimum electric grid feed in tariff for renewable energy such as the one that applies in Spain is an example of the first, and the Renewable Obligations initiative in the UK whereby energy producers are required to produce or buy a set quota of renewable energy is the second. It is, of course, possible to combine the two by specifying a minimum feed in tariff and having minimum quota commitments.

The two most important means of aligning private and public costs and benefits, namely the cap and trade schemes and carbon taxes mentioned above, are discussed in a subsequent section.

This part of the paper focuses on the less well-known possibilities for helping meet mitigation targets through mobilizing funding and changing incentive structures to encourage green behaviour.

Restricting the use of ‘dirty’ products and investments

The laudable EU initiative to outlaw non-energy efficient incandescent lamps is another example of a quantitative restriction. In fact, we believe that all territories in the world, beginning with the EU, should conduct a comprehensive audit of all energy intensive products and apply prohibitions or stringent restrictions on the use of ‘dirty’ products’ where green and reasonably priced alternatives exist.

The ideal conditions for such a move would be where 1) the initial investment for green products is not substantial, 2) there is a significant private economic gain in terms of energy savings that exceeds the additional cost of the green products, and 3) there is a significant impact in terms of reducing carbon emissions.

Quantitative restrictions can also be imposed on new dirty power plants and new efficiency standards can be brought in restricting emissions per device.

The Chinese government, as part of its 'green credit' policy, places restrictions on how much financing banks can provide to 'dirty' projects. This initiative could be expanded by, for example, bringing such limits within the purview of the ongoing discussions on financial sector reform.

Promoting 'clean' products and investments

The moves to penalize dirty products and restricting dirty investments could be augmented by, for example, providing subsidies and tax breaks for green products and promoting green investments.

Offering tax breaks on green products, for example, would be good policy. In the EU, where Value Added Tax Rates are often close to 20%, introducing a zero-rated VAT category for green products may be a suitable idea.

This would need to be co-ordinated by the European Commission because 1) of the existence of the single market 2) and the fact that a zero VAT rating would require a pan EU agreement since this would fall below the legal minimum VAT rate that applies across the common market.

In a similar vein, the UK has halved the tax payable on ultra low carbon cars. While none of the many tax breaks used in various individual EU countries is likely to have a significant impact by itself, a more strategic and EU-wide approach might make a substantial contribution through providing a significant green stimulus.

To this end, the US recently announced an extension of tax breaks for clean energy investments. This would allow manufacturers of technology like solar panels and wind turbines a 30% tax credit, in an effort to stimulate investment in renewable and make them more competitive with conventional sources of energy. The EU should also explore such tax breaks.

Using tax breaks on energy efficient products and green investments is a policy that can prove to be very useful in the armoury of all countries, developing and developed.

Addressing the paucity of upfront funding for economically viable projects

The second incentive issue poses a problem because of a lack of established funding mechanisms for green investments and the uncertainty associated with them. The other part of the problem is that individuals and financial institutions both work on the basis of historical data and favour investments with which they are familiar. Coal fired plants, for example, have been around for decades and clear data sets exist for their operating lifetime, costs of construction and maintenance etc. Most project financing mechanisms and investors find it easy to project past data into the future to calculate cash flows, and the expected costs and benefits associated with such investments.

This means that new green technologies and untried investments without sufficient historical records are penalized vis a vis existing dirty technologies. That is why the green sector is almost always underfunded.

A long term dedicated sector specialized actor would better understand the project dynamics so may not need to charge the ‘unfamiliarity premium’ that more generalized non-specialist investors may need to charge.

Leveraging public investment to attract private investments

That is why direct and indirect public intervention is likely to be needed to help bridge the funding gap. Its role will be critical in facilitating larger scale private investment. Using public banks such as the World Bank and the European Investment Bank internationally, as well as national banks such as the BNDES in Brazil, KfW in Germany and the newly proposed green investment bank in the UK to provide seed funding, as well as contingent support in the form of insurance, guarantees and credit enhancements, will help attract private funding.

Setting up pilot projects with demonstration potential

Setting up publicly funded pilot projects or supporting private investors to help set up projects that have a demonstration potential can help remove some of the uncertainty associated with new and untested technologies. This will enable innovations and technologies that have a successful pilot phase to show economic and technological viability that can attract private investors.

Making it mandatory to disclose exposure to carbon and climate change risks

At the same time as encouraging the private sector as well as public sector investors to recognize the long term economic viability of ‘green’ investments, they should also be made fully aware of the likely long term economic costs of ‘dirty’ investments. Making it mandatory for companies to disclose their exposure to carbon, their excessive dependence on fossil fuel technologies, or vulnerability to the likely impacts of climate change can all help investors make sounder risk/reward decisions at the point of making investments.

A recent study by Risklab, part of the Allianz Global Investors group, found that investors who target their portfolio of investments using ethical and environmental benchmarks significantly improve the risk/return profile of their portfolios.

The Chinese government, as part of its ‘green securities’ programme, requires stringent disclosure of a company’s environmental performance record before it is allowed to raise money in the equity markets. Governments across the world, but especially in developed regions such as the US and the EU, should make such risk disclosure mandatory as a prerequisite for listing and also as part of the annual reports issued by corporations.

Providing micro level incentives for making efficient ‘green’ decisions

Even beyond this ‘experience’ issue, human beings suffer from an excessively short-term focus. Most of us know, for example, that the case for a little bit of upfront investment in home insulation is likely to reduce our energy bills by a significantly greater amount over the medium term. Yet the record of individual home-owners as well as businesses making such upfront investments is dismal. Even when

households make such a decision, they are often discouraged by a lack of easy and affordable funding mechanisms to pay such upfront costs.

The example above is symptomatic of insufficient demand, which is compounded by a problem of insufficient supply. Public initiatives, such as information campaigns and a provision of new targeted sources of public and private mechanisms for funding economically viable upfront investments (like home insulation), are the right policy measures to address this.

The issuance of home insulation grants is particularly promising. Here, subsidies are given to homeowners who insulate their homes to improve energy efficiency. Such grants in Ireland, for example, can amount to Euro 4,000 – a considerable incentive for individuals to conserve energy through insulation. While these green grants and loans have been approved by the EC, their issuance has not been widespread throughout the EU, and so the EC should take a more active stance in advocating their use throughout Member States.

Incentives to go green could also be provided in the form of low or zero interest green loans to encourage individuals to invest in green technology and infrastructure. While many people are convinced of the need to transition to environmentally sustainable goods or homes, they often lack the initial capital required to purchase them, despite lower energy costs in the future and green loans can help plug that gap.

The city of Berkley in California, for example, has undertaken a pilot programme in which it lends homeowners the money to put solar panels on their homes, financed through the issuance of Property Assessed Clean Energy (PACE) bonds. Similar bonds have also been successfully issued in other US municipalities.^{vii} Essentially, these bonds speed up and expand the adoption of energy-saving practices by making them economically viable, particularly given the current constraints on credit access. The bonds can then be repaid through the savings in energy costs. Such micro level financing efforts deserve to be widely replicated throughout the EU and in the rest of the world.

Addressing short-termism in the financial sector

Everyone agrees that the price of carbon (equivalently the penalty for GHG emissions) is likely to be sharply higher in the medium term. Yet financial and business actors continue to behave as though this is not, in fact, the case. Even now, businesses are continuing to make ‘dirty’ investments, ignoring the fact that were carbon price to increase to the expected level, these would no longer be profitable.

More disturbingly, there is growing evidence that financial markets, which are supposed to send signals to the real economy that encourage long-term productive and profitable investments, are doing the exact opposite. Banks as well as capital markets continue to provide cheap finance, for example, for coal fired power plants. Financial markets continue to reward energy intensive companies that are currently profitable but exposed to serious downside risk from higher carbon prices in the long term. Short-term profitability is being rewarded often at the cost of long-term profits and sustainability.

Surveys of chief financial officers and CEOs reveal that as many as 75% of them would sacrifice making long term profitable investments if it meant that share prices would fall in the short term. Financial markets often discount green investments so this means that excessive short-termism in the financial markets is directly translating into lost green investments.

Company executives are loath to disappoint analyst expectations of quarterly (or annual) profits, and a study of the companies listed on the DJIA index showed that, more than 60% of the time, company earnings come in just above consensus forecast delivering the predictable share bounce. This level of forecast hugging is clearly impossible in the complex world we live in and is evidence of earnings manipulation. This short-term focus of corporate executives, analysts and traders all work against green investment.

Introducing financial transaction taxes and differentiated voting rights

That is why it is essential that the short termism of financial markets, shareholders and CEOs be addressed upfront. Financial transaction taxes, which penalize excessively short-term oriented behaviour in the financial markets, as well as differentiated voting rights for long term shareholders and new rules on CEO and senior employee compensation, are useful measures that would help tackle the problems highlighted.

Encouraging pension funds and wealth funds to make green investments

Public pension funds, sovereign wealth funds and government-controlled investors and entities such as the European Investment Bank are less inflicted by financial market short-termism and are in a good position to make long term profitable 'green' investments, since they have a longer term horizon. They are, in fact, in a strong position to make good profits from such investments because the financial markets are likely to have underpriced them.

For example, the Norwegian pension fund has already launched a \$2.5bn green window that will invest in renewable/alternative energy, clean technology and climate change sectors, including water, energy and natural resources.

Given how exposed many of the world's top sovereign wealth funds are to oil and the energy sector, dedicated investments targeted towards the green sector would help them diversify their risks. The EU should pursue a strategy to help put together mechanisms that would encourage these funds to invest in 'green technology' and other green initiatives in the European Union.

In parallel, there is a need to formulate mechanisms to channel SWF and pension fund investments into developing country green investments which would provide benefits of 1) high returns for investors 2) diversification of their portfolios and 3) mitigation benefits to help tackle climate change.

Using pan EU institutions such as the European Investment Bank to launch a pan EU green infrastructure program funded by green Eurobonds would be a particularly opportune idea that could serve the triple purpose of helping tackle climate change, generating jobs and growth and furthering EU integration.

Furthermore, the European Bank for Reconstruction and Development and the World Bank can be used to facilitate similar investments for developing countries.

Inducing long-term investors to evaluate risks/opportunities of climate change

While the average holding period of a typical hedge fund is very short, at the other end the spectrum funds such as the Norwegian sovereign wealth fund have 'infinite' investment horizons. The Norwegian fund, for instance, plans to only disburse its expected annual return, and will leave its principal untouched. So, while hedge funds and other short-term investors may care little if a high price for carbon is likely to eliminate company profits in 15 years, this is exactly the sort of risk that longer term investors need to grapple with. This longer term also brings opportunities for example to identify green investments that are likely to generate excess return over the longer term.

In order to help evaluate these risks and opportunities, the Norwegian fund has teamed up with several other large funds and commissioned a study to evaluate climate risks and opportunities for long-term investors. This sort of thinking should be encouraged and is likely to release more funds from 'green' investment from long term investors in the near future. In fact, the EU can legislate for all pension funds and other long-term investors to study and account for these climate risks as part of their fiduciary responsibilities.

Addressing the high effort and uncertainty associated with green investments

The last incentive hurdle was that investors, when surveyed, revealed that they had a strong desire to invest their money in green projects but have no idea of how to do this. Many pension fund and ethical fund managers also confess to be put off by the high threshold efforts needed to make green investments and verify their authenticity. It is partly to allay these information and effort problems that several private sector entities have developed various ethical and socially responsible investment indices. Many of them include the environment as a factor, and some are even pure green plays.

However, the number of such indices is proliferating and liquidity in any of the indices is low. Also, the indices are of variable quality and many investors have expressed their frustration at the fragmented landscape they are confronted with.

The World Bank and the European Investment Bank have teamed up with S&P and FTSE respectively to launch dedicated green indices. While the indices purport to reward environmentally friendly behaviour neither is dedicated to green investments. The European Commission may serve a useful role by setting up such an index. Provided such an index is launched and has the stamp of approval of the European Union, it is likely to attract substantial funds and become liquid.

Moreover, setting up publically supported venture capital funds to invest in multiple technologies may also be prudent policy, given the uncertainty still associated with many promising green technologies. The UK has just announced the setting up of a Green Investment Bank that might provide a useful model for channelling public and private money towards green investments.

Combining all these initiatives could help unleash more than \$100 billion of additional funds every year in clean energy and efficiency enhancing investments.

Forest Investments

REDD – Reducing Emissions through avoided Deforestation and Degradation

Much of the analysis from the previous section will apply if one considers planting forests or decreasing deforestation to be green investments. The fact that this involves upfront concentrated costs and delivers long term more diffuse benefits make aspects of tackling deforestation very similar to the process of trying to stimulate green investments. At the same time, forests are sufficiently different from industrial investments to merit an additional treatment. This section discusses possibilities for achieving mitigation targets from initiatives to preserve and plant forests.

In 2006, The Stern Review on the Economics of Climate Change found that the release of carbon as CO₂ emissions during deforestation accounts for over 18% of emissions globally – a share larger than the global transport sector (14 percent)^{viii} and comparable to the total emissions of the United States (20.2 percent) and China (21.5 percent) (CDIAC 2010). In the tropics, an area the size of England is cleared every year.^{ix}

Though this painted a bleak picture, the Stern Review posited that these findings have positive implications: *“Curbing deforestation is a highly cost-effective way of reducing greenhouse gas emissions”^x.*

The foregone economic opportunity of conserving forests is much lower than the economic opportunity of reducing other greenhouse gas emitting activities, such as power generation and transportation. Stern (2006) estimated that in eight countries responsible for 70% of emissions from land use, the opportunity costs of conserving forests (i.e. the revenue that would have otherwise been generated by logging and developing the land at the business-as-usual rate) equated only to an estimated \$5 billion annually. With such low economic productivity relative to high levels of carbon emissions, it is imperative that a strategy to halt tropical deforestation is central to any future global deal on climate change.

The most efficient strategy to drastically cut carbon emissions would be through a global system whereby landowners^{xi} that conserve their forests are compensated for their foregone economic opportunity – a strategy known as *reducing emissions through avoided deforestation and degradation* (REDD). Even more so than in rich countries, markets for public goods are almost completely non-existent in developing countries so the mechanism for delivering the reduction in forest cover needs to be thought through.

It is critical to note that beyond carbon sequestration, tropical forests also provide numerous other forms of environmental services, some vital to human existence:

- Plants emit the oxygen we breathe as a by product of photosynthesis.
- Insects and animals provide pollination and pest-control services, each estimated to be worth billions of dollars per year in the US alone^{xii}
- Forests perform watershed maintenance services: first, by acting as a natural purification system; second, by retaining water, which serves to lessen soil erosion and regulate the water supply to minimize the threat of floods and droughts.
- Finally, tropical forests in particular safeguard biodiversity. Because a biologically diverse ecosystem spreads risk across a variety of species, it maintains a threshold against potentially catastrophic and irreversible environmental change. In this sense, biodiversity acts as an insurance mechanism analogous to the way diversity reduces risk in an investment portfolio.^{xiii}

While the costs of maintaining these services fall solely on the landowner, the benefits are enjoyed on a much wider-scale. The services are non-marketable because they are non-excludable. For example, it would be impossible for a landowner to deny non-paying free-riders access to the water purified by their forest.

The failure to internalise these positive externalities in the market value of forests leads to perverse incentives and suboptimal use of the land. To illustrate, from the perspective of the landowner, the net benefit from logging and developing a forest will outweigh the net benefit from preserving it. In contrast, preservation is often optimal from a societal perspective.

Traditional policies used to address deforestation have taken the form of command-and-control regulations used to dictate the use of public land: approximately 86% of global tropical forests are officially state property.^{xiv} Theoretically, because a democratically elected central government is accountable to its people, when it makes decisions it will internalize all externalities accruing within its borders.

If the total benefits accrued to a society in conserving a piece of land outweigh the opportunity costs of developing it, the government will designate the land a 'protected area.' The protected areas approach is particularly useful, because, as a centrally planned strategy, it can be more targeted than a market-based approach. For example, if a specific piece of land is vital to a watershed or is home to an endangered species, a government can mandate that the area be conserved.

The protected areas approach has had significant success protecting temperate forests in developed countries, where government institutions are relatively strong and the population relatively affluent. In the tropics, however, local people living within and around forests generally have low-incomes, and rely on its resources for their livelihoods. Often termed "fence and forget" or "fortress conservation," protected areas have notoriously failed to account for the economic concerns of local populations.

Additionally, restricted budgets, weak enforcement capacity, lack of awareness and corruption cause state-owned tropical forests to frequently degenerate into open access resources. With ill-defined and un-enforced property rights, many forests in the developing world are subject to a tragedy of the commons, in which individuals' and firms' strategic behaviour induces them to harvest the forest in an unsustainable manner.^{xv} Due to high enforcement costs and low returns, protected area strategies, if implemented at all, are often ignored or abandoned.

Furthermore, national governments have limited capacity to internalise international-level externalities such as the public benefits of carbon sequestration. Thus, "unless either a full set of markets exists for all forest ecosystem services or a cooperative outcome can be negotiated, in the long run, sovereign nations will ignore spill-over benefits and as a consequence will allocate too much of their land to uses other than forest".^{xvi}

Payment for Environmental Services

Payment-for-environmental services (PES) strategies aim to rectify market failures by establishing surrogate markets for the public goods that forests provide. For PES to function properly, two requirements must be fulfilled: payments to the landowner must exceed the opportunity costs of developing the land, and property rights must be well defined and enforced.

Note that property rights do not necessarily have to be private. For instance, a nation could be paid by the international community to halt deforestation, and manage the task internally through command-and-control. Debt-for-nature swaps, a mechanism used since the 1970s, can also be grouped under PES. In such strategies, developing countries are relieved of foreign debt in compensation for conserving of a given piece of public land. Despite the fact that PES finance can flow to a national, regional, or local level, by granting tenure to the often-impooverished inhabitants and users of forests, PES could potentially offer a side-benefit of poverty alleviation.

Box: The Yasuni Reserve Conservation Proposal

In 2007, the government of Ecuador proposed that the international community pay it USD 350 million per year for 10 years to refrain from tapping an oil field located within the Yasuni nature reserve, one of the most biologically diverse areas in the world. An operation to harvest the oil would require six interconnected drilling platforms, which would have serious social and environmental implications in the Amazon rainforest.

Construction of roads would inevitably increase logging and contact between drillers and indigenous groups could quite likely lead to conflict. Drilling is currently banned within the Yasuni reserve, but the ruling could be overturned under a "national interest" clause. Not harvesting the reserve means a loss of USD 7 billion in potential revenue. The net payments suggested by the government would equal half the estimated value of the oil reserve. Thus far, Ecuador's requests have proven unsuccessful, but have been met with interest from the governments of Germany, Italy and Norway (Black 2009).

Recent news reports have highlighted that the initiative may have been abandoned but irrespective of the final fate of this particular suggestion, the Yasuni proposal has set an interesting and useful precedent.

There are numerous variations of Payment for Environmental Services, but they generally fit into three models:

1. Private deals between environmental service beneficiaries and private landowners
2. Direct payments from governments or organizations to landowners
3. Cap-and-trade systems.

Private deals

A private PES deal could be as simple as downstream users of a watershed paying upstream landowners for the conservation of their forests. Often, downstream businesses are willing to pay for a quality and well-regulated water supply. A commonly cited example is that of the bottled water company, Perrier, paying French landowners to maintain the forests surrounding their water sources.^{xvii} The government can actively engage beneficiaries and landowners to facilitate bargains, but once the market is established, it can be relatively hands off.

Both the advantage and the limitation of local schemes is that they internalize the market value of environmental services exclusively on a local level. To demonstrate, whereas watershed maintenance has a high economic value for downstream users, it has a low or non-existent economic value for people on the other side of the planet.

Direct payments

Direct payment schemes involve payments from an implementing government or organization to landowners contingent on conservation. The advantages of such schemes accrue due to the high level of control maintained by the implementing organization. Like protected areas strategies, direct payment PES schemes can be targeted towards pieces of land that offer high environmental value.

Unlike more market-based schemes, the implementing body can ensure that the payments to landowners exceed the opportunity costs of not developing the land. Likewise, it can ensure that the payments do not grossly exceed the opportunity costs, which would create inefficiencies in the system. Finally, direct payments for conservation can occur without the creation of cap-and-trade markets, which can take years to get off the ground, and necessitate a certain level of demand.

Box: Costa Rica's Pago por Servicios Ambientales

Begun in 1978 as a tax incentive for reforestation in efforts to maintain the lumber stock, Costa Rica's *Pago por Servicios Ambientales* has evolved to direct subsidies to landowners in efforts to maintain carbon sequestration, biodiversity, watershed services and scenic beauty.

Over the last ten years Costa Rica has invested 200 million dollars in contracts to subsidise 8000 landowners a set percentage of their land-value annually. The PES scheme protects 8 percent of the country's landmass, which is on top of a further 12 percent protected by national parks. The scheme is

half financed by a 3.5 percent carbon tax on fuels (unique within in the developing world), and half by World Bank loans, Global Environmental Facility grants, and a carbon-purchase agreement by the Norwegian government. To date, Costa Rica is the only developing country to turn around forest loss (Umaña 2009).

Despite this success, direct payment mechanisms also have their limitations. Primarily, they are fiscally burdensome: direct payments involve generating donor funds or levying taxes, which in many cases is politically unpalatable especially in poor developing countries.

As a result, direct payment schemes may not be financially sustainable in the long term. Unlike more market-based schemes, which would likely survive as long as the forest is providing a service for which beneficiaries are willing or required to pay, the survival of a direct payment mechanism depends largely on the whim of donors or the government *de jour*.

Forest Investments through cap-and-trade mechanisms

As discussed briefly in a previous section, a cap and trade scheme has two components 1) a mandated limit or cap on emissions, and 2) an issuance or auction of a limited number of permits to pollute that can then be traded amongst private sector participants. An ideal system would work on a world-wide basis limiting emissions to a cap that is consistent with successfully tackling climate change. While some cap and trade systems such as the European Union Emissions Trading System (EU ETS) are in operation, no global system exists (yet). The EU ETS is discussed in detail in the next section.

Cap-and-trade systems are an attempt to harness the demand for environmental services and overcome the free rider tendencies of polluters. To illustrate, within a carbon market, a cap will be implemented on carbon emissions for companies, industries, or nations. Any pollution produced over the cap must be offset through purchases of tradable carbon credits, some of which could theoretically be produced by REDD.

However, such systems only work for services that hold widespread economic value. For example, because climate change is a systemic problem in that mitigation involves a reduction in the aggregate level of human greenhouse gas emissions, carbon sequestration services hold economic value on a global level.

Theoretically, a ton of carbon produced in London, can be offset by a ton of carbon sequestered in the Brazilian rain forest.

A liquid cap-and-trade market that harnesses the global demand for environmental services of forests would be the most efficient way to curb large amounts of deforestation.

Unlike a centrally planned direct payment scheme, players could buy and sell registered certificates instantaneously at the market-rate; market forces should, under good conditions, allocate capital to areas with the highest return. This is the rationale for incorporating REDD credits into global carbon

markets. The Eliasch Review (2008) estimated that the finance required to halve emissions through REDD to 2030 would be \$17 to 33 billion per year, with its model necessitating carbon markets generate \$7 billion of these funds annually by 2020.^{xviii} Though costs will rise over time, even at the high end of the spectrum, REDD offers the most cost efficient method of reducing carbon emissions.

Currently, carbon credits from REDD schemes can only be traded in voluntary carbon markets. One possible added benefit of incorporating REDD into mandatory markets is that doing so could simultaneously address problems that hold economic value only at a local level.

Examples include watershed deterioration and depletion of natural resources. However, unlike direct payment schemes, in which the implementing body can ensure that the payments suffice to promote conservation, carbon markets only take into account the cost of carbon in the payments.

There are currently efforts within the international community to create a biodiversity fund, which would supplement the value of carbon credits derived from forests that protect biodiversity. Payments for local ecosystem services, however, would not be included. For this reason, in cases where a specific piece of forest provides many important services, it may be optimal to employ alternative tools that account for the forest's full value.

Incorporating REDD into mandatory carbon markets would require significant initial investment in capacity building. Satellite-imagery verification systems would have to be complemented with ground support. Transparency would be an issue in states plagued by corruption. In these cases, either governance would have to be improved prior to implementation, or a REDD architecture would have to be developed which can be delivered in a weak governance environment.

Moreover, there is concern that if REDD credits were made fully fungible (interchangeable) with other carbon credits, they will flood the market and cause the overall carbon price to plummet. A number of methods could overcome this issue.

The inflow of REDD credits would have to be met by more stringent caps on emissions. Indeed, the new source of credits might serve as a carrot, encouraging new governments to adopt a cap within a global climate agreement.

Alternatively, a temporary (or permanent) side market could be created for REDD credits. REDD credits could award fewer offset permits, and the two markets could be merged when the prices reach parity.

The third option would be to mandate that country level mitigation targets could only be part fulfilled through REDD say 25% with the rest having to come from industrial emission reductions.

Finally, private markets in general have historically favoured the urban middle-class and wealthy at the expense of the rural poor, who, in the case of forests, are often the stewards of the environment. While REDD holds potential to reverse that stereotype, without the proper institutions in place, it takes no stretch of the imagination to envision corporations capturing privatised forests and driving the rural poor off their lands. This concern would need to be addressed upfront in order to win widespread support in developing countries, especially amongst the local forest inhabiting communities who would be most at threat from such predatory behaviour.



Cap and Trade Mechanisms and Carbon Taxes

Cap and Trade

As discussed earlier, a well-run, globally applied Cap and Trade scheme can prove to be an effective mechanism for helping mitigate GHG emissions. For example, such a scheme was used successfully to cut down sulphur dioxide emissions in the United States^{xix}.

Under such a scheme, an annual cap on the amount of emissions is set and each unit of GHG emission from the sectors of the economy that are covered needs to be matched by a 'permit to pollute'. The total number of permits, which can either be 'grandfathered' or allocated or auctioned (sold to the highest bidder), can then be traded amongst eligible participants.

Due to the fact that the total amount of permits in circulation are limited and lower than the current emissions from the covered sectors, the permits will become valuable with a theoretical value equal to the cost of reducing emissions by the last unit that brings total actual emissions under the cap set by governments.

Under an ideal framework, this would mean that carbon emissions are reduced predictably at the point where it is most economically efficient.

However, such an ideal framework is of course never realized. There are three significant problems with trying to achieve GHG mitigation through Cap and Trade mechanisms.

- If the coverage of the Cap and Trade mechanism is not universal, the most efficient GHG reductions will not be achieved.
- If other financial markets are anything to go by, the market for permits will be excessively volatile which means that it will not be able to generate an appropriate stable carbon price signal for engendering long term green investments.
- If every unit emission reduction is treated the same, no matter where or how it comes about, there is a real danger that poor citizens in the developing world would be pushed into energy poverty as rich citizens of the developed world will almost always be able to outbid them for the right to emit units of GHGs.

Despite these limitations, carbon markets under Cap and Trade schemes can perform a number of very useful functions, namely:

- Ensuring that mitigation aims are achieved.
- Internalizing some of the costs of GHG emissions by making it more expensive to pollute through putting price on carbon.
- Potentially raising revenues if the permits to pollute are auctioned rather than just given away.

- Transferring substantial resources to the developing world where mitigation would be cheaper.

While there is currently no global cap and trade carbon trading scheme in existence, some regional/national schemes are indeed operational. By far the most significant of these is the European Union Emissions Trading Scheme (EU ETS). Other existing trading schemes include Switzerland, US North-eastern states (RGGI) and New Zealand, while the US, Australia, Canada and Japan are preparing for establishing such markets. Since the EU scheme accounts for more than 80% of global trading, it is discussed in detail below.

The EU-ETS: A golden opportunity for climate financing

The 1997 Kyoto Protocol defined absolute binding emissions targets for 38 so-called Annex-B industrialized countries. These targets applied to the commitment period of 2008-2012, and obliged the parties to reduce their emissions by a set amount from the 1990 baseline. In order to reduce compliance costs, a number of “flexible mechanisms” were provided for under the protocol. These allowed countries to use three of these mechanisms in order to meet their targets. They could:

- Use emissions trading to help achieve quota obligations in the most effective way
- Or use project-based mechanisms, namely Joint Implementation (JI) and the Clean Development Mechanism (CDM), which allowed parties to claim carbon offsets if they financed ‘green’ projects that followed lower emission pathways. Joint implementation referred to the countries in transition, while CDM applied to developing countries.

The EU did not support those mechanisms at the international negotiations. However, repeated attempts by the European Commission (EC) to introduce carbon taxes were opposed by the UK while emission levels in the EU kept rising. Frustrated, the Commission proposed the Emissions Trading Scheme as an alternative approach to reducing EU emissions and the directive was adopted without much opposition. This obliged Member States to start trading GHG permits from 2005 and covered the power and heat generation, iron and steel, oil refining, pulp and paper, cement and other building materials industrial sectors.

The EU-ETS, which is now the centre-piece of the EU’s climate strategy, covers nearly half of the region’s total emissions. It applies to GHG emissions from some 11000 industrial installations and power plants across the EU, in addition to Iceland, Liechtenstein and Norway. In 2007, more than two billion EU emissions Allowances (EUAs) changed hands for a market value of 37 billion Euros.

Despite looking promising on paper, the EU ETS has suffered from some serious shortcomings, which are likely to afflict any such trading scheme.

- The first is the problem of quota allocations, where each country and industry group has lobbied hard to maximise their allocation, resulting in the issuance of too many permits to pollute. Moreover, a fear of declining competitiveness in addition to this successful lobbying meant that most of the permits at the start of the scheme were not auctioned but just given away. This has

had the perverse effect of generating windfall profits for a number of 'dirty' companies including, for example, energy producers in the UK.

- The second problem that has beset the EU ETS has been the extreme volatility of the carbon price. In particular, the years 2006 and 2008 saw a carbon price crash: the first due to an excessive issuance of emission quotas, and the second due to the financial crisis induced recession which reduced actual emissions.

Auctioning quotas and revenue potential

The very large revenue potential from the auctioning of allowances has failed to be realized because too few permits have sold and too many have been allocated freely. In the first two phases of the EU ETS, 2005-2007 and 2008-2013, Member States' opportunity to auction quotas was limited to 5 and 10% respectively. The actual use of auctioning was even less. Even in phase two, only a few countries used the opportunity to reserve a share of the quotas for auction: Germany (9%), the UK (7%), the Netherlands (4%) and Lithuania (3%). Nonetheless, in 2009 Germany raised about EUR 230 million from allowance auctions, which it allocated to development expenditure.

For the third phase, 2013-2020, the European Commission has changed the way that quotas are assigned, correcting several of the flaws from the first periods. To this end, allocation is set to be centralized, with auctioning as the default allocation rule. To remove inefficiencies and secure a coherent quota allocation, a more stringent EU-wide cap is replacing the current national cap. Auctioning will be introduced in 2013 as an allocation rule for sectors not exposed for competition, and phased in gradually for other sectors by 2020.

The Commission expects that about 50% of the quotas (ca 1 billion Mt CO₂-eq) will be auctioned on average. While the power sector must buy 100% of the quotas, other sectors will continue to receive 80% for free, decreasing annually to 30% in 2020. This should remove windfall profits and put new entrants on the same competitive footing. Furthermore, in order to mitigate the impact of aviation, the EU has decided to include international aviation in the EU-ETS from 2012; the Commission is also working on a proposal to include maritime transport in the scheme from 2013. These are discussed in somewhat greater detail in the next section.

According to an EC staff paper, assuming that by 2020 half of the total EU-ETS allowances were auctioned at a price of EUR 30 (on the basis of a cap on EU-ETS allowances at 1.72 billion tons of CO₂ in 2020), total annual revenues from auctioning for ETS participating countries could amount to some EUR 25.8 billion in 2020. Our own calculations show that auctioning of 80-90% of the EUAs, applying Point Carbon's EUA price estimate of 40 euro for 2016, could raise at least EUR 53 to 63 billion of revenue. However, the amount generated is strongly dependent on the number of quotas allocated and the expected price development in the EU ETS market.

Auctioning an average of 1 billion EUAs annually from 2013 to 2020, using Point Carbon's 0 Euro EUA price estimate for 2016, will generate around 40 billion Euros per year. The World Wildlife Fund estimates show that the inclusion of aviation is expected to yield between 3.3 and 9.8 billion Euros per year in additional revenues. EC estimates assuming a 15% auction and a lower carbon price, however, are much lower – a few hundred million Euros to one billion Euros annually.

The real potential for revenues is considerably larger given that allowances can probably be auctioned to more sectors than is currently the case without losing international competitiveness. Moreover, tighter caps will imply a higher carbon price.

Accordingly, the auction revenues are intended to be used in a variety of climate initiatives, many of which may be located in Europe itself. It is intended that these revenues should also contribute to the Global Energy Efficiency and Renewable Energy Fund and to the Kyoto Adaptation Fund. This was made operational by the Poznan Conference on Climate Change (COP 14 and COP/MOP 4) and is targeted at reducing deforestation and facilitating adaptation in developing countries. However, there is no clear commitment on what proportion of funds should be devoted to developing countries.

Mobilizing Funds for Developing Countries

The EU, as the world's largest economy and the first region in the world to industrialize, obviously needs to shoulder a significant amount of the burden for adaptation and mitigation financing in developing countries.

One criterion used to determine the EU's financing responsibility is its share of cumulative carbon emissions, which the Stern Report puts at 31% of the World's total (2005 figures). While this might seem reasonable from the "polluter pays" perspective, it takes no account of ability to pay. Oxfam has addressed this issue through the production of an 'Adaptation Financing Index' (AFI). The AFI takes into account cumulative carbon emissions, but combines this with 'capability' with the UN Human Development Index taken as a proxy for this. The AFI also takes population into account. Yet, even using this criterion, the share of the EU is more or less unchanged. So as a rule of thumb, the EU must take responsibility to generate about a third of the total adaptation funding needs in the developing world.

Under the Copenhagen Accord, developed countries committed to provide "new and additional" resources approaching \$30 billion in the period of 2010-2012, with an increase to \$100 billion annual starting from 2020. Of the 2010-2012 pledges, the EU has thus far made a collective commitment to provide only EUR 2.4bn, only about a third of its fair share. Clearly, much more needs to be done both internationally and at the EU level.

Three main mechanisms are currently operational in order to mobilize resources for developing countries 1) the Clean Development Mechanism (CDM) 2) a levy on emissions trading and 3) auctioning emission quotas. These are discussed in some detail below.

The Clean Development Mechanism (CDM)

The CDM was introduced with the twin aim of helping developing countries shift to a trajectory of sustainable development, and to reduce the cost of compliance to the Kyoto commitments in industrial countries. The basic underlying mechanism is that under the CDM, developed countries can offset some of their emission reduction obligations by financing green projects in developing countries that account for an equivalent amount of reduced emissions throughout their lifetime. Some commentators have branded the CDM mechanism a success since it has helped attract private investments to mitigation projects in developing countries: in 2007 and 2008, for example, the CDM mobilized \$15 billion (approximately EUR 10.8 billion) in primary CDM transactions (World Bank 2009),

However, the real value of these investments is higher since CDM funds can help leverage additional private investments that far exceed the value of the emissions reduced. In 2007, for example, CDM helped mobilize up to \$45.9 billion (EUR 33 billion), mostly from private investors, for investments in clean energy in developing countries.^{xx} In comparison, the Global Environment Facility, the flagship environmental fund of the international community, received \$3.13 billion in donations for its operations between 2006 and 2010.

Despite the evident success in attracting private investments, the CDM has been much criticized. This is on account of three main reasons: 1) a lack of actual environmental achievement, 2) doubts as to whether the projects are, indeed, leading to additional GHG emission reductions, and 3) the high administrative costs involved.

Additionally, the project focus of CDM makes it difficult to mobilize sufficient financing for investment in large-scale mitigation and adaptation. Moreover, the CDM is primarily a tool for funding mitigation, and while some funds are (indirectly) mobilized for adaptation through the CDM, this potential is probably not very significant.

The currently used method for using CDMs to mobilize funds for adaptation is to impose a 2% levy on issued CERs (Certified Emissions Reductions), which are the offsets derived from the emission reductions resulting from CDM investments. The of this levy are then destined for the Kyoto Adaptation Fund.

Estimated revenues from selling the 2% of issued CERs up to 2012 range from 58 to 216 million Euros^{xxi} to 115 to 683 million Euros.^{xxii} The fact that the revenues are outside the national budget, combined with the developing country heavy governance structure of the Kyoto Adaptation Fund, gives poor countries relatively stronger ownership over the generated revenues and where they should be allocated.

However, the CDM and international trading market face an uncertain future for two reasons. There has not yet been a binding decision on international emission quotas or how to meet them. Furthermore, the EU, which is currently the largest user of CERs, has decided to restrict their use in the third phase of the EU ETS to CERs derived from CDM projects with pre-2013 deliveries. On the other hand, some have

suggested that the concept of the CDM levy to fund adaptation should be extended to JI and more broadly to all international emissions trading. This could generate a much larger amount of 0.2 to 1.7 billion Euros per year. This proposal is discussed in further detail below.

International auctioning of emissions allowances

Under the currently operational Kyoto Protocol, each country has emission targets that it needs to meet through a number of mechanisms some of which have been discussed above. Another way of looking at this system is that each country is allocated a set number of permits to pollute equivalent to its emission targets. This allowable emission level of GHGs is measured in Assigned Amount Units (AAUs).

As things stand now, each country is 'allocated' this permission to pollute for free. This could, however, be changed so some or all of these AAUs could be exchanged for money. Norway put forward a proposal before the UNFCCC summit in Bonn in 2009 suggesting that a substantial amount of funding could be mobilized for funding mitigation and adaptation in developing countries through this means. According to the proposal, finances could be raised either by withholding a small percentage of the AAUs to be auctioned directly or through a small tax on the value of the issued allowances, similar to the 2 percent CDM-levy. Such a system would generate funding that is predictable, efficient and equitable. Predictable, because it will generate a sustainable flow of funding outside national budgets; efficient, because it could be relatively easily implemented and is associated with few market distortions; and equitable, because developed countries, at least in the first phase, would bear the financial burden.

The scale of the potential funding depends on the developments of the next climate regime. At the moment, the international AAU-market is limited, partly because of surplus allowance or so called "hot air". The way forward is uncertain: the outcomes from the Copenhagen negotiations were ambiguous in their direction for international climate change policies. However, based upon the Kyoto-countries announced 2020-emission goals, auction of AAUs are expected to yield 3.75 billion Euros annually in the period 2013-2020 for each percentage point of AAUs auctioned.^{xxiii}

Inclusion of the US in an international auction program would almost double the numbers to 6.6 billion Euros. If 10% of the AAUs are auctioned, this proposal would raise 37.5 to 66 billion Euros in additional annual funding, while a 2% levy on the value of the issued AAUs could raise 11 to 18 billion Euros annually.

While the CDM levy of 2% penalizes a supposedly desirable activity: 'financing mitigation in developing countries,' the AAU-auction or levy system taxes an *undesirable* activity: pollution. What is essential for the AAU-market to function, then, is that the quota allocation is sufficiently restrictive and that the surplus allowances from the first Kyoto period are dealt with in a satisfactory manner.

Despite the unanimous emphasis on the importance of additional finance for climate change actions in developing countries, consolidated in the Bali road map, the establishment of an international mechanism to secure this has been long awaited. The Norwegian proposal has met resistance in international climate

negotiations, since it is only based on contributions from Annex 1 countries, which excludes developing countries as well as Australia and the US.

Nonetheless, some regional initiatives have been taken on that front: both EU and the US are, in principle at least, willing to establish mechanisms for the auctioning of emissions quotas and allocating some of the to developing countries. While the US would, under the Waxman-Markey bill approved by the House, contribute 7% of the allowances from its domestic cap-and-trade program to international adaptation, development of clean technology, and REDD between 2012 and 2020, EU pledges on international funding have been more ambiguous.

Carbon Taxes

As we discussed in a previous section, there are two major ways of incorporating a “polluter pays” principle into efforts to tackle climate change. Both involve putting a price on carbon, thus shifting incentives towards green behaviour by making it more expensive to pollute.

One, the cap and trade system we have discussed in the previous section, is a form of quantitative control which limits the amounts of emissions but leaves the market free to determine price levels. The second is a carbon tax, a price control, which fixes the price of carbon but delivers uncertain outcomes in terms of how much emission reduction is delivered by the market at each tax level.

If pushed to choose between the two mechanisms, Re-Define, the author’s organization, is in favour of a carbon tax over a cap-and-trade mechanism, a view shared by several academics.^{xxiv} However, given the messy reality of the world we live in, where a uniform carbon tax is unlikely to be implemented in the near future, the question we address in this paper is cap and trade AND carbon taxes not cap and trade OR carbon taxes.

Most carbon taxes take the form of a charge on fossil fuels that, at least in theory, relates to their carbon content. Proportionality to carbon content is important if they are to be efficient in helping reduce carbon consumption. Several taxes exist, and several more have been proposed and are under scrutiny by policy-makers, businesses and academia, with some emerging initiatives beginning to gain leverage among governments. The proposals being most discussed are: a global tax on carbon emissions, national or regional energy and fuel taxes, as well as taxes levied on international transport. We do not discuss the global tax any further.

The most interesting existing initiatives, as well as the most interesting discussions, on carbon taxes are related to the European Union, so we discuss the region in some detail. We will also discuss proposed taxes on international transport since this sector accounts for a substantial proportion of GHG emissions.

We argue that, given less than 50% of the EU’s emissions are covered by the Emissions Trading Scheme (ETS), having a complementary regime of taxes and emissions trading is the best way to both mobilize the

greatest amount of revenue as well as align economic behaviour with mitigating climate change. At the very least, the sectors not covered by the ETS should be subject to a carbon tax. Moreover, competitive concerns about taxing sectors that are internationally exposed could, at least in theory, be tackled using the concept of border adjustment taxes.

The European Union and Carbon Taxes

Despite the EU's adoption of a cap and trade scheme, the European Commission had long favoured the idea of a carbon tax. As early as the 1990s, a carbon/energy tax had been proposed at the EU level, yet failed due to the intensive lobbying by some industrial groups, as well as countries such as the UK.

In the absence of an EU-wide carbon tax, several countries such as Denmark, Finland, Germany, Italy, the Netherlands, Slovenia and Sweden, went ahead and adopted carbon taxes unilaterally. Despite this first step, however, none of these countries have introduced a uniform carbon tax for fuels in all sectors, a step that would efficiently curb carbon emissions.

Finland and Sweden were the first two countries to implement a carbon tax on fossil fuels in 1990 and 1991 respectively. Taxes on oil had been in place in both of these countries since the 1970s in efforts to reduce their dependence on oil, with the resultant effect being that biomass became less expensive than coal in these countries in the 1990s. By 2002, the carbon tax amounted to 17.2 Euros per tonne of CO₂ in Finland (with the exception of natural gas which was taxed at half this rate) and 70 Euros per tonne in Sweden,^{xxv} which provides an interesting comparison with the Euro 20-30 level that has prevailed in the carbon markets in the EU.

Despite the lack of unanimity required for EU harmonization, European countries that have undertaken unilateral environmental tax reforms have shifted more than 25 billion Euros a year in taxes from labour to carbon and energy.^{xxvi} According to Eurostat, 76% of all EU environmental taxes are related to energy and 21% to transport, and in 2004, revenues from these taxes accounted for 3% of all tax revenue in Europe, remaining at this level in recent years. Nevertheless, due to concerns with competitiveness, the largest industry GHG emitters have managed to systematically avoid reforms.

Beyond these examples, recent developments include the Dutch green tax on cars to be implemented in 2012, a new Irish carbon tax, and President Sarkozy's now shelved plan to introduce a carbon tax on domestic energy and road fuels in France are interesting. The Dutch green tax on cars, for example, has a dual objective of cutting carbon emissions and reducing congestion. For each kilometre driven, drivers will pay a minimum of 0.03 Euros, with higher charges imposed during rush-hour, on transit in congested roads, and on heavy polluting vehicles such as trucks and bigger cars.

Meanwhile, Ireland has introduced a carbon tax that starts at a level of Euro 15 per tonne of carbon and expects to raise Euro 330 million in revenue from this tax annually.

The proposed French carbon had aimed to raise 3.5 billion Euros a year and reduce French GHG emissions by taxing households, road transport, and industry gas and oil consumption. However, the proposal hit a roadblock after the recent March regional elections when President Sarkozy announced that he would no longer pursue a carbon tax that could impact negatively on the competitiveness of French industry unless there was a Europe-wide agreement.

In this way, it is clear that carbon taxes have a substantial revenue potential which remains currently underexploited.

The experiences from existing carbon taxes in several European countries could be used to further develop a pan-European approach, as all Member States stand to gain from a harmonized green tax system in the EU. Introducing such taxes would increase economic efficiency to a large extent, whilst having a positive environmental effect and raising substantial revenue.

In an attempt to harmonize the taxation rules across Europe and address the concerns about distorted competition, an EU-wide minimum tax level on energy products was introduced in 2003. The 2003 Energy Taxation Directive widens the scope of the EU's minimum rate system, previously limited to mineral oils, to all energy products including coal, natural gas and electricity.

Despite this effort, however, the EU's energy dependency has grown considerably since 2000, reaching approximately 55 % in 2008, and the implicit tax rate on energy has fallen. Furthermore, the ratio of environmental to labour taxes has decreased, indicating that; overall, a general shift from labour taxes to environmental taxes in relation to total tax revenue has not been achieved.

To some extent this trend reflects a growing reliance on policy instruments other than such Pigouvian carbon taxes, for example the emissions trading introduced in 2005. However, it must be taken into account that energy taxes were also reduced to compensate for the substantial rise in the oil price over recent years.

The EU's Sustainable Development Strategy recommends that Member States "consider further steps to shift taxation from labour to resource and energy consumption and/or pollution." However, consistent lobbying has ensured that the levels of taxation do not consistently reflect the carbon content of the fuels, but also the competitive position of the different energy products and electricity.

Taxing international transport

There is a long-standing debate on the introduction of taxes on GHG emissions from aviation and maritime transport at a global scale, which refer to a levy on airline or maritime transport fuel. This international transport sector is the fastest growing source of GHG emissions and some sources of pollution, such as aeroplane emissions in the stratosphere, have a disproportionate impact on climate change. The rapid growth has, to an extent, been fomented by the growing supply of cheap flight fares in Europe and North America, and the large rise of international trade volumes.

The case for a global taxation of air transport was discussed in the 2004 Landau Report,^{xxvii} which identified three ways in which the aviation tax could be imposed:

- A tax on kerosene - fuel consumption x distance
- A tax on the use of air corridors
- A direct tax on tickets

From the perspective of tackling climate change, it would be preferable to tax the emissions or the use of kerosene, over taxing tickets or the use of air corridors. According to the report, a tax of \$3.65 per ton of kerosene could yield \$4 billion, and a tax of 1% on ticket and freight fares could yield \$74 billion. These figures are particularly pertinent given the \$100 billion of environmental aid the UNFCCC estimates is necessary to finance climate change adaptation and mitigation in developing countries.

Box: The Landau Report on Innovative Financing

Commissioned by French President Jacques Chirac in December 2004, the Landau Report resulted from intense international debate over innovative financing mechanisms to increase levels of overseas development assistance (ODA) and guarantee the observance of the Millennium Development Goals (MDGs). It arose in the context of the then recently adopted 'New York Declaration on Action Against Hunger and Poverty'. One of the key innovative sources of development finance put forward by the Landau report was to levy a tax on aviation related pollution and use the revenue to in the fight against AIDS, tuberculosis and malaria. The tax was proposed to the UN and in the European Commission, and was heavily supported by President Chirac and President Lula of Brazil.

Taxation of international maritime transport could follow a route-based differentiation, based on either the vessel route or cargo route. If implemented regionally, the tax could be levied on ships arriving and departing from the shore. Under a regional taxation scheme, taxing the vessel route implies that the tax would be levied on the last leg of the ship journey.

Yet, despite their growing significance as a proportion of global GHG emissions, the international climate regime fails to outline concrete measures to deal with emissions from international aviation and maritime transport. The Kyoto Protocol omits international aviation and maritime transport in specifying targets for signatory countries, and instead allocates responsibility for policies to reduce the growing GHG emissions from these sectors to the International Civil Aviation Organisation (ICAO) and the International Maritime Organisation (IMO).

While there is currently no carbon tax for international air and maritime transport, a form of aviation ticket was indeed introduced at the national level in several countries, including France, Chile, Ivory Coast, Madagascar, Niger, Mauritius and the Republic of Korea. For example, in response to the Landau Report, France started to apply an air ticket solidarity contribution from July 2006 onwards. The corresponding

rates were \$1 in economy class and \$10 in first and business classes for domestic and intra-European flights, and \$4 and \$20 respectively on international flights. These raise revenues amounting to \$200 million per year. If the exact same tax rates were applied at a global scale, the revenue would be of the order of \$10 billion per annum^{xxviii} – potentially a substantial source of funding for mitigation and adaptation initiatives.

In the absence of a global initiative to tackle GHG emissions from international transport the European Union has decided to include aviation in the EU ETS, and is working on a proposal to include shipping in an attempt to curb the tremendous GHG emission growth. The aviation industry is set to be included from 2012, covering emissions from all arriving and departing flights to avoid competitive distortions. This would also apply to non-European operators. The quota requirements would be calculated on the basis of fuel consumption and the distance between the airport of departure and the airport of arrival.

The Commission has provided for 15% of the aviation allowances to be auctioned. This would generate, assuming a carbon price between 30 and 40 euro, around 0.9 to 1.2 billion euro per year, with the inclusion of maritime transport raising further revenues.

Moreover, the Member States and the European Parliament have also asked the Commission to put forward proposals to target reducing maritime emissions, with the plan that these are adopted from 2013.

Thus, any revenues from the international transport sector eventually come from a combination of domestic and international tax payers. Since the tax base is international, it is also logical to apply the revenue to meeting international goals. Allocating the of auctioning permits or taxing the international transport sector towards adaptation finance is thus conceptually appealing and is a step that EU institutions should consider.

Other innovative mechanisms to mobilize funds for climate initiatives

The discussion in the previous section focused on cap and trade mechanisms and carbon taxes as both potential sources of revenue as well as policy tools to address incentives towards greater mitigation. Clearly both of these tools deliver ‘double dividends’ in helping tackle climate change.

The following section focuses primarily on highlighting some other ideas for mobilizing revenues in particular to fund adaptation as well as mitigation measures in developing countries. Some of the initiatives discussed in this section also have the capacity to deliver ‘double dividends’ while others focus exclusively on revenue.

Taxing the financial sector

We are in the midst of the biggest financial crisis for a generation and this had led to a significant deterioration in both public and private finances. It would not be an exaggeration to say that the fiscal stress associated with the crisis played some role in undermining a potential climate deal in Copenhagen and will continue to hamper agreements between developing and developed countries in forthcoming discussions.

It then makes sense for any planned taxes on the financial sector to be part allocated towards efforts to fight climate change. Another factor that is relevant here is the international nature of finance so any revenue raised will have a significant international element. This makes such revenue more suitable for allocation to international public goods of which adaptation financing is an obvious one.

We also saw in the first section how the short termism prevalent in the financial sector can undermine green financing. It thus makes sense to introduce a financial transaction tax that can help tackle some of this excessive short termism. This will deliver a 'double dividend' in terms of not just helping engender more green friendly investments through lengthening investment horizons but also delivering substantial revenue of as much as \$200bn - \$300bn annually part of which can be allocated to climate financing for developing countries.

Re-Define has made a strong case for introducing a differentiated financial transaction tax regime which extends this 'double dividend' into 'multiple dividends' by delivering on other public policy goals. Under this scheme, financial transaction taxes can also help reduce tax evasion by generating transaction level data and help tackle systemic risk through policy makers having the right to vary tax rates counter-cyclically^{xxix}.

The financial system needed more than \$15 trillion in tax payer fund commitments to stave off a total collapse. Efforts are now being made to recoup some of this money with the discussion focusing on levying a tax on bank balance sheets.

One of the biggest triggers, as well as a source of amplification, for the financial crisis was an increasing reliance by banks on cheaper short-term funding. This worked well as long as the economy appeared to be booming, but, as in the past, the sources of short-term finance dried up at the first sign of trouble. That is why it is extremely important to engender systemic stability to discourage over-reliance on this short-term funding.

Re-Define has suggested that a 'double dividend' in the form of substantial revenues as well as lower system risk could be delivered by modifying the bank levy regime to impose a differentiated tax rate linked to the duration of liabilities on bank balance sheets. Our calculations show that this could generate between \$100bn and \$200bn world-wide on an annual basis.

Moreover, bank levies and transaction taxes are complementary initiatives that target different segments of the financial system to tackle excessive short-termism and mitigate the build up of systemic risk.

Tackling Tax flight

Tax systems lie right at the heart of modern states and form the backbone of the social contract between citizens and their governments. Good tax policy and related good governance was primarily a domestic affair in the past; that is no longer the case. Changes to the international economy, such as: 1) growing

cross-border trade and financial flows, 2) increasing complexity of multinational corporation operations and international production networks, 3) the liberalization of capital and current accounts, and 4) the growth of 'tax havens' jurisdictions which legislate specifically to help economic actors avoid regulatory and tax obligations in other jurisdictions, have significantly increased the opportunities for economic actors to legally and illegally reduce their tax payments.

Yet, this internationalisation of economic activity has not been accompanied by the internationalization of tax governance or even significant progress on cross-border co-operation on tax matters. This has allowed economic actors to use international economic linkages to escape paying taxes – tax flight. This tax flight reduces public revenues, weakens the social contract and undermines good governance. That is why EU Member States need to pursue a fiscal policy that seeks to minimise tax flight

Tackling tax havens

Tax havens typically earn their keep not from taxes but from levying an annual fee on each of the shell companies, trusts, foundations or personal bank accounts they host. Typically, this annual fee is only of the order of a few hundred dollars. This means that a Cayman Island shell structure, which could be used to avoid millions of dollars of taxes in other onshore economies, would typically bring in only a few hundred or a few thousand dollars of revenue to the Cayman Island government. At an aggregate level, Re-Define estimates that tax havens typically earn less than 1% of the tax losses that their existence inflict on onshore economies.^{xxx} The negative externality posed by havens is thus huge, and their existence is highly inefficient from the perspective of overall tax revenue in the world.

In a perfect world, the zero/low tax rates offered by tax havens would not pose a very serious threat. Tax regimes around the world operate primarily on the basis of source and residence principles wherein states can tax incomes generated within their borders or incomes attributable to their residents. Tax haven operations are often shell operations that usually perform no economic activity, so the real income is always generated in an onshore economy and could in theory be taxed there even when it is reported as the income of a tax haven resident entity. Likewise, the assets belonging to offshore bank accounts, trusts and foundations come from an onshore source and should be taxable there. This would be the case were it not for the fact that tax havens also offer secrecy in combination with low tax rates. This means that governments are often not able to attribute such income and assets to their residents or to a source within their territory. That is why tackling secrecy is central to the question of tackling tax havens.

Championing the creation of a global tax organization

Despite the massive internationalization of commercial activity, the world of taxation lacks a truly international body and a cohesive regime but works instead through a network of bilateral Double Tax Agreements and Tax Information Exchange Agreements (TIEAs). These lay out principles for sharing tax revenues and exchanging information between the two respective jurisdictions. With 192 countries in the world, there is a need for more than 18,000 bilateral tax treaties to cover all nations; of these, only about 3,600 are in place yet. A multilateral tax system akin to the World Trade Organization – an International

Tax Organization – would be a far more efficient way of organizing global fiscal affairs. This is a worthy goal that the European Union should champion.

Absent such a global level agreement, the EU, as the largest economy in the world, still has the wherewithal to act to establish new rules of the game. But it can only do so by acting in solidarity as one EU, rather than a motley collection of disparate Member States pushing their own agendas.

Negotiating stronger bilateral TIEAs at a pan European level

Tax havens are reluctant to undermine their secrecy, so have typically been hesitant to enter into bilateral tax treaties. When they did so, it was only because up until recently the text of such agreements did little to pierce this secrecy. Typically, only information that the havens kept could be shared, so they kept few records of beneficial owners of bank accounts and legal entities registered in their territories. Even where the records existed, the havens were under no obligation to share them and did so only on the basis of specific requests from treaty partners. These requests typically have a very high burden of proof in terms of the specificity of the information, so, in a manner of speaking, requesting partners ‘already need to have the information that they request’. That is why there were fewer than ten episodes of information exchange annually under most of these TIEAs.

Some of this has changed under pressure from bodies such as the OECD, and more recently the G-20, and tax havens are now required to maintain proper records of beneficial ownership. They are also increasingly under increasing pressure to negotiate more TIEAs. However, there is little change to the mechanism for the exchange of information which has not been automated, and so remains ad hoc and highly ineffective. Urgent progress is needed on 1) the negotiation of more TIEAs, and 2) improving the sharing of tax relevant information.

Furthermore, it makes little sense for Member States to negotiate separate tax treaties with haven countries, as has been the case. In fact, bilateral deals with tax havens can be negotiated on a multilateral basis so the European Commission should negotiate TIEAs for Member States. The OECD ‘Model TIEA’ provides for such a multilateral option. In the absence of a pan EU directive, the Member States will have to separately pass the required legislation at the country level once such an agreement has been struck. Such a mechanism has been used effectively by the Nordic Council since 2006, where TIEAs are negotiated jointly and signed separately. This not only strengthens the bargaining hand of the onshore economies but is also far more efficient and moves the world in the direction of a truly multilateral tax regime. The European Commission should initiate a parallel process for introducing a directive that allows the European Union to strike fully multilateral tax treaties with other countries on behalf of all the Member States.

Reviving a truly multilateral approach with automatic exchange of information

Despite the ‘multilateral’ option discussed above, the model TIEA being used bears little resemblance to the truly multilateral Council of Europe/OECD Convention of 1988. This convention provides for true

multilateralism as well as the automatic exchange of information - the two tools necessary for an effective international tax regime. The European Commission and the Parliament should initiate a process of fully adopting the Council of Europe/OECD Convention of 1988 on Mutual Cooperation in Tax Matters across all Member States. The EU should intensively push for the adoption of the same by other OECD countries and tax havens in particular. Technical assistance from the EU should be made available where required, especially to developing countries and tax havens. Alternatively, upgrading the UN Committee of Tax Experts to a full statutory international tax body and locating a truly multilateral treaty under the aegis of the UN would be an even more inclusive option.

Expanding the scope of the EU Savings Tax Directive

The EU Savings Tax Directive (EU STD) broke new ground for being both multilateral in nature and requiring an automatic exchange of information. Its effectiveness has, however, been severely hampered by its limited geographic and transactional scope since it applies only to the EU and some satellite territories, and covers only the interest income on personal savings. The extent of its limitation is clear from the following example:

Say an EU citizen transfers \$1,000,000 of unreported and hence untaxed income to his account in Switzerland. Most savings accounts pay an interest of around 1% so the annual interest income would equal \$10,000. The withholding tax on this would be around 30% or \$3,000 part of which will be transferred to the member state.

However, there is no withholding tax on capital gains or income relating to equity, derivatives and other forms of investments, which in recent (pre crisis) years have been generating 10% - 20% annual return. Much more importantly, the tax due on the original \$1,000,000, of between \$300,000 and \$500,000 in most European countries has simply not been paid. So the EU STD captures \$3,000 but misses out the \$500,000. Moreover, the account holder could simply avoid even this miniscule tax simply by transferring their account to a non EU STD jurisdiction or by setting up a legal structure in the form of a corporation, trust or foundation.

There is consequently an urgent need for the EU to push hard for a strict revision and expansion of the scope of the EU STD. The EU STD, suitably extended, could serve as yet another template for a truly multilateral system complete with automatic exchange of information. The new EU STD should also contain a provision for sharing tax relevant information with or collect revenue on behalf of developing countries - the Least Developed Group of countries in particular on a non-reciprocal basis to help tackle capital flight and corruption.

Introducing country-by-country reporting and a consolidated pan EU Tax base

Since tax flight is facilitated primarily by a lack of information for onshore tax authorities, any steps that improve the information available could provide a substantial boost to the efforts to reduce tax losses. If a country-by-country reporting provision is made mandatory for corporations, this would generate

significant new and relevant information for tax authorities. If, for example, they find that a multinational corporation is reporting 50% of its world-wide profits in a low tax jurisdiction with less than 1% of total employees, their suspicions would be aroused and they would be able to take follow up action to minimise tax flight. The EU is already in a lead position worldwide on taking up the issue of country-by-country reporting, but could and should go much further. Requiring EU based MNCs to institute the standard while slowly expanding its reach through the International Accounting Standards Board would benefit both the EU as well as its developing country partners. Parallel moves to institute an EU-wide Comprehensive Consolidated Corporate Tax Base would help stem the destructive tax competition amongst Member States that has been on the rise and would help boost tax revenues overall.

Tackling the mis-pricing of trade transactions

The mis-pricing of trade transactions is perhaps the most important channel for tax flight. In a world where supply chains are becoming ever more complex and the percentage of cross border service transactions is increasing, it has become ever-easier for MNCs and other commercial actors to use internal and external mis-pricing of these transactions to shift profits to low tax jurisdictions and tax havens. The EU, which has a customs union, should act immediately to apply an intelligent mis-pricing detection filter to its international trade transactions to help tackle this large channel of abuse. This filter would be useful for detecting illicit financial flows both out of and into the union. Where relevant, the information generated should also be shared with developing countries.

Learning from successful country level strategies

The European Union could do much to apply lessons learnt from country level initiatives against tax flight. The US program of qualified intermediaries, which obliges bank and other fiduciaries to share tax relevant information on US citizens, could easily be replicated at the EU level. The fact that this has not happened yet is indicative of how much less effective fractious Member States are acting alone than when they act together as the European Union. Some other unilateral measures that should be considered for replication at the EU level are:

- Adopting a financial transaction tax that increases the risk of detection (this generated information helped substantially reduce domestic and cross-border tax evasion in Brazil, for example). A penalty rate for transactions with tax havens would be effective.
- Adopting special reporting requirements and fewer exemptions for investments and financial flows to and from 'tax havens' (Argentina and Spain)
- Requiring accounting firms to register tax shelters before selling them (USA and UK)
- Initiating a cross-functional program of the kind that exists in Australia (Project Wickenby – a task force that comprises the tax office, crime commission, security and investment commission and a number of other relevant governmental bodies and helps tackle tax flight)
- Aiming for legal rulings (as done in the UK and Ireland) which would require banks to report customers with undeclared offshore bank accounts.
- Tax amnesties of the kind being offered by Italy and the UK and offering rewards for information from tax havens as Germany has done unilaterally are other somewhat less orthodox options to consider.

Revenue estimates

Estimates of undeclared wealth held offshore typically exceed \$10 trillion of which around 30% or more is likely to belong to EU Member States. The annual tax flight from the EU easily exceeds \$100 billion. Additional tax revenues from both reducing this tax flight as well as repatriating some of the money held offshore can easily generate much needed additional annual tax revenues for EU Member States running

into the hundreds of billions of Euros. The need for this revenue both to repair the hole left by the financial crisis in public finances as well as to address the urgent challenge of climate change was never more urgent.

Tackling tax flight from developing countries in particular, which EU initiatives can help bring about, can significantly increase their domestic resources to help mitigate climate change and adapt to it.

The one off potential for trillion dollar gains from repatriation of fled capital back to developed and developing countries could be part allocated to green investment helping tackle some of the large funding short fall for green investments.

Plus, tackling tax flight delivers multiple dividends in the form of additional revenue, better governance, more transparency and lower corruption levels.

IMF Green Bonds and Special Drawing Rights

George Soros, has argued that IMF shareholder reserves, the so called ‘Special Drawing Rights’ (SDRs), could be used to create a \$100 billion climate fund. SDRs are essentially a notional currency whose value is defined by a basket of key international currencies: the US dollar, euro, pound sterling, and yen, and were created in the 1960s to supplement the IMF’s member countries’ official reserves.

Soros proposed that more than \$100bn worth of SDRs that lie untouched in the accounts of the 15 wealthiest countries be used to create a climate fund to tackle climate change in the developing world. The Green Fund could use the SDRs to invest in projects such as forestry, agricultural and technical innovation schemes, and rely on returns from the sale of these projects’ credits on the carbon markets, thus making it an attractive self-financing fund.

The International Monetary Fund^{xxxii} has put forward a proposal of a \$100bn Green Fund that it suggests could be part finance by industrialized countries using their international reserve assets including those held by the fund in the form of SDRs aka Soros’s proposal.

The IMF suggest that this Green Fund would issue green bonds totalling up to \$40 billion a year by 2020, and they would subsequently be lent to developing countries with the purpose of helping them finance climate change mitigation and adaptation projects.

The finances could be channelled through special climate funds managed by, for example, multilateral development banks or, as envisaged in the Copenhagen Accord, the Copenhagen Green Climate Fund. Although \$100 billion appears to be a significant amount of new financing compared with developed countries’ total international reserves (excluding gold), it represent only around 4% of these reserves.

Global Climate Financing Mechanism

The notion of a Global Climate Financing Mechanisms stems from two fundamental aspects of climate financing: it needs to be substantial and it needs to be frontloaded, since a dollar invested in tackling climate change now is likely to be much more effective than a dollar spend tackling climate change in 2020.

That is why this paper has tried to address both the issues of tapping new additional sources of funds as well as mechanisms such as borrowing that allow us to frontload investment. A related idea is one that promises repayment of present day borrowing through the use of future additional climate funds.

To this end, the Global Climate Financing Mechanism (GCFM) is based on the idea of an International Financing Facility (IFF), proposed initially in 2003 by Gordon Brown, the UK's Chancellor of the Exchequer at the time. The proposal is to advance the climate commitments by borrowing from the private capital market, with future revenues from the carbon market being used for repayment. Thus, the GCFM could serve as a bridging financial facility until the quota auction system or carbon taxes generate revenues that are substantial enough to meet all financing needs for mitigation and adaptation in developing countries.

In principle, any source of revenue could be linked to the GCFM mechanisms.

Appendix

This appendix briefly highlights the proposals that have been put forward by various countries at the UNFCCC in order to help mobilize funding for mitigation and adaptation in developing countries.

The Chinese Proposal

The Chinese submission to the UNFCCC Secretariat is the most straightforward and, in some ways, the most intuitively appealing of the options available. Eschewing the call for ‘innovative’ proposals, the Chinese argued that developed countries should fund adaptation in developing countries with central government budget support equivalent to 0.5% of GDP.

While details remain sketchy, the US\$185 billion that this would raise annually would not all be earmarked for adaptation, however. Rather, this would also fund mitigation – including technology transfer – and general capacity building. Muller (op cit) suggests that around a quarter (US\$46bn.) would fund adaptation activities.

The World Bank

The proposed Pilot Program for Climate Resilience is funded in a similar way to the Chinese proposal – i.e. through central government budgets – but differs in other fundamental respects. Firstly, it is funded on a discretionary rather than mandatory basis. Secondly, payments take the form of loans rather than grants – or straight compensation payments, as most developing countries would strongly prefer. Thirdly, these loans are viewed as official development assistance (ODA) and so count towards a country’s 0.7% of GDP target in this respect.

The Mexican Proposal

The Multilateral Climate Change Fund (MCCF) proposal is focused primarily on funding global mitigation of climate change, but with a small proportion of the revenues raised being earmarked for adaptation spending. The proposal resembles that suggested by the Chinese more than the World Bank’s PPCR in that payments into the fund are not discretionary with national commitments being a function of greenhouse gas emissions, population size and national income.

Unlike the Chinese proposal, however, contributions are not restricted to the developed economies, with middle income emerging economies also being expected to contribute. In some ways this is rather like IMF quota requirements, where paying into the fund enables middle-income countries to draw on a multiple of their payments to fund mitigation and adaptation. Least Developed Countries (LDCs), in contrast, would be able to draw on the fund without being expected to make contributions themselves.

As with both the preceding proposals, the MCCF is to be funded through central government budgets, with the difference being that a part of the funding may be supplied through a levy on the auctioning of national carbon permits.

The Swiss Proposal

The proposal made by the Swiss government in 2006 is for a global tax on all carbon emissions, which would be universally applied to both developed and developing countries. The incorporation of an 'exemption' to the tax of US\$1.5/tCO₂ per capita means that, in practice, the tax would not be applied uniformly. Particularly for LDCs, the per capita exemption would be above current emission levels so that no tax would be paid, though as Muller points out it is estimated that 52% of total revenues would be provided by developing countries.

The tax would be collected domestically, thus situating the proposal at this end of our first spectrum. Unlike the previous proposals considered, however, a carbon tax is not necessarily autonomous. Clearly one purpose of a carbon tax is to discourage the use of carbon. To the extent that it is successful in this, however, it would erode the tax base thus progressively reducing the revenues available for adaptation. This differs from the levy on carbon permits as the price of these will undoubtedly rise, leading to more revenues, even as supply volumes fall. A flat carbon tax of US\$2/tCO₂ on the other hand is not price sensitive and so would not benefit from increasing carbon prices, but would 'suffer' from falling volumes.

The EU Proposal

The GCFM discussed briefly in the main text is very similar in principal to the UK's International Financing Facility (IFF), wherein money for development is 'frontloaded' by issuing bonds on the international capital markets and using the to invest in development. The structure allows payments to be spread over the lifetime of the bond thus, as Muller points out, circumventing the 'domestic revenue problem'.

Proposed in 2008, the GCFM would adopt the same approach, with the being channelled to developing countries to fund mitigation and adaptation activities. The scale of the resulting fund would be determined by the willingness of governments to commit credibly to meeting the annual payments and the appetite for this instrument in international capital markets. This latter issue has clearly been affected by the ongoing financial crisis, though it is also true that given the dearth of private investment vehicles that are deemed 'safe', government guaranteed instruments could still be expected to attract considerable interest.

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ⁱ <http://news.bbc.co.uk/1/hi/8635765.stm>

ⁱⁱ http://en.wikipedia.org/wiki/Bali_Road_Map

ⁱⁱⁱ <http://www.occ.gov.uk/activities/stern.htm>

^{iv} Pathways to a low carbon economy, McKinsey(2009)

^v Framework for Assessing Climate Change Adaptation in Developing Countries, Stephen Spratt, 2008

^{vii} This section is based on the European Parliament Paper “Emergent Global Challenges: Tackling the Triple Crises of Tax, Finance & Climate”, Sony Kapoor, 2010.

^{vii} The Economist, (2010) “A lighter burden: a promising way to defray the cost of going green,” January 28th 2010.

^{viii} Stern, 2006, xxv

^{ix} Eliasch, 2008, 3

^x Stern, 2006, xxv

^{xi} We use landowner in a loose sense, and this includes private and public land owners

^{xii} Bulte et al. 2006, 420.

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- ^{xiii} Di Falco et al. 2009.
- ^{xiv} Agrawal et al. 2008, 1460.
- ^{xv} See Hardin, 1968.
- ^{xvi} Bulte et al., 2006, 415.
- ^{xvii} Jenkins, 2009.
- ^{xviii} Eliasch 2008, 11
- ^{xix} <http://www.springerlink.com/content/r137355060202414/>
- ^{xx} UNFCCC, 2008.
- ^{xxi} UNFCCC, 2007
- ^{xxii} UNDP, 2007.
- ^{xxiii} Whitesell and Vanamali, 2009.
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- ^{xxvi} Andersen & Ekins 2009.
- ^{xxvii} http://www.cttcampaigns.info/documents/fr/landau_en/Landau1.pdf
- ^{xxviii} Segerstad 2006
- ^{xxix} Bank Levies AND Financial Transaction Taxes NOT Bank Levies OR Financial Transaction Taxes, Re-Define Policy Paper (2010)
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- ^{xxxi} <http://www.imf.org/external/pubs/ft/spn/2010/spn1006.pdf>