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A Developing Country Perspective

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Abstract

For over two decades, scientific and political communities have debated whether and how to act on climate change. The present paper revisits these debates and synthesizes the long-standing arguments. Firstly, it provides an overview of the development of international climate policy and discusses clashing positions represented by sceptics and supporters of action on climate change. Secondly, it discusses the market-based measures as a means to increase the win-win opportunities and to attract profit-minded investors to invest in climate change mitigation. Finally, the paper examines whether climate protection policies can yield benefits both for the environment and the economy. The paper suggests the possibility of building environmental and climate policies around development priorities that are vitally important for developing countries and stresses the need for using sustainable development as a framework for climate change policies.

Key Word(s): Climate change, Sceptic, Supporter, Developing country

JEL Codes: Q4, Q5

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1. INTRODUCTION

The impact of climate change continues to be hotly contested, but much of the disagreement has shifted from the scientific certainty of climate change to identifying appropriate policy responses[1]. The debate centres on the causes and consequences of climate change, what, if anything should be done to mitigate the emissions of greenhouse gas (GHG) emissions, particularly with respect to factors such as population and economic growth, and energy use. While most scientists agree that there is a significant human influence on the climate, there is still a legitimate debate regarding the quantity, time and place of these effects. Most scientists argue that human economic activity is the main reason for global warming and the Earth's average temperature will rise between 5 and 10 degrees Fahrenheit over the next century or two. Some insist that the observed warming is not a trend into the future, but merely a sign of natural climate variability. According to them, global warming is not an urgent problem in the distant future and even if it were, the cost of prevention and remediation is too high. There is a third theory too: human civilization has existed during a climatic anomaly--over 10,000 years of relatively stable and warm climate. Normally, the earth's climate over millions of years is much more unstable and, on average, somewhat cooler. Prof. Richard Alley of the Pennsylvania State University believes that the ice core records show that huge shifts have happened in the climate--not over centuries or even decades, but over years. This means that we could face a change of 10 - 20 degrees Fahrenheit over a few years. We could settle into a new ice age, or end up warmer still. We are likely to be better off in the warmer world than in the colder, since an ice age is a tough environment in which to feed more than 6 billion people.

So, according to scenario I, there is a possibility of experiencing a gradual warming of 5 - 10 degrees Fahrenheit over the next century which could be highly disruptive, especially to agriculture and human health. Hence, we should take drastic steps immediately to reduce greenhouse gas emissions. If the second theory is right, there is little cause for concern, since what we are experiencing is just a modest blip and will return to stability. If the third scenario

[1] The U.N.'s Intergovernmental Panel on Climate Change along with Al Gore won the 2007 Nobel Peace Prize.

is correct, then we will be experiencing an era of unstable climate extremes. However, one thing is certain. We need to watch the indicators of climate change carefully, and there is an urgent need to improve our climate science and modeling. This would require the enhancement of our knowledge on (i) the reliability of the temperature measurements, (ii) the quantum of impacts and (iii) impacts in different regions so that we can focus on remedial measures.

In the debate on climate change mitigation, we can distinguish two main groups, which may be referred to as skeptics and supporters[2]. While the skeptics generally do not want to take action or want to postpone measures on climate change, the supporters claim that action is needed right now. The categorization into two groups is a simplified one because there is quite a significant variation within these broad camps. Another key issue in the debate on climate change is the costs of climate change itself. Supporters fear that the environmental and socio-economic costs of climate change are significantly high while the skeptics are more fearful of the economic consequences of trying to avoid climate change. In contrast to the 'no-rush' approach advocated by skeptics, the supporters believe that the cost of delay is much higher than one of immediate action. When it comes to detailed calculations of the cost of climate change mitigation, skeptics sometimes use worst case assumptions, which exclude partially or completely, the use of market-based mechanisms and 'no-regrets' options. Supporters believe that there are significant opportunities in almost every country to achieve climate change mitigation at a zero or negative net economic cost.

With respect to policy responses three types can be distinguished. The first is *focused intervention* to minimize the negative impacts on the environment. An important consideration is to 'avoid cures that may be worse than the disease'. The second is *adaptation*, which some economists prefer because the measures are taken in the future, and because their discounted present cost is lower. This policy is controversial, however, because

[2] It can be argued that it is problematic to use the categorization of sceptics and supporters because it is too difficult to capture the complexity of the issue and the diversity of viewpoints by categorizing the debate into two camps. This caveat is important, but it is equally valid to argue that even very differentiated views on climate change will ultimately have to decide upon basic dualistic questions that divide sceptics and supporters, such as whether climate change is influenced by human activities (yes/no), whether climate change will have serious impacts in the future (yes/no), whether governments shall spend money on avoiding climate change (yes/no), and so on. The answers to such questions determine which basic category the respondent belongs to, which still allows for the fact that there can be significant variation within each category.

it does not prevent or mitigate climate change. The third is *prevention*. This is promoted mainly by environmentalists, and requires immediate investments to prevent future damages.

From a developing country perspective, addressing climate change issue poses a fundamentally different challenge. For these countries, emission reduction is not a priority in the near term. With income levels far below those of developed countries and per capita emissions of one-sixth of those of the industrialized world, developing countries have to strive for economic growth and a better quality of life. This may lead to claims in some quarters that developing countries are increasing their share of global emissions. It is important to know that many of their efforts are towards economic development and poverty alleviation and energy security. Put it differently, these are multiple drivers for actions that reduce emissions and they produce multiple benefits. The most promising policy approaches, then, will be those that capitalize on natural synergies between development priorities and climate protection which simultaneously advance both these efforts.

The goal of this paper is to demystify the climate issue and view it from a developing country perspective. This is due to the fact that the most vulnerable are the developing countries because their adaptive capacity is less than those of developed countries (vulnerability changes with population and economic growth, and technological progress). This will enable the reader to participate fully in one of the most important debates of our time.

2. A BRIEF HISTORY OF CLIMATE POLICY

The question of how climate change might affect human activities appeared on the international agenda in 1979 at the World Climate Conference (WCC).[3] The conference issued a declaration calling on the world's governments '(…) to foresee and prevent potential man-made changes in climate that might be adverse to the well-being of humanity.'[4]

[3] The term 'climate change' is preferable to 'global warming'. The latter refers to the observed heating of the Earth's atmosphere; whereas 'climate change' refers to a broader set of alterations in climate patterns, which include warming as well as cooling trends and other meteorological changes. Although some of the changes could be explained as natural climate variability, there is an increasing scientific consensus that climate change in recent history has been increasingly caused by human activities, including the burning of fossil fuels, deforestation, and industrial activities such as cement production. These and other anthropogenic activities result in the emissions of greenhouse gases (GHGs) including carbon dioxide (CO2), chlorofluorocarbons (CFCs), methane (CH4), and nitrous oxide (N2O), and water vapour. Of these gases, carbon dioxide accounts for more than 90 percent of GHG emissions. About three quarters of annual CO2 emissions result from burning fossil fuels including coal, oil, and natural gas (IEA 1997).

[4] UNEP and UNFCCC 2002, Information Sheet 17.

Following this conference, it took many years with further meetings and initiatives before the international community was able to agree on initial steps to deal with the problem.[5] In 1988, UNEP and the World Meteorological Organization (WMO) established the Intergovernmental Panel on Climate Change (IPCC) with the mandate '(…) to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human induced climate change, its potential impacts and options for adaptation and mitigation.'[6]

The IPCC is a scientific body that includes 2,500 scientists including eight Nobel Laureates. Since its establishment, the Panel released four Assessment Reports[7] in 1990, 1995, 2001 and 2007 (released recently), which summarized the state of scientific knowledge available at that time. These reports formulated a consensus opinion while pointing to areas that are uncertain or controversial and need further research. In its 'First Assessment Report' released in 1990, the Panel expressed concerns about the growing evidence for a human impact on climate change.[8] The report was influential for the development of the United Nations Framework Convention on Climate Change (UNFCCC), which was adopted at the Earth Summit in 1992.[9] In this non-binding document, 154 countries, plus the European Community, agreed on the '(…) stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.'[10] To achieve this goal, the countries were divided into two groups: the developed (Annex I) countries were encouraged to cut their emissions of greenhouse gases (GHGs) back to 1990 levels, while the remaining countries did not have to commit to such reductions, following a principle of '(…) common but differentiated

[5] According to UNEP and UNFCCC (2002), the key events were the Villach Conference (October 1985), the Toronto Conference (June 1988), the Ottawa Conference (February 1989), the Tata Conference (February 1989), the Hague Conference (March 1989), the Noordwijk Ministerial Conference (November 1989), the Cairo Compact (December 1989), the Bergen Conference (May 1990), and the Second World Climate Conference (November 1990).

[6] IPCC 2003.

[7] It is currently finalizing its Fourth Assessment Report "Climate Change 2007", also referred to as AR4.

[8] Houghton, Jenkins, and Ephraums 1990.

[9] The Convention entered into force on 21 March 1994, 90 days after the receipt of the 50th instrument of ratification (see UNEP and UNFCCC 2002). An international convention must be ratified by national parliaments in order to be valid under national law.

[10] UNFCCC, Article 2

responsibilities (…).'[11] In practice, differentiated responsibilities meant that developed countries were obliged to assume leadership in efforts to mitigate climate change.[12]

Another significant tenet in the UNFCCC is the precautionary principle.[13] Article 3 of the Convention describes the notion as follows: 'Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures.'[14] Science may never be able to predict exactly what will happen and where, but it can '(…) provide scenarios and assess the probabilities and consequences of various plausible alternatives.'[15] According to the precautionary principle, policy decisions must be made under uncertainty when there is a risk of catastrophic damage. Also the precautionary principle suggests that many segments of the private sector may be better off, if serious costs are avoided by adopting precautionary measures.

The development of the UNFCCC and other international environmental treaties was accompanied by the establishment of the Global Environment Facility (GEF) as a joint venture of the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), and the World Bank. For the past twelve years, the GEF has been one of the main sources of international funding for clean energy and other measures to address climate change. The GEF does not implement environmental projects itself, but it provides grants and concessional funds for projects. Apart from climate change, the GEF also funds projects in areas such as biological diversity, international waters, and the depletion of the ozone layer.

The purpose of the GEF is to fund reduction and adaptation measures both in countries in transition and in developing countries.[16] Since its establishment in 1991, GEF has allocated more than $6 billion in grants and mobilized a further $12 billion in co-financing. So far, more than 1,800 projects have been supported by the GEF in transition economies and in developing countries. The GEF is supported by a large number of governments, which have replenished the funds every three to four years. In August 2002,

[11] UNFCCC, Article 3

[12] This is the first of five guiding principles laid down in Article 3 of the UNFCCC.

[13] The precautionary principle is also discussed in Section 12.2.2.

[14] UNFCCC, Article 3

[15] Schneider and Rickel, not dated.

[16] Martinot and McDoom 2000, 16.

almost $3 billion were pledged to finance GEF activities until 2006.[17] Although $3 billion is a significant sum, it translates to less than $1 billion a year, which is spread across many countries and multiple environmental problems. To assess the level of funding, compare $1 billion, for example, to $80 billion provided by the US Congress in March 2003 as a first installment for the war in Iraq. In light of the scale and severity of global environmental problems, GEF funds by themselves cannot make a major difference. Since it is unlikely that governments will dramatically increase their allocations for the global environment in the foreseeable future, greater priority must be placed on devising ways to mobilize private capital to complement public funding.

At the Rio meeting, a process was put in place to strengthen the regime over time. The participants agreed that the supreme decision making body of the UNFCCC, the Conference of the Parties (COP), would meet regularly to discuss further steps to mitigate climate change. At its first session, which took place in Berlin in 1995, the COP concluded that the 1992 UNFCC commitments were insufficient and that there was a need to establish compulsory targets. In December 1995, just in time for COP2, the IPCC released its 'Second Assessment Report', which was written and reviewed by about 2,000 scientists. The Report reaffirmed that '(…) the balance of evidence suggests that there is a discernible human influence on the global climate.' The report also noted '(…) the availability of so-called no-regrets options and other cost-effective strategies for combating climate change.'[18]

The confirmation of the evidence on climate change galvanized policy makers into action. The Kyoto Protocol[19] was adopted on 11th December 1997 at the COP3. The Protocol for the first time set legally binding emissions targets for a group of countries listed in Annex I. In Article 3 of the Protocol, Annex I countries commit to reduce their emissions of GHGs by at least five percent below the 1990 level by the years 2008–2012.[20] Individual commitments differ from this guideline in both directions. The 5 percent group target would be achieved through the following cuts:

[17] GEF, not dated.

[18] UNEP and UNFCCC 2002, Information Sheet 17.

[19] The full name is *The Kyoto Protocol to the United Nations Framework Convention on Climate Change*.

[20] Emission reductions need not be achieved by a fixed year, but the average of the commited five-year period will determine whether the Kyoto targets are achieved.

1. Eight percent by Switzerland, most Central and Eastern European states, and the European Union. The EU will meet its group target by distributing different rates among its member states;
2. Seven percent by the US which in 2001 withdrew from the Kyoto Protocol; and
3. Six percent by Canada, Hungary, Japan, and Poland.

In contrast, Russia, New Zealand, and Ukraine are to stabilize their emissions, while Norway may increase emissions by up to 1 percent, Australia by up to 8 percent, and Iceland by up to 10 percent.[21] The Kyoto Protocol focuses on six GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). These gases are to be combined in a basket, with reductions in each gas translated into CO_2 equivalents that are then added up to produce a single figure.[22]

According to Article 25 of the Kyoto Protocol, the agreement becomes valid '(…) on the ninetieth day after the date on which not less than 55 Parties to the Convention, incorporating Annex I Parties, which account for at least 55 percent of the total carbon dioxide emissions for 1990 from that group, have deposited their instruments of ratification, acceptance, approval or accession '[UNFCC, 2003]. In March 2001, the United States, which represents about one quarter of global carbon dioxide emissions, withdrew from the Protocol. As of June 2007, 172 Parties had signed and ratified or acceded to the Kyoto Protocol. With the United States' withdrawal, Russia's ratification became pivotal for reaching the 55 percent threshold for bringing the Protocol into force.

The 'Third Assessment Report', which was published in 2001, reported the findings from three task forces: Working Group I dealt with the evidence on climate change, Working Group II focused on possible consequences, and Working Group III examined mitigation options. The models of Working Group I found that in the course of the 20th century 'globally averaged surface temperatures' have risen 0.6°C, with a margin of error of ± 0.2°C. According to the IPCC Special Report on Emission Scenarios (SRES), the globally averaged surface air temperature is projected to increase between 1.4°C and 5.8°C by 2100 relative to 1990 levels.[23] The Working Group II identified different scenarios for the potential consequences that could follow from the range of projected increases in temperature. It also

[21] A list of reduction commitments of the parties can be found in Annex B to the Kyoto Protocol.

[22] The concept Global Warming Potential (GWP) is used to calculate CO_2 equivalents according to the IPCC methodology (see IPCC 1995).

[23] IPCC 2001b.

presented the consensus of the group as to their level of confidence with its predictions. The Working Group II confirmed that overall harmful impacts of climate change are likely to overshadow positive impacts. One prediction is that, as a result of the melting of the polar icecaps, the volume of the world's oceans will increase, probably somewhere between 0.09 and 0.88 metres by 2100.[24] The result could be coastal flooding that may dislocate up to several hundred million people worldwide.

Other possible consequences of climate change include more frequent and extreme weather-related events such as heat waves, droughts, fires, floods, and storms, which could damage economies and result in negative impacts on human health. The scientists in Working Group II note that a rise '(…) in the frequency or intensity of heat waves will increase the risk of mortality and morbidity, principally in older age groups and the urban poor (high confidence) (…) .Any regional increases in climate extremes (storms, floods, cyclones, etc.) associated with climate change would cause physical damage, population displacement, and adverse effects on food production, freshwater availability and quality, and would increase the risks of infectious disease epidemics, particularly in developing countries (very high confidence/well-established).'[25] While shifting climate zones could exacerbate food shortages, climate change could also bring localized benefits to some regions, for example the potential to grow wheat in Siberia.

Working Group III, which assesses various climate change mitigation options, concluded that a wide range of policy instruments should be considered in order to stimulate participation of various stakeholders in climate change mitigation. Firms and financial institutions are among the main stakeholders to be targeted by policy measures. The IPCC experts believe that a broad selection of instruments enlarges the number of no regrets options and help to fit policies to short-, medium-, and long-term goals (IPCC, 1995). The Working Group estimated that about half of the total GHG emission reductions attained by 2020 could be profitable, based on discount rates ranging from five to 12 percent, which are in line with public sector discount rates.[26] At the same time, it notes that 'Private internal rates of return vary greatly, and are often significantly higher, affecting the rate of adoption of these technologies by private entities.'[27]

[24] IPCC 2001b.

[25] IPCC 2001c. [chapter 2.2.2 page 2]

[26] Public sector discount rates are controversial in the climate area.

[27] IPCC 2001a. [

The third volume of the fourth assessment report of the IPCC has been approved on 4th May 2007. According to the report, between 1970 and 2004, global emissions of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6, weighted by their global warming potential (GWP), have increased by 70%, from 28.7 to 49 Gigatonnes of carbon dioxide equivalents. The largest growth in global GHG emissions has come from the energy supply sector (an increase of 145%), transport 120%, industry 65% and land use, land use change, and forestry 40%. A range of policies, including those on climate change, energy security[8], and sustainable development, have been effective in reducing GHG emissions in different sectors and in many countries. The scale of such measures, however, has not yet been large enough to counteract the global growth in emissions. The report[28] is a consensus document put together by 600 scientists and agreed by representatives of 113 countries, predicts continued warming of 0.2 °C per decade for the coming few decades. Over the twenty-first century it predicts a range of 1.1-2.9 °C warming in a scenario with low emissions of greenhouse gases, and 2.4 ─ 6.4 °C in a high-emissions scenario. The warming is expected to be the greatest over land, and the chance of heat wave increasing in frequency is greater than 90%[29].

3. CLASHING POSITIONS ON CLIMATE CHANGE

3.1 Sceptics

The sceptics include, at one extreme, those who see climate change as a hoax inflated by media and who maintain that the only sensible solution is to do nothing. According to the supporters they misjudge the risks of climate change by making selective use of evidence. Backed by the fossil fuel lobby and its allies in the media, they endeavour to deflect attention from the emerging consensus in the scientific community. However, not all sceptics can be described as extreme and not everyone serves as a mouthpiece for the fossil fuel lobby. There are other groups of sceptics who do not discount the possibility of serious consequences of climate change, but who believe that the cost of taking action now is higher than that of not taking action. One prominent sceptic, Wilfred Beckerman, expressed this position when he claimed that 'Global warming is no cause for alarm or dramatic action. If dramatic action

[28] The Report provides an overall scientific view on climate change that integrates and synthesizes information from the three volumes around 6 topic areas that include: impacts, adaptation and vulnerability and mitigation of climate change

[29] Summary for Policymakers (http://www.ipcc.ch/SPM2feb07.pdf)

were taken, the effects on human welfare would be horrendous – even more horrendous perhaps than the effects of global warming itself.'[30]

In 1995 the Leipzig Declaration on Global Climate Change was signed by about one hundred scientists, stating that 'Costly actions undertaken to reduce greenhouse emissions are not justified by the available scientific evidence.'[31] Since climate modelling is not always precise, sceptics argue that it cannot serve as a basis for strong policy measures. John Christy, a professor of atmospheric science at the University of Alabama, notes that 'Reports are filled with *ifs*, *maybes* and *coulds*. What we do know is that the climate varies naturally.'[32]

Often the disbelief in climate science is rooted within a scepticism of the environmental movement – a reaction against inroads made by environmental ideas into mainstream policy. Mary Hager describes the lingering doubts about the conventional wisdom among those individuals who disagree with the general scientific consensus about the environment: 'What if global warming does not loom on the horizon, or if seasonal stratospheric ozone layer depletion is part of a natural cycle and not the creation of human created chemicals? What if pesticides really promote a more abundant and varied food supply for the world without causing cancer and ail in children? Or if hazards from abandoned wastes have been blown out of proportion?'[33]

While a wing of sceptics claim that global warming merely is a figment of imagination, more moderate groups recognize that there has been a warming trend and that this trend is likely to continue into the future. Some sceptics acknowledge that, based on the cumulative evidence, there could be serious consequences in the long run. Still, they argue that predictions about future warming and the consequences associated with climate change are often exaggerated, and that the GHG theory is not the only plausible explanation of observed warming trends. For example, James Hansen, Makiko Sato, and Reto Ruedy argue

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[30] Beckerman 1996. Wilfred Beckerman has been one of the favourite targets of environmentalists ever since he published the book *Two Cheers for the Affluent Society: A Spirited Defence of Economic Growth* (1974) in response to Donella Meadows' *The Limits to Growth* (1972) and other early environmental literature.

[31] Smith 1997, 2. The Leipzig Declaration has been discounted by the fact that only a few signatories are considered respected scientists in the field (Jensen 1998). Given that hundreds of scientists work on every IPCC Assessment Report, and that contributions from sceptics are welcome, the results of these reports are generally more trusted than findings produced by individuals or relatively small groups, especially those whose objectivity is questioned because of conflicts of interest (EMS 2003).

[32] GCC 2001

[33] Hager 1993, 10.

that too much emphasis has been placed on carbon dioxide, but they do not discount the possibility that carbon dioxide is an important contributing cause to climate change.[34]

The more research is conducted, the easier it becomes to support any position with evidence. Sceptics can point to an increasing number of studies on global warming that are inconclusive, while avoiding or disparaging conclusive studies. The moderates within the spectrum of sceptics are careful not to dismiss well-established facts, so as not to lose credibility. However, they emphasize evidence that undermines the impetus for policy action, and they point to real or perceived weaknesses in the research of their opponents. The European Science & Environment Forum for instance states that 'Solar output and sunspot activity could well have played a major role in climate change as observed over the last century'[35], adding that there is a lack of '(…) firm geological evidence to support global warming.'[36] Another sceptic, Patrick Michaels, explains the extremely hot summer of 1998 as '(…) the result of a strong El Nino superimposed on a decade in which temperature continues to reflect a warming that largely took place in the first half of this century.'[37] In a congressional testimony, Michaels argued that future warming would be '(…) relatively modest (…)'[38] and that forecasts of future impacts on '(…) ecosystems, health and the economy are based on old models which are in error.'[39]

Academic sceptics are supported by activists in anti-environmental groups. Jim Baca describes the movement 'People for the West!', whose members are engaged in grassroots mobilization by going door to door with petitions in rural and minority communities in the United States, by calling people, and by writing letters.[40] According to Michael Bruner and Max Oelschlaeger, sceptics are successful due to '(…) their ability to articulate persuasive rationales through slogans, myths and narratives.'[41] These narratives are disseminated through friendly media. Eileen Claussen, President of the Pew Center, a climate change

[34] Hansen, Sato, and Ruedy 2000.

[35] Landscheidt T, 2003

[36] Greenpeace, not dated.

[37] Michaels 1998, 1.

[38] Michaels 1995.

[39] Michaels 1995.[

[40] Baca 1995, 54.

[41] Bruner and Oelschlaeger 1994, 379.

research institute, argues that the Wall Street Journal is an influential source of such myths. To illustrate her point, Claussen cites following from the Wall Street Journal:[42]

> *Why require the nations of this planet to spend the hundreds of billions of dollars necessary to reduce carbon dioxide and other emissions when we don't even know if the earth's climate is getting permanently hotter or if that temperature change is caused by human activity or if that change is even dangerous?*

Sceptics base their arguments on different estimates of the cost of compliance with the Kyoto Protocol. They point to pessimistic scenarios, such as the one developed by the Energy Information Administration, which showed that it would cost the United States 4.2 percent of GDP to comply with Kyoto. They suggest to postpone action until there is greater certainty about the causes and consequences of climate change. They argue that it makes no sense to rush for 'short-term' Kyoto targets, and that it is better to wait until the market itself will force out carbon-intensive fossil fuels and will favour the use of more environmentally friendly fuels and energy efficient technologies.[43] Some scientists insist on letting the process of GHG emissions stabilization last for about one hundred years. In their opinion such an approach will not harm the US and the global economy and will bring environmental benefits.[44]

Sceptics and lobbyists who strive to prevent action on climate change further are supported by groups in academia and in think tanks such as the Cato Institute, the Heritage Foundation, and the American Enterprise Institute. Together with lobby organizations such as the Global Climate Coalition (GCC), this network develops the intellectual foundation for anti-environmentalism, and the justification for advising against 'premature' and 'imprudent' action[45].

Much is at stake. A transition to renewable forms of energy and greater energy efficiency would make industries and markets react. The countries of OPEC (Organisation for Petroleum Exporting Countries) stand to lose most from the commercialization of clean energy technologies.[46] Apart from a loss of revenue due to expanding alternative energy

[42] Claussen 2002.

[43] See Van Doren 1999.

[44] Walker, Bloomfield, and Thorning 1996.

[45] The Global Climate Coalition (GCC) was one of the most outspoken and confrontational industry groups in the United States battling reductions in greenhouse gas emissions

[46] Yeh 1997.

markets, the Kyoto sanctioning mechanisms for non-compliance could lead to a welfare decrease in the OPEC region.[47]

The Little Ice Age and the Medieval Warming that preceded it from 950 to 1300 AD stand out in every temperature record as the major weather events of the last 1,000 years, and they're a hefty problem for global warming advocates. If the world was warmer in 1200 AD than today, and far colder in the year 1400, why would we blame current temperatures trends on auto exhausts?[48]

Most scientists prefer to stay out of the politically charged 'Greenhouse Wars'[49], which are less about science than about the quest for economic power. But it is difficult to avoid getting drawn into the battle. Many sceptics appear comfortable in the dual role of scientists and advocates, and also supporters realize that unless they become effective advocates, they can easily be '(…) over-ruled by governments as a result of heavy pressure from the OPEC countries and the Global Climate Coalition.[50] The main problem, however, is of economic nature. Scientists are dependent on research funds, and not all funding is free of political and economical interests.[51]

3.2 Supporters

Many supporters of action on climate change agree with sceptics that the climate is influenced by multiple contributing factors, including natural causes. Without adopting a mono-causal point of view, many supporters nonetheless argue that the theory of human influence on the climate is well established. They also believe that many consequences of climate change, although not certain, are documented so well already that it would be irresponsible to wait with action. Hence the main issue for supporters is not whether to do something about climate change, but what to do about the problem.

The debate centres on the effectiveness, cost, and ethical appropriateness of various courses of action.[52] While some supporters favour command and control mechanisms, such as

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[47] Hagem et al. 2003.

[48] Dennis Avery, 2003

[49] Pearce 1997.

[50] Greenpeace, not dated.

[51] See for example Gelbspan 1995 and Collier 1997.

[52] For an interesting debate on ethics, see Michael Sandel's editorial *It's Immoral to Buy the Right to Pollute,* which was published in the New York Times on 15 December 1997 following the signature of the Kyoto Protocol, including the replies from Robert Stavins, Steven Shavell, Sanford Gains, and Eric Maskin published on 17 December 1997.

for example regulated limits on GHG emissions, others would like to rely on economic instruments, such as for instance carbon taxes and market-based mechanisms such as emission trading. There is much debate on the role of the private sector in problem solving. Some believe that the private sector is crucial for any solution, while others question the motives of private actors. Many supporters agree that civil society should play a role in problem solving as well. And some argue that lasting solutions to environmental problems require more fundamental transformation, including changes in economic structures, the media, and education.[53]

While some pessimists claim that it is already too late to take effective action on climate change, the majority argues that it is not too late to mitigate future damages. Supporters believe that if nothing is done, serious consequences are unavoidable, including rising sea levels, more extreme weather events, disruption of agriculture, and impaired health. All of this could lead to major reductions in economic well-being and quality of life.[54]

To support their call for action, supporters refer to evidence of serious impacts. A report prepared by Innovest for the United Nations Environment Programme (UNEP) shows that banks, insurances, and other businesses have incurred significant losses due to climate change already, and that these losses will likely multiply if global warming is left unchecked. The report notes that global economic damages associated with natural catastrophes have approximately doubled every ten years, reaching almost $1 trillion in the course of the past 15 years. Annual weather-related disasters have quadrupled compared to 40 years ago; and insurance payouts have increased by a factor of 11, rising to an average $10 billion annually during the 1990s. If we extrapolate these trends into the future, yearly losses will increase to almost $150 billion in the next decade.[55] Table 1 lists the number of great weather-related disasters and the increase of economic and insured losses in the period from 1950 until 2001.

Based on the numbers shown in Table 1, pessimists among the supporters claim that the reduction of greenhouse gases will not always bring the intended results. For example, there may be little improvement with regard to the decline of forest areas or the number of malaria incidences, which are key areas of concern in relation to anthropogenic warming.[56] However,

[53] For an analysis of the differing views on climate action and the Kyoto Protocol, see Jacoby, Prinn, and Schmalensee (1998).

[54] See IPCC 2001c.

[55] Innovest 2002a, 6.

[56] Dorf 2001, 468.

the possibility that reducing GHG emissions will not lead to rapid results cannot be used as an argument that nothing should be done. The key issue is the uncertainty about the absorption capacity of ecological systems and the threshold at which such systems collapse. Richard Dorf argues that '(…) climate change on top of the other environmental problems may be the straw that breaks the camel's back, particularly with respect to forests, ecosystems, and biodiversity, which suggests that immediate action ought to be taken to curtail GHG emissions.'[57]

Table 1: Great weather disasters 1950–2001

	1950-59	1960-69	1970-79	1980-89	1990-99	Last 10: 1992-2001
Number	13	16	29	44	72	64
Economic losses (US $bn)	41.2	54.1	79.4	126.1	425.4	362
Insured losses (US $bn)	-	7.2	11.5	23	98.9	79.3

Source: Innovest 2002a, 7 and MunichRe, 2004

Figure 1 illustrates the steeply increasing cost curve, which is believed to be, at least partly, related to climate change. The figure depicts the economic and insured losses and some of the projections and risks associated with climate change and their impacts on the ecosystem and human activity. However, care should be taken to correctly estimate the rate and scale of these losses since it may result in either too little attention and significant human costs or too much cost for unneeded preventative measures. Figure 2 shows the trend in annual frequency of great natural catastrophes during 1950 and 2004 which enables to understand the type of hazard and estimates the number of people that might suffer consequences. The results can be used to determine options for reducing or eliminating risks.

[57] Dorf 2001, 469-70.

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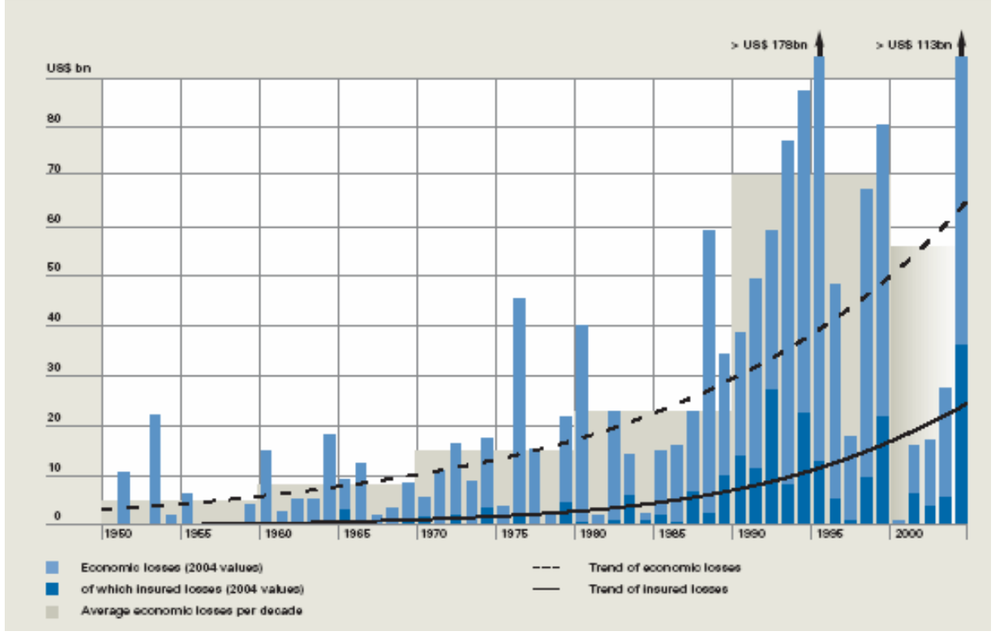

Figure 1: Trend in economic and insured losses, 1950-2004

Source: MunichRe, 2004

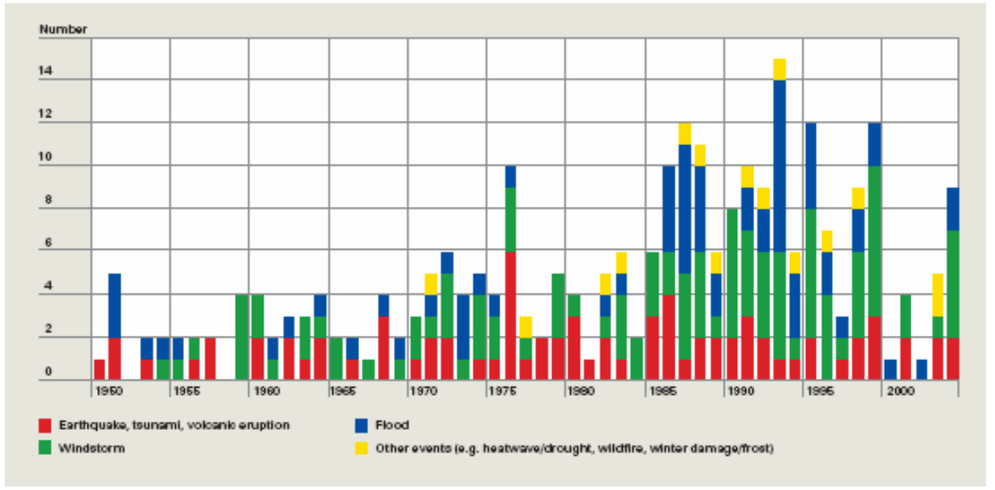

Figure 2: Trend in annual frequency of great natural catastrophes, 1950-2004

(Source: MunichRe, 2004)

Table 2 shows the impacts of sea level rise on South Asian countries, those with dense population. According to the table, the impacts of sea level rise are smaller than worldwide.

Table 2: Impacts of sea level rise

Impacts of sea level rise: South Asia					
	1m	**2m**	**3m**	**4m**	**5m**
Area (Total = 4,197,171 sq.km.)					
Impacted area	12,362	21,983	35,696	52,207	69,225
% of total area	0.29	0.52	0.85	1.24	1.65
Population (Total = 1,306,556,000)					
Impacted population	5,870,427	10,187,694	17,810,069	22,065,103	39,505,521
% of total population	0.45	0.78	1.36	1.69	3.02
GDP (Total = 3,295,567 million USD)					
Impacted GDP (USD)	18,021	30,957	52,036	72,462	94,020
% of total GDP	0.55	0.94	1.58	2.20	2.85
Urban extent (Total = 241,779 sq.km.)					
Impacted area	809	1,379	2,311	3,599	5,117
% of total area	0.33	0.57	0.96	1.49	2.12
Agricultural extent (Total = 3,023,617 sq.km.)					
Impacted area	3,442	6,951	13,501	23,716	35,190
% of total area	0.11	0.23	0.45	0.78	1.16
Wetlands area (Total = 579,130 sq.km.)					
Impacted area	9,184	16,685	25,988	36,109	46,003
% of total area	1.59	2.88	4.49	6.24	7.94

Source: Dasgupta *et a*l, 2007.

Table 3: Projected climate change impacts compared to other environmental problems

Climate-sensitive sector / indicator	Year	Impact / effect	
		Baseline (includes impacts of environmental problems other than climate change)	Impacts of climate change, on top of the baseline
Agricultural production	2060 for baseline. > 2100 for climate change	Must increase 83 %, Relative to 1990	Net global production would change –2.4 % to +1.1 %; but could substantially redistribute production from developing to developed countries
Global forest area	2050	Decrease 25-30 (+) %, relative to 1990	Reduced loss of global forest area
Malaria incidence	2060 2100	500 million 500 million	25 to 40 million additional cases 50 to 80 million additional cases
Sea level rise	2060 2100	Varies Varies	< 25 cm < 50 cm
Extreme weather events	2060 or 2100	Not applicable	Unknown whether magnitudes or frequencies of occurrence will increase or decrease

Source: Dorf 2001, 468, referring to IPCC 1996, and Goklany 1998; 2000.[58]

[58] Reprinted from Dorf 2001, 468 with permission from Elsevier Science and Cambridge University Press.

Table 3 provides information on climate change impacts vis-à-vis other environmental problems such as public healh under the baseline conditions in the 2060s. (i.e., in the absence of global warming). Agriculture production will decline significantly and the population at risk of malaria might increase. Thus, the impacts of climate change into the foreseeable are secondary to the impacts of other agents of climate change built into the base line.

3.3 **Analysing Issues: Sceptics vs. Supporters**

If one compares the arguments of sceptics with those of supporters, one finds little common ground. In what follows, five issues will be analyzed to show how supporters differ from sceptics.

(i) Scientific knowledge: In general sceptics and supporters agree that there is a need for more knowledge on climate change, but they disagree on how much certainty is achieved already, and how much is needed. Supporters believe that there is a sufficient basis of established facts to justify measures on climate change now. George Marshall argues that waiting for a complete scientific understanding will not be accepted as an excuse by future generations affected by global warming. Moreover, he states that '(…) there is far more certainty about climate change than there is about many other aspects of science on which policy decisions are routinely made'.[59] Sceptics and supporters concur on the need to improve models designed to predict the course and consequences of climate change.

(ii) Alternative explanations of climate change: Supporters are not convinced about most alternative explanations of observed warming trends forwarded by sceptics. For example, supporters argue that there are not sufficient data to support the conclusion that the warming is due to sunspot activity, since satellite monitoring of the sun started not until the late 1970s.[60] They also point out that the warming cannot be explained by long run fluctuations, as suggested by this theory, the world would currently be in a cooling phase. They recall that in the 1970s, some scientists were concerned about the prospect of global cooling.

(iii) The precautionary principle: Supporters advocate the application of the precautionary principle. This principle is considered necessary for environmental and health damage prevention in a forward looking society. The precautionary principle was first applied in Germany in the 1970s. Later on, it was incorporated into international agreements, including

[59] Marshall, 2006

[60] Collier 1997.

the Bergen Declaration on Sustainable Development and the UNFCCC. In January 1998, the Wingspread Conference on the precautionary principle concluded that '(…) if a practice seems likely to harm the environment, even if proof of harm is not definitive, actions should be taken to eliminate or control the practice.'[61] In the words of Raffensperger and Tickner, the precautionary principle is '(…) a tool with ethical power and scientific rigor'.[62] One way to motivate '(…) the public and policy-makers to take preventative action in the face of possible climate change' is to raise public awareness of health impacts.'[63]

According to Innovest, precaution is one of three fundamental principles, on which the evolving international policy framework should be based.[64] A message for the industrial and the financial sector is that destructive impacts of climate change can have global implications and can affect any area of business activity negatively. While four out of five business leaders from the top 500 companies are aware of financial risks caused by climate change, only two out of five are taking relevant steps to hedge possible threats and to make use of potential opportunities.[65] The main areas of business involvement are emission trading mechanisms and greater investments in clean power technology. In this respect, a wide array of actions are developed specifically for policy makers, market regulators, commercial bank managers, and other key decision makers.[66] The main recommendations can be summed up as follows:

(iv)Tradeoffs: Many supporters are willing to countenance tradeoffs between a better environment and health on one side and wealth on the other side. Some supporters believe that developing countries need to make tradeoffs between growth and a cleaner environment. Others believe that developing countries have an opportunity to leapfrog developed countries in terms of adopting cleaner technologies as a basis for development. The notion of leapfrogging over old technologies may be the best way to make action on climate change palatable to developing countries. These countries are and will remain concerned primarily about economic growth. As Thomas Schelling wrote, 'The Chinese, Indonesians, or

[61] Maret 2000.

[62] Raffensperger and Tickner 1999.

[63] Long and Iles 1997, 45.

[64] Innovest 2002a.

[65] Innovest 2003.

[66] Innovest 2002b.

Bangladeshis are not going to divert resources from their own development to reduce the greenhouse effect.'[67]

(v)Benefits of climate change: Supporters and sceptics agree about localized benefits and that some regions may become richer due to increased yields of crops. Nevertheless, they are not convinced that these benefits will outweigh the costs for any country, and much less for the world as a whole. Ute Collier writes that some agricultural plants such as wheat, rice, and soy beans, so called C3 plants, can be shown to thrive on greater concentrations of CO_2 in laboratory experiments. She cautions, however, that '(…) levels of temperature and precipitation are also crucial and combined effects may be negative in some areas. Also, some important crop plants (C4 species, such as maize, sorghum and sugar cane) are less responsive to higher CO_2 levels and are likely to suffer from water shortages and increased soil parching in a warmer climate.'[68]

4. CLIMATE REALISTS

Between climate change supporters and skeptics, there has been a tiny minority of analysts who are convinced of the urgency of the problem while remaining profoundly sceptical of the proposed solutions. Most of them are from developing countries and their voices have largely gone unheard.

The data about emissions show (Fig 3) that developed countries (Annex 1) emit far more than that of developing countries (non-Annex 1). Global emissions, on a per capita emissions, increased from 0.01 metric tonnes in 1800 to 1.2 tonnes in 2005. Average per capita emissions were 8.4 tonnes of carbon dioxide in the EU-15 and 19.7 tonnes in USA. Despite their faster growth in emissions, developing countries such as those from Asia still emit a lot fewer emissions (on a per capita basis) than countries from Europe and North America. Per capita emissions from China were 2.6 tonnes and for India the figure was 1.0 tonnes. By 2050, emissions will start stabilizing for both Annex 1 as well as for non-Annex 1 countries (IPCC 2007).

[67] Schelling 1997, 8.

[68] Collier 1997.

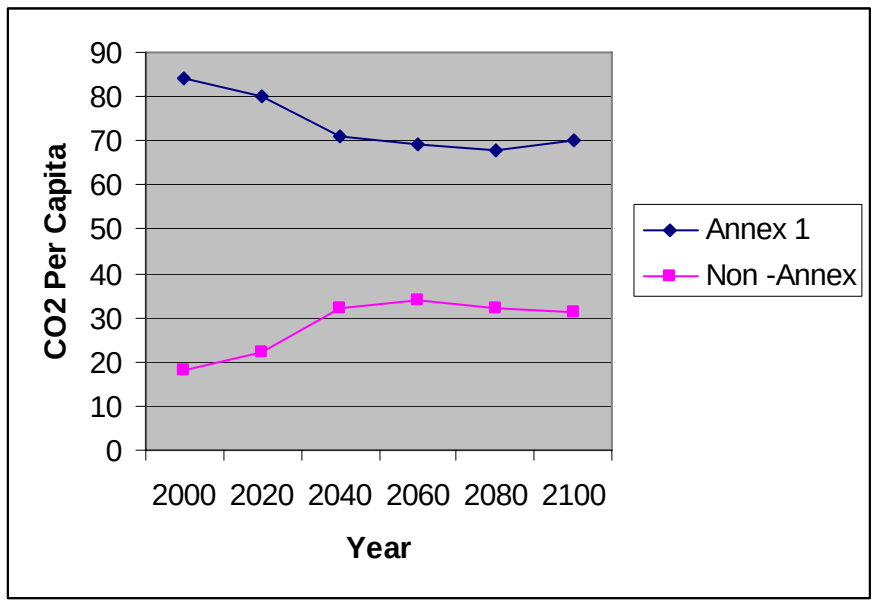

Figure 3: Per capita CO2 emissions by Annex 1 and Non-Annex 1 countries

For the developing countries, climate change issues are not the main concern when compared with problems such as poverty, natural resource management, energy and livelihood needs. From their perspective, development should come first, i.e., one should start from a sustainable development perspective which prioritises poverty reduction and equity. The challenge for such a type of development is the practical question of choosing sustainable pathways that provide food and energy security, employment opportunities and at the same time minimize environmental impacts. Hence, a less-polarised way of meeting the challenges of climate change is to build policies upon development priorities that are vitally important to developing countries. Such an approach views the risks of climate change not as a burden to be avoided, but as a side-benefit of sustainable development. And this could then lead to an alternative strategy for establishing cooperation between developing and developed nations. Such a strategy should involve efficient utilization of natural resources, increase in service levels, lower spending by the consumer on resource-related expenditure reduction and also reduction in air pollution levels. In this connection, energy efficiency and clean energy technologies can play a significant role which provide a net positive economic benefit ─ monetary, health, and environmental ─ to the society as a whole. Investments in energy efficiency result in long-term benefits such as reduced energy consumption, local environmental enhancement and overall economic development[69]. Cost-effective energy efficiency is the ultimate multipollutant reduction strategy. Here we briefly describe various

[69] Sudhakara Reddy and Balachandra, 2006

win--win pathways for direct and indirect benefits under different types of projects and programmes aiming at spurring economic development and reducing the climate change impacts. These "No-regrets options" have the potential to be welcomed by both skeptics and supporters as they provide the dual benefit of climate change mitigation and economic improvement.

The concept of no-regrets can be considered as synonym for the concept of win-win. There are two types of no-regrets, respectively win-win outcomes:

(i)The first type — *economic win-win* — is achieved when a problem is mitigated at a negative net *economic* cost, thus leading to a win for problem solving and a win for the economy.

(ii)The second type — *financial win-win* — is achieved when a problem is mitigated at a profit (negative net *financial* cost), thus leading to a win for problem solving and a win for the particular investor, company, or industry.[70]

The distinction between economic and financial cost is important, because the number of measures that are economically viable is probably higher than the number of measures that are financially profitable. This is because in a detailed economic analysis externalities are taken into account, whereas in a financial analysis they are not. Few doubts that there are the proverbial $100 bills waiting to be picked up from the street, but the question is whether there are sufficient viable business propositions to make it worthwhile for businesses to alter their course and start systematically searching for win-win opportunities. The essence of the theory of private capital mobilization (PCM) is that win-win opportunities can be created.[71] In other words, if there are too few $100 bills on the street, it is possible to print them. Where there are such bills, but barriers too to get hold of them, it is possible to reduce, remove, or overcome these barriers. The key is to focus on those win-win opportunities that require only a small subsidy or intervention and that create large external benefits.

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[70] Among financial win-win opportunities, we must distinguish between immediate and delayed financial win-win opportunities. Immediate win-win opportunities yield a direct profit on a project, whereas delayed financial win-win opportunities improve corporate profits/competitiveness over time. Michael Porter, a professor at Harvard Business School, popularised the notion of delayed win-win opportunities (although he uses a different terminology). Porter argued that well-designed environmental regulation improves corporate competitiveness over time by prodding firms to invest in more efficient technologies that not only improve environmental performance but also lower costs and improve the bottom line (Porter and van der Linde 1995).

[71] See Assenza, forthcoming. *Mobilizing Private Finance for Sustainable Development: Wishful Thinking or Realistic Policy?* Olomouc, Czech Republic: Periplum.

If we want to get businesses and financial institutions to be active participants in solving problems, it is not sufficient to demonstrate that their participation will be good for the economy or the society as a whole, but we have to show that it will improve the balance sheet of the particular organization concerned. If financial win-win situations can be created by mobilizing private capital, it is possible to strengthen the case against the argument that companies can not afford to take environmental action.

Economic win-win situations contain activities that lead to positive environmental and developmental change. They do not involve significant tradeoffs between the environment and the economy. Economic effects, thereby, can have many different meanings such as GDP, number of jobs created, consumer benefits, business competitiveness, or average industry performance, and each researcher will have his or her own preference[72].

Financial win-win opportunities combine profit and sustainability. In this way, win-win opportunities overcome asymmetrical interests that have often prevented effective problem solving. It is worth distinguishing between real win-win arrangements that involve a net positive pay-off for all stakeholders, and relative win-win arrangements, where some parties may have to pay something, but not as much as under alternative arrangements. The latter is the case, for example, if car manufacturers facing a costly carbon tax, see a requirement to increase sales of clean cars as preferable.

There is another way to conceptualize the win-win issue by using a stakeholder perspective. From a narrow view of this approach, win-win outcomes are achieved if the participant benefits from a particular project. From a wider view, win-win outcomes are related on the distribution of benefits to all stakeholders, also to those that are not directly involved within a project. In an ideal scenario, the government will achieve its policy goals, such as for instance to reduce public expenditures, to improve the environment, or to protect disadvantaged social groups, firms and financial institutions will achieve their business objectives, such as for instance to make profits and to improve their reputation, and the civil society organizations will attain their aims, such as for instance to improve the environment, ensure democratic legitimacy, and prevent corruption. A win-win solution means to achieve those particular goals that the stakeholders define as such for themselves. These options should be looked at from various perspectives.

4.1 Governmental perspective: This perspective looks at the net costs of the no-regret measures as resource options based on the total costs to the government and the customer.

[72] Sudhakara Reddy and Balachandra 2003

This perspective includes national development goals, social equity, national priorities, self reliance, energy security, policy making, as well as institutions forming. Power industry is a case in point. During the power plant connstruction land, energy, steel, concrete, as well as transportation facilities are required. During the operation, power plants use coal with significant ash content and emit CO_2, SO_x, NO_x, etc., which pollute air, water and land. While pricing the electricity, we look at the capital and operating costs only and ignore these environmental and social costs. If all these costs are included, the costs of energy generation through these conventional technologies will be high and are comparable with energy through renewables. Another important issue is energy security that has to be tackled by the government. Over the last three decades, we have witnessed events that have transformed the outlook for the global oil market. The first oil crisis of 1973, the invasion of Kuwait by Iraq and the recent war on Iraq have resulted in sharp fluctuations in energy markets and reawaken concerns about energy security both for oil producers and consumers. Ensuring oil supply means being prepared to mitigate any short-term disruption of supply, and foster investment into a sustainable long-term supply. Mitigating short-term disruptions to oil supply involves use of oil stocks and emergency response measures, such as demand restraint, fuel switching, surge production. Securing reliable, competitive and environmentally sustainable long-term oil supply in the world is the responsibility of the government. Here, the role of energy efficiency and the diffusion of renewable of energy technologies will be significant for a reliable and secured supply of energy.

4.2 Business perspective: The relative novelty of the energy efficiency field together with its technical nature, and the invisibility of energy caused a lack of good information on energy efficiency technologies, their potentials, and costs.[73] There are also other issues pertaining to the attitudes of the business establishment. They include the lack of recognition of non-market needs of consumers, and the focus of the private sector on environmental remediation rather than pollution prevention. Leaving aside that business goals and the measurement of their successes are complex and a matter of debate, it can be safely assumed that businesses establishments are profit-seeking organizations. Energy efficiency involve efficient use of resources, which is key to industrial development. Industries not only prevent pollution but can also enhance profits by reducing energy and material use. They save the direct costs of these resources, as well as reducing disposal costs, avoiding fines, and minimizing bad

[73] Robinson 1991.

publicity. In addition, resource efficiency often enhances productivity, streamlines production, and improves workplace conditions.

4.3 Society perspective: Perhaps the most important, but least discussed and appreciated benefit of no regret options is the impact on local economies. Clearly, households, enterprises, and the government benefit directly by improving the efficiency of energy use. If they improve energy efficiency, they have more disposable income. However, there is an important net benefit to local economies, too. If expenditures on energy are reduced, the savings will improve the performance of the local economy via the 'multiplier effect' to the extent the savings are spent in the local economy. The multiplier effect is an economic phenomenon characteristic of all economies, relating the spending and re-spending effects of money on the output of local economies. Also, the expenditures on energy efficiency improvements themselves will improve local economic performance because the materials and labor for those improvements are likely to come from the local economy.

Table 4: Benefits to individuals and society through energy efficiency – Indian scenario

Service	From	To	Investment (Rs)	Energy Saved (GJ)	Savings (Rs/year)	CO_2 Emission abated (kg)
Cooking	WS-T (10%)	WS-E(30%)	250	16.0	1000	1680.0
	WS-T (10%)	Biogas	10000	19.4	1250	2520.0
	KS-T (30%)	LPG Stove	2000	2.3	300	226.2
Water Heating	WS-T(10%)	WS-E (30%)	250	4.6	250	487.2
	WS-T (10%)	Biogas	10000	5.7	320	840
	WS-T (10%)	Solar Water Heater	15000	8.0	500	840.0
	Electric Water Heater	Solar water heater	15000	3.2	1780	627.5
Lighting	IB (60 W)	CFL	140	0.75	660	190
	FL(36 W)	CFL	100	0.60	500	160
	Kerosene Lamp	CFL	100	1.1	830	296

Note: WS = Wood stove; T = Traditional; E = Efficient; IB = Incandescent Bulb, CFL = Compact Fluorescent Lamp
Figures in parentheses are efficiencies of the devices

Table 4 provides the economic costs and benefits to an individual household as well as carbon emission benefits to the society through technology shifts. As the table shows, a standard technology for cooking activity is replaced by an efficient one, the energy/per

family/per year will be saved to the tune of 50 to 300% depending on the type of technology that is being replaced. With the reduction in energy consumption, the GHG emission reduction also will be achieved. The use of efficient devices demonstrates the advantages of climate benefits in terms of reducing the emissions levels as well as reducing the incremental costs. Thus, the cost and benefits of reducing a tonne of emissions in technological (inefficient to efficient) shifts might be more than a ton of emissions averted while shifting from one fuel to another (kerosene to LPG). The estimates of carbon emission for lighting are indirect emissions due to the use of electricity generated mainly using coal.

Table 5: Employment benefits due to energy efficiency in EU countries

	Net employment (person/year)	Net employment per million invested	Net employment per million - government invested
Fiscal, residential schemes			
France	71400	12.9	106.9
Germany	-4200	-9.5	-31.7
UK	3815	9.3	9.3
Netherlands	1000	12.6	
Germany	3800	Negligible	
UK	17400	4.5	
-Miscellaneous (Others)			
France	81.7	11.5	11.5
Netherlands	3800	12	372.5
Spain	3344	50.7	265.4
UK	12260	98.1	

Source: Wade and Warren 2001.

Energy efficiency investment can create significant employment opportunities too. Although providing employment was never a key aim of energy efficiency policy, the positive employment side effects of policies and programmes will prove to be useful in building support for energy efficiency investments across various governments. New jobs can be created especially in manufacturing and the construction sectors. This is particularly the case where EE projects can demonstrate positive impacts for social groups currently disadvantaged in the employment market for example those with low skills and few qualifications, living in economically deprived areas. Joanne Wade and Andrew Warren, have co-authored a paper in which the employment impacts of energy efficiency investment programmes in nine EU Member States are discussed. Based on detailed case studies of 44

individual programmes and modelling of the wider effects, the study investigated short-and long-term impacts, both on total numbers of employed persons and on the skills mix utilized in the economy. The results confirm that there are net employment gains in virtually all cases. Table 5 illustrates these results in terms of net employment impacts.

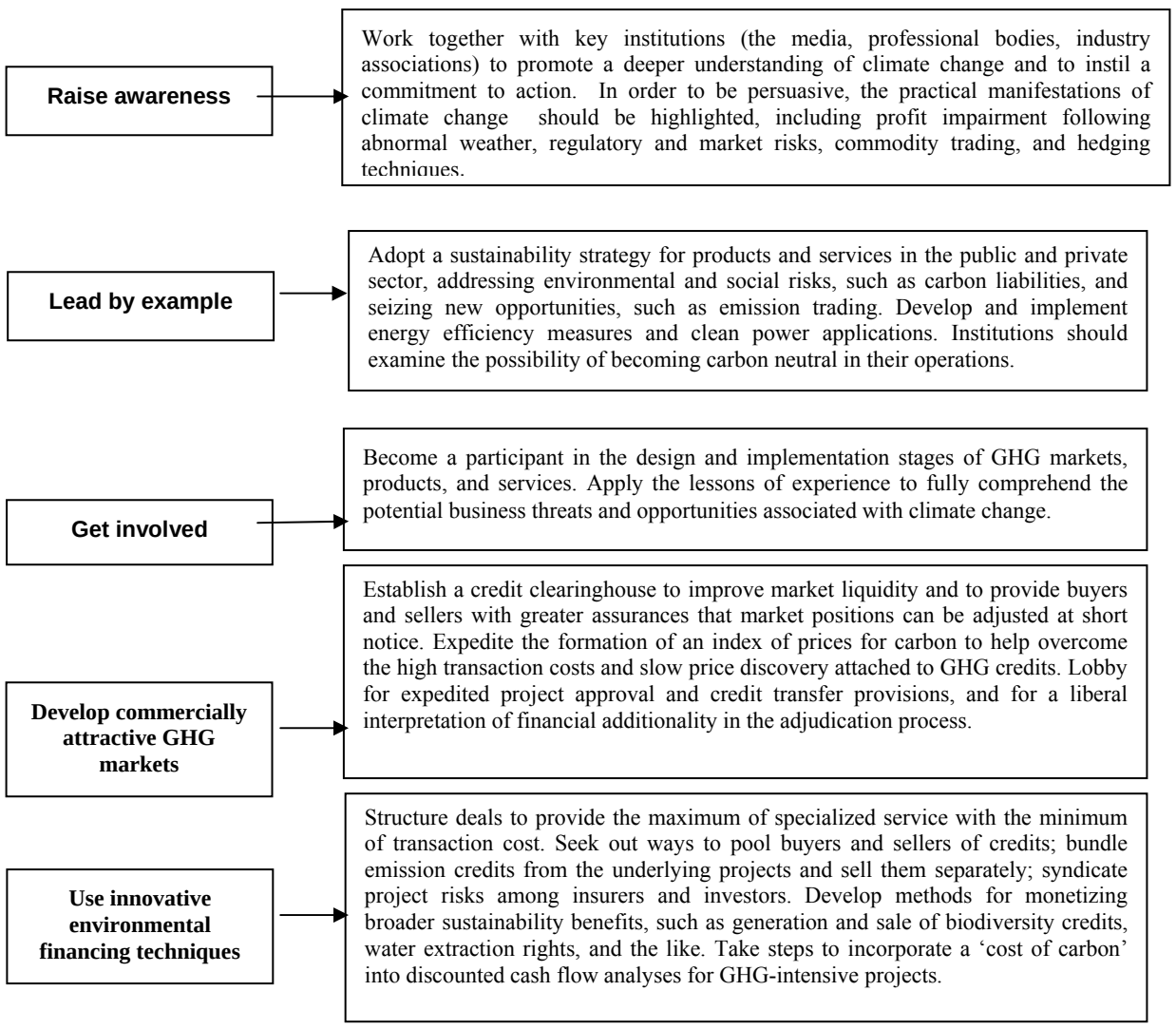

Figure 5: Recommendations for financial institutions and governments

Source: Adapted from Innovest 2002b, 37-43.

It can be noted that these are total impacts over an extended time period up to a maximum of 30 years in some cases. It is suggested that employment gains for fiscal and regulatory policies are of a similar magnitude to the findings of the case study approach. However, it is suggested that the case study approach underestimates the positive effects of institutional programmes such as EE initiatives. The modelling results suggest a median employment gain of 29 person years per million whereas the case studies identified effects in

the range of 8-14 person years per million. This difference demonstrates the fact that a case study approach cannot reflect fully the positive economic stimulus caused by private — rather than government — investment.

Finally we have to distinguish between win-win opportunities which are exploited and those which are latent. The first type are win-win opportunities, which do not require any intervention from governments, multilateral institutions, or other parties, because the private sector is aware of them and is exploiting them, already. As they are privately financed without special incentives already, there is no need to mobilize private capital. The second type of win-win opportunities are latent ones, Those may or may not be known to the private sector, and require a stimulus or some other form of intervention. The intervention may be regulatory, informational, financial, or a combination of these. The intervention may be economy-wide — affecting all firms and financial institutions — ,sector-wide, or targeted at particular companies and individuals. Any win-lose situation can be turned into a win-win situation by compensating the losers.

5. MARKET-BASED CLIMATE POLICY

All environmental policy instruments, including traditional command and control mechanisms, such as performance standards, and economic instruments, such as taxes and subsidies, can have an impact on private investment decisions. However, market-based measures have the greatest potential to attract profit-minded investors for climate change mitigation. The main idea of market-based mechanisms is to solve environmental problems in an economically efficient way by sending appropriate price signals to private investors to internalize the societal costs of their business decisions and to provide an economic incentive for firms to reduce those costs.

Marked-based measures are sometimes favoured due to ideological reasons. For example, because of the belief that the government is not capable or efficient in providing solutions.[74] However, markets require clear price signals and a legal framework. Therefore, market-based measures necessarily imply a role for the government. They would not thrive in an environment, entirely free of regulation, where the government does not provide clear rules and frameworking conditions.[75]

[74] Anderson and Leal 2001.

[75] Stavins 1989.

Warwick McKibbin and Peter Wilcoxen argue that mitigation policies, which do not minimize cost, are doomed to failure. For example, they propose coal market reform through reducing coal subsidies and trade barriers as a solution that will generate both economic and environmental benefits. Whilst price reform of this kind may disadvantage fossil fuel industries, the renewable energy sector can anticipate inflows of capital that would otherwise go to carbon-intensive industries.

Apart from subsidy reform, trading emissions may be an instrument with the greatest potential in terms of climate change mitigation. The first emission trading schemes have been developed in the United States.[76] The most well known programme is the sulphur dioxide trading scheme established at the beginning of the 1990s to tackle acid rain. This system enables firms to buy and sell rights to emit sulphur dioxide in a manner equivalent to buying and selling currencies in a foreign exchange market. The fact that it combines both environmental and economic benefits makes it attractive as a model for carbon trading systems. High penalties have prevented sources from violating the cap level – the maximum amount of allowable emissions. Indeed, since the acid rain programme commenced in 1995 sources included into the scheme comply with their caps at lower costs than predicted at the time the programme was implemented.

The experience has shown that the programme can ensure emission reductions at the least cost to society. This outcome should make it attractive even in the eyes of those who tend not to trust in market solutions. The programme is successful as the trade is beneficial for both, buyers and sellers. Sources that have a high cost of abatement can buy additional allowances at a lower price whilst sources that are able to reduce emissions below their cap are rewarded for better environmental performance by selling their extra allowances and making a profit. The total cost of reducing emissions through trading is smaller than that of other policy mechanisms. For instance, it was calculated that the Danish goal of 21 percent and the EU goal of 8 percent of GHG abatement would be achieved 9 and 24 times more costly by using taxation policy than with the use of emission trading.[77]

With regard to pollution permit trading, there is a clear incentive for decreasing emissions, because there is a monetary value attached to allowances. Emission trading systems stimulate research and development, as the business sector can anticipate profitable

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[76] See Hahn's classic article 'Economic Prescriptions for Environmental Problems: How the Patient Followed the Doctor's Orders' (1989) for a review of early efforts to achieve emission trading and emissions charges in the US and Europe.

[77] Svendsen and Vesterdal 2003.

emissions abatement. Furthermore, emission trading systems provide high flexibility in choosing which type of emission reduction — including investment into abatement technology, fuel switch, energy efficiency measures, or utilization of renewable energy sources — is most suitable, In contrast, command and control approaches that, for example, specify the types of pollution control devices to be installed do not provide the same degree of flexibility.[78]

In 2008, a new scheme will come into operation, which promises to become the largest emission trading market in the world. The European Union's Emission Trading Scheme (ETS) would be applicable not only in the EU, but also in accession countries and the countries of the European Economic Area. The ETS is designed to contribute to the greenhouse gas reduction commitments under the Kyoto Protocol. The first emission trades have already been agreed to, indicating the interest of private sector actors. For example, Shell Trading will sell a considerable number of allowances to Nuon during the first compliance year.[79]

A study undertaken by Enviros Consulting, which evaluated the UK carbon trading programme, concluded that the scheme provided local companies with the necessary experience to enter the EU-wide emission trading system and other international carbon markets. At the same time, the study questions the effectiveness of the programme in decreasing UK carbon emissions. However, the authors of the study hope that as the scheme matures it will contribute to the UK Kyoto target more significantly. To improve the operation of the programme, Enviros Consulting recommends to change voluntary enforcement mechanisms into mandatory ones.[80] Another major instrument for climate change mitigation is environmental taxation. Several industrialized countries introduced taxes on the carbon content of oil, coal, and gas. This measure is designed to cut the use of carbon-intensive fuels and increase the use of cleaner energy, thereby decreasing GHG emissions. In comparison to environmental taxes, emission trading may be more effective in terms of reaching an emission target, since it sets a strict emission goal. On the other hand, a tax may provide more up front certainty as to the cost of the programme, and it can be used in market segments where the establishment of an emission trading scheme is impractical or unwieldy. A mix of emission trading and environmental taxes may be the most effective approach in

[78] US EPA 2002.

[79] Shell 2003.

[80] Enviros Consulting 2003.

many countries. The former instrument is better applicable to large polluters, while the latter better suits small polluters.[81]

If an emission trading system is implemented at an international level, it could create strong demand for investment projects designed to reduce GHG emissions. Private capital could be mobilized through this mechanism because GHG reduction projects would yield credits that can be sold in the market. Firms that are able to reduce greenhouse gases at a price below the trading price can make a profit out of mitigating climate change. In this way, climate change could become the basis for a growing sector of business activity, ultimately developing into a major economic driving force in the coming decades. Specialists from Natsource, DZ Bank, and other organizations involved in climate change mitigation see a big advantage of a carbon market in that it will enable '(…) bringing future revenues from forward GHG contracts to the beginning of the project, rather than payments at the back end.'

There are also critical voices concerning emission trading schemes.[82] For example, Martin Tampier argues that the renewable energy sector will not be able to benefit from the ETS since renewables will not be covered. The only possibility for them to get involved is to offer renewable energy to those, who might wish to substitute for fossil fuel generation. Moreover, for many firms, paying the non-compliance penalty might be cheaper than reducing their emissions. A low penalty would encourage many firms to prefer non-compliance rather than investing in more expensive clean technologies. Further, an emission trading scheme may not, in itself, be sufficient to achieve broader policy objectives such as renewable energy development. It is not clear if emission trading will help renewables to cover the gap between production costs and electricity prices, and thereby, to become more competitive with conventional fuels. However, the future may bring a decrease of renewable energy prices and at the same time an increase in the prices for emission credits and energy from fossil fuels.[83]

Currently energy efficiency projects may be better suited to take advantage of emission trading, while renewables could benefit from Joint Implementation. However, this assumption should be subject to further research. The Transnational Institute states that Joint Implementation and the Clean Development Mechanism favour implementation of large scale renewable energy projects since small ones have more difficulties in measuring and

[81] Svendsen and Vesterdal 2003.

[82] See for example Victor 1991, for a critical perspective on market-based mechanisms.

[83] Tampier 2003.

identifying energy production. According to Bachram et al, 'This undermines diversity and innovation in the renewable energy sector as a whole.'[84]

In terms of actual policy developments currently under implementation, the development of a GHG trading system would be an essential component of a reform of incentive structures. If the effectiveness of such a system is not whittled down in negotiation, and if compromise does not result in the lowest common denominator, GHG trading has the potential to mobilize large sums of private capital, especially if combined with carbon taxes and other policy instruments. The question is how to make these ideas working in practice. In order to make GHG markets operate efficiently, the main tasks include producing demand, enhancing buyer confidence in pricing, bringing greater liquidity to the GHG market, overcoming the short-term cash flow problems, and creating larger economies of scale.[85]

The main task for private investors is to calculate the effects of GHG regulations and carbon price sensitivities into the analysis of project economics.[86] The interest of investors will increase if it can be shown that technologies become cheaper as a result of commercialization and that GHG emission markets offer opportunities to create profits from project cash flows and advisory fees. The alternative to voluntary action on climate change are higher taxes and stricter environmental regulations, as well as higher indirect costs due to environmental and health damages which ultimately are paid by households and firms. An important advantage of GHG trading is that it includes incentives based on self-interest, such as for instance, direct profit opportunities for firms which can reduce pollution at less than the trading price. Thus, GHG trading is not favoured by arguments about enlightened self-interest, although these arguments may be important to long-term profits and business competitiveness.

Market-based mechanisms should not be treated as a panacea for solving environmental problems, since there are cases, which require complementary mechanisms including economic instruments and command-and-control approaches. However, market-based provisions should be further investigated and exploited when they offer advantages. The US sulphur trading programme has shown that market-based approaches can be cost effective in mobilizing private capital for clean technologies, which gives ground for optimism concerning carbon trading schemes. Using a mix of measures, climate change

[84] Bachram et al 2003, 22.

[85] Innovest 2002b.

[86] Innovest 2002b.

mitigation policy can provide a stimulus for speeding up the commercialization of clean energy technologies.[87]

6. DISCUSSION – DEVELOPING COUNTRY PERPSECTIVES

The impacts of climate change can be reduced if a transition is made from supply obsessed planning to focussing on demand side management and renewable energy programms. The driving forces for the promotion of such a sustainable energy path may shift increasingly from regulation to opportunity. While for a long time businesses adopted strategies of avoidance and outright resistance, in recent years an increasing number of them have begun to explore the profit potential of clean energy technologies. Oil giants redefined themselves as energy companies and, together with a host of engineering and technology companies, increased their exposure to clean energy technology.

The more win-win opportunities exist, the cheaper is it to achieve economic and social development. In fact, as long as win-win opportunities are exploited, achieving economic development and at the same time mitigating climate change are economically and financially viable. However, although win-win opportunities are profitable, this does not necessarily mean that they are privately financed and that there is no need to mobilize government capital. Due to a variety of barriers, the private sector cannot take advantage of all profit opportunities. Since it is unlikely that all profit opportunities have been recognized and exploited, traditional policy options and market-based measures can enable profit-minded investors to take advantage of environmental business opportunities. If win-win opportunities are sizeable, the question is how to realize them cost effectively and make them commercially self-sustaining over time. This question merits further attention by policy makers and the business community (Figure 6). In the absence of demonstrated linkages between different sectors, the technology options are given a superficial treatment by policy-makers. To illustrate an example, access to electricity and subsidised kerosene is justified from the perspective of reduced forest loss. Reduced expenditure on health and retention of a healthy and productive community is seldom quantified. Policy-makers would provide increased budgets for rural health care without considering a complementary budget for the diffusion of renewable energy technologies or electrification programs. This does not demonstrate poor performance on the part of policymakers but highlights the need for a pool

[87] See Chapter 9 for an analysis of commercialization.

of skills and resources for assisting policy-makers in justifying decisions taken in the process of planning rural development (ISSD, 2003).

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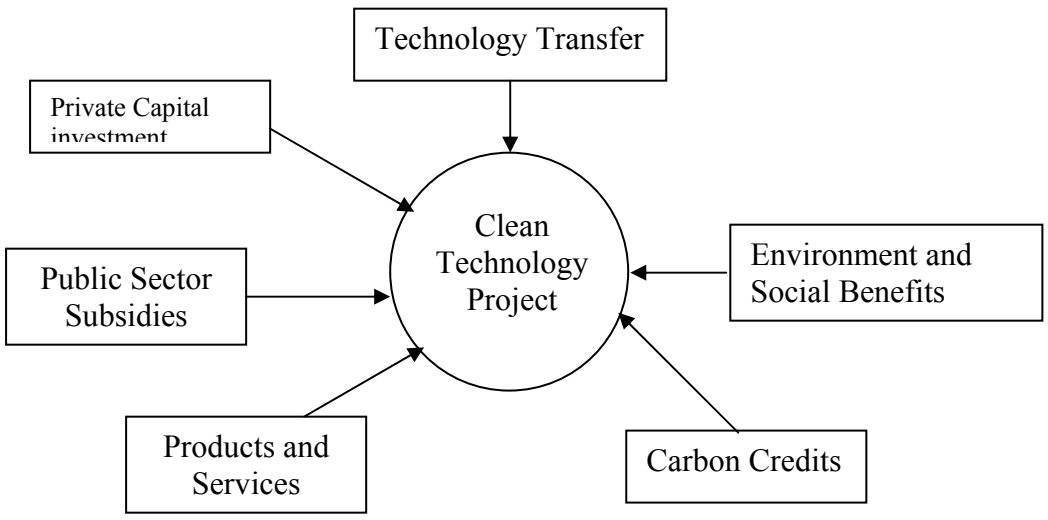

Figure 6. Cost Benefit of a Cleaner Technology Project

In short, economic prosperity, human development and environmental benefits should move hand in hand. Conversely, high-energy use places an enormous burden on long-term economic development and poses critical problems to improving living standards, particularly those from the developing countries. Energy inefficiency becomes a drain on factories, machinery, and resources, affecting competitiveness. Hence it is important to invest in the efficiency of the energy supply systems and reduce losses on the demand side. However, it is a matter of disagreement how many opportunities are available, and what percentage of an environmental target can be achieved with efficient technologies and win-win options. Nonetheless, it can be safely argued that that there are plenty of these no-regrets opportunities, and that development can be achieved through these options and climate change can be mitigated in a cost-effective way without undermining prosperity.[88]

From the perspective of developing countries, international agencies, such as the United Nations have not adequately addressed their priorities for sustainable development. These agencies provide policy advice to the developing countries to focus on climate change issues as top priority since it might be difficult to implement them in many developed

[88] See for example Pew Center 2001; Innovest 2002a; Lovins and Lovins 1997.

countries which are the real culprits. This is unfair to make the developing countries repay the environmental debt of the developed world. For the developing countries, climate change issues are not the main concern when compared with problems such as poverty, natural resource management, energy and livelihood needs. It may often be possible to build environmental and climate policy around development priorities that are vitally important from the developing country perspective. The climate change benefits will eventually come as a result of implementing these policies. In such a scenario climate change policies may be seen not as a burden to be avoided but rather as a attendant benefit of sound and environment friendly development projects and programmes.

In the interest of global sustainability and moving on to environmentally more desirable paths, the concept of economic and social development should be the top priority for developing countries. This means that climate change issue must be viewed through the lens of human development. The challenge for such a type of development is the practical question of choosing sustainable pathways that provide food and energy security, employment opportunities and at the same time minimize environmental impacts. Instead of focusing attention on policies to reduce climate change risks, the starting point should be the development issues that are vital to the economic development and how this can be achieved in an environment-friendly manner. This means that environmental policies should be derived from development priorities. This needs a conceptual framework that places sustainable human development before climate change by reversing the existing framework. For that one has to find out alternative and cleaner pathways to achieve sustainable development goals that can also contribute to climate change goals. To achieve this objective one has to reframe the global climate change debate as deriving from and complementing development priorities which can be approached on multiple levels and from various perspectives and should take into consideration the rapid economic growth to be achieved by developing countries. There is also the need to build scientific and technical capacity, advancing scientific knowledge, and linking economic, social, technological and policy making. This "reversal thinking" should map development, equity and vulnerability on to the greenhouse gas emission problem. The determinants of this include financial resources, technology, and importantly the availability of trained persons to use them effectively. Access to information and institutional mechanism (legal, social, etc.) is also important

For developing countries, climate change remains marginal to the pressing issues of poverty, natural resource management, food security, energy needs and access to modern transport or land use that takes into consideration development, equity and vulnerability and

capture the attention of leading stakeholders. Presently, the cooperation efforts and analyses of climate change policies have been driven uniquely by concerns of the developed countries. From this perspective, related ancillary benefits in energy efficiency, and health impacts of local air pollution may be significant and promote actions, but they are only of secondary importance in that they may reduce the total costs of compliance with climate change commitments. Such an approach will have limited success in developing countries. The challenge then is to have an integrated development and environmental policies so that the developing countries can stay on the paths that minimize the local and global environmental costs of relieving poverty, providing adequate food, getting electricity to households and industry, providing employment and transportation facilities consistent with the needs of developing country people. It may not be easy to reframe global environmental policies as deriving from development priorities and solve the climate change problem. However, this new framework suggests that global collaboration on climate change should be approached at multiple levels through local and national development projects, as well as through multilateral efforts to establish cooperation mechanisms within an equitable and efficient global climate change regime.

According to this approach, a less-polarized way of meeting the challenges of sustainable development and climate change is necessary to build environmental and climate policy upon development priorities that are crucial to the billions of people form the developing world. For example, international financiers are expected to prioritize projects that have a low financial cost per unit of GHG emission reduction, while national stakeholders are keen on national benefits of the activity in the form of employment generation, social development, and local environmental improvements. Following that, it will be relevant to measure multiple financial, economic, social and environmental benefits of mitigation policies and then negotiation can take place between national stakeholders and international financiers to develop a portfolio of policy options that balance sustainable development and climate change policy priorities. Another issue is the issue of generalized methodologies. The parameters that are included in the models vary significantly by nation and region, and with time. Hence, it is important to develop localized models of environmental impacts, population exposure, preferences and valuation. This type of methodology is useful in understanding synergies and tradeoffs between global and local environmental policies. Research is required on inter-linkages between sustainable development and climate change policies.

Adaptation and mitigation strategies have to be developed for sectors such as energy, transport, land use, industry and waste and see how such plans can be implemented in practice. In many countries, energy initiatives and other climate-favouring activities emerge as additional benefits of sound development programmes. Price reform, agricultural soil protection, sustainable forestry, energy sector restructuring are being undertaken without any reference to climate change. These initiatives help in mitigating environmental risks and at the same time they enhance economic and social development.

However, a number of barriers ─ technical, financial and capacity ─ exist for implementing these initiatives[89]. Barrier removal is an essential part of technology transfer and efficiency improvement. In this regard, public sector participation in technology diffusion should be seen as a way of obtaining economic, environmental and social benefits of clean technologies since private sector cannot be expected to bear the full transaction cost for barrier removal. To achieve this policy-makers need to design appropriate policy measures to promote cleaner technologies. There are also chicken and egg problems facing energy efficiency and renewable energy technology (RET) markets. On one hand, the capital markets will not finance RET projects in the absence of a sufficient volume. On the other hand, the market for RET projects will not develop to be of a sufficient volume in the absence of adequate financing. Such issues have to be addressed. An innovative financial, institutional and implementational mechanisms is needed that can support such integrated objectives.

7. EPILOGUE

There is a need for using sustainable development as a framework for climate change policies. Regarding the principle of sustainable development, creating a system and making it acceptable to all is of paramount importance. This creates a huge ethical problem. A rich person in a developed country can complain bitterly about the way poor countries are allowing their environment to be destroyed by economic development. On the contrary, a poor person in a developing country, ever doubtful about getting food, health care, education, would leap with joy at any improvement in the situation, and would not care for any environmental damage unless it affects his livelihood. How do we balance short-term benefits to the population with the long-term interests of preserving the environment? In

[89] Sudhakara Reddy, 2003

such a situation, the framework that is developed should reflect the needs of developing countries and provide a constructive basis for combining the policies of local development and global climate change. For the implementation of such a framework the international climate change policies should be linked to sustainable development. There is also a need for a more systematic assessment of various institutions, market instruments and regulatory frameworks that can be used to support the implementation of these policies.

A goal to "stabilise world climate" is misplaced, not to mention its unattainable nature. Climate is a dynamic system within which extreme events and dramatic changes will always occur, irrespective of human actions or preferences. It is widely agreed that the climate is changing but its future trajectory and impacts on the environment and society remain uncertain.[90] There can be little doubt '(…) that man is capable of influencing the climate through human activities of many different kinds.'[91] Although a matter of some debate with regard to the data reliability, the curve of the global mean temperature has been rising since 1861 and although no single explanation for global warming can be given the greenhouse effect is a plausible one. This effect is attributed to the greenhouse gases CO_2, CH_4, N_2, O, O_3 and FCCs.[92]

The clash between sceptics and supporters is likely to endure, and may even become more pitched as the stakes on climate change are raised. The expansion of scientific knowledge is unlikely to end the debate, as each side will get more data to confirm their case. Sceptics will continue to assail supporters for blending science with environmental activism, and supporters will maintain their doubts about the scientific credibility of sceptics, because of their links to economic interests.

Regardless of who is right in this debate, each side is valuable to the other. A vocal group of contrarians is necessary to achieve scientific progress, since it forces supporters to improve their science and vice versa. It is necessary to point out the flaws in assumptions, logic, and method, and to propose counter-arguments for every argument. The problem is not the scientific controversy, but the way in which science is used by economic and political interests, and the risk that scientists become pawns in a high- stakes political game.

Development may well be a better strategy for reducing the impacts of climate change than focusing on greenhouse gas emission reduction. Developing countries, with less ability

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[90] Santamouris 2001, 22; Heal and Kriström 2002, 3.

[91] Santamouris 2001, 19.

[92] Santamouris 2001, 25.

to prosper, afford and use new technologies, have higher rates of hunger; poorer public health services; greater incidence of infectious and parasitic diseases; less access to education, safe water or sanitation; and, therefore, greater mortality rates and lower life expectancies. It is a proven fact that there are a large number of `no-regret options' waiting to be exploited. These options have the potential to be welcomed by skeptics, supporters as well as neutral observers as they provide the dual benefit of economic improvement of the masses and climate change mitigation, a concept of win−win situation. Hence the resources that are spent on emission reduction for the sake of avoiding impacts are better spent on vulnerability reduction in developing countries. This approach would enhance societies' abilities to cope not only with climate change but adversity in general, regardless of its cause, or whether it's man-made or not. Such a multifaceted and holistic approach would help to improve the lives of people living in poverty, without compromising the ability to address future challenges, whether caused by climate change, or something else entirely.

To compare the two strategies to reduce the impact of climate change, one has to address the tradeoffs between environmental protection and development in general, or even between emission reduction and development aid. In a narrow sense, cutting emissions helps alleviating malaria and water shortage. In a broader sense, the same money can be spent differently to alleviate malaria and water shortage even more. Only by considering the broader question can we decide how much effort should be expended on development, thereby on greenhouse gas emission abatement.

The climate negotiations will succeed only if developing countries are driven by development priorities, and if there are countries or groups of countries among them willing to take a leadership role to push the process forward. In the absence of leadership, even well-intentioned players remain uncoordinated, which increases the transaction costs. Hence, the issue of climate change should be approached at multiple levels through local and national development projects, as well as through multilateral efforts to establish cooperation mechanisms within an equitable and efficient sustainable development regime.

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