



# Enhancing Cooperation

## Report of the High-Level India-EU Dialogue

July 2009

The High-Level India-EU Dialogue is an initiative of Action for a Global Climate Community (AGCC), a London-based Non-Governmental Organisation. The Dialogue stimulates an open discussion and evaluation of ideas on the key questions of reducing global emissions, sustainable development and the political and economic strategies to achieve these aims.

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## Executive Summary

India and Europe need to work together towards restructuring global political and economic structures, within the context of tackling climate destabilisation. Both India and the member states of the European Union recognise the vital importance of the rule of law in a world that is threatened by lawlessness, and which will grow steadily more dangerous with climate destabilisation. Both India and the European Union are facing major concerns over environmental security. Both have evolved political systems that are based upon democratic parliamentary accountability and cultural and religious pluralism. Both accept ethical principles of equity and differentiated responsibilities in tackling climate change. Both need to tailor their policies to the needs and aspirations of their electorates and, above all, both need to show that their policies are able to create jobs and maintain long term sustainable economic development.

**While the High-Level India-EU Dialogue does not concern itself with the detailed negotiations taking place under the process leading to Copenhagen, cooperation in the key field of sustainable development, in particular in the context of climate destabilisation, is a natural fit for the India-EU partnership.**

The time for enhanced cooperation is now. At a time when economic stimulus to the global economy is required, there is an opportunity to focus much of the stimulus on green, climate friendly action. The private sector has a key role to play, operating within a framework set by Government. Together, the EU and India need to identify how and when European and Indian per capita emissions might converge. But to make progress, tangible collaborative projects are required.

### Flagship Projects

Central to the High-Level India-EU Dialogue has been an analysis of the potential for major collaborative flagship projects that could demonstrate practically the importance of enhanced India-EU cooperation in the establishment of a low-carbon economy. Participants shared the view that working together on major projects would not only show what could be achieved but would also build a greater trust and understanding between India and the EU.

This report lists four areas for potential Joint India-EU flagship programmes:

1. **solar energy (CSP and photovoltaic);**
2. research into, and implementation of, **adaptation programmes;**
3. tackling the effects of **black carbon;**
4. research into the potential for **biochar**, and implementation of subsequent programmes.

In all of these areas, a joint India-EU approach could play a major role not only in reducing the potential impact of carbon emissions on climate destabilisation but also in essential research, development and training that could allow both partners a global competitive advantage and push them to the forefront of new and innovative technology.

It is clear that the issues of technology transfer and intellectual property rights (IPR) must be resolved urgently and this will require a joint agreement that neither prevents risk taking and investment nor creates a price barrier that prevents innovative solutions from being widely used in poor communities.

A further example of potential collaboration is in the area of leveraging international financial flows for climate change. The establishment of a significant private and public sector Euro 50-100 billion 'Fund-of-Funds' partnerships could be a way forward.

The potential for an imaginative programme of flagship projects lies at the heart of the India-EU Dialogue recommendations. It is critical that the 'ownership' of Flagship Projects should be assumed at a political level by both partners and that a coordinating mechanism should have clear lines of reporting to both parties on a regular basis and annually to the India-EU Summit.

### The Institutional Partnership

Without diminishing or undermining the important work undertaken by the existing EU-India mechanisms, this report suggests that the process of enhancing India-EU cooperation requires that these mechanisms be strengthened.

There are three key reasons for advocating such a strengthening:

1. the need to coordinate and rationalise the work of existing joint institutional mechanisms (listed in Appendix II) and to set a strategic road map for long term enhanced co-operation;
2. the need to bring together all the technical, financial and political factors required to drive forward Joint Flagship Projects referred to in the joint EU-India Summit Communiqué of 2007;
3. the need to create a strategic framework that will encourage and enable private investment to develop new technologies.

Strengthening, coordinating and enhancing India-EU partnership could unleash new energies and tap into the skills, talents and entrepreneurial potential of people in India and the EU member states and be in the vanguard of the so-called '*Third Industrial Revolution*'.

Many of the existing EU-India bodies feed their reports and recommendations to the annual India-EU summit meetings that take place alternately in India and the Member State that holds the EU Presidency. The last such meeting was held in Marseille under the French Presidency of the EU in September 2008 and concluded with a strong statement of commitment to joint action to climate change and energy security. The joint communiqué affirmed that: "*the EU-India Initiative on Clean Development and Climate Change, the EU-India Energy Panel and the EU-India Science and Technology Steering Committee are the relevant fora under which bilateral cooperation can be advanced on these important global issues.*"

One of these mechanisms, for example the EU-India Energy Panel or the Science and Technology Steering Committee, should be given the clear lead and political authority, flowing from the Summits, to take

forward work in the area of climate de-stabilisation. It could then play a vital role in coordinating the work of the many separate technical committees and working groups, thereby providing a strategic direction and maximising their effectiveness.

Reports on progress would be submitted to the annual India-EU summit meetings but there would also be the need for political engagement from both sides on a continuing and continuous basis between summits. There will be a need to

- draw together the reports of the various working groups into the coordinated body of agreed recommendations;
- propose clear targets for enhanced cooperation on flagship projects, joint research and modelling and adaptation to the annual India-EU Summit meeting;
- oversee the execution of decisions taken by the annual India-EU summits;
- evaluate key projects for recommendations to the India-EU summit;
- encourage dialogue with civil society organisations able to assist in the implementation of strategic goals;
- prepare the agenda and the necessary papers for the annual India-EU summit meetings working closely with all the directorates general of the European Commission, Indian ministries and relevant EU member states' administrations.

The Panel or Committee could be strengthened with a small permanent secretariat of civil servants from India and the EU, based in Delhi and overseen by an Action Group or Task Force of six senior people – representing the Commission, the Presidency (on behalf of the Council of Ministers) and Parliament from EU, and the Ministry of Foreign Affairs, Prime Minister's Climate Panel and Lok Sabha from India – to give the strategic partnership political weight between Summits, to prepare the Summit.

## 1. Introduction

*“India and the EU, as the two largest democracies of the world and global actors in a multipolar world, underscored their commitment to the Strategic Partnership launched at The Hague in November 2004. They reaffirmed that the Strategic Partnership flows from a shared conviction in the values of democracy, fundamental freedoms (including religious), pluralism, rule of law, respect for human rights and multilateralism in the international political architecture as the means to tackle global challenges effectively. They expressed their determination to further strengthen the Strategic Partnership and to cooperate at the global level for the cause of peace, security and sustainable development for all”.* (India-EU Joint Statement issued at the conclusion of the New Delhi Summit, 30<sup>th</sup> November 2007)

The High Level India-EU Dialogue was created in order to turn these aspirations into reality. While some important steps have been taken to enable India and the EU to find a way to tackle jointly the crucial issues listed in the Joint Statement, a great deal remains to be done. Most especially, the urgent task of tackling climate destabilisation, within the context of fulfilling India’s developmental needs, has not received the priority action it requires.

The objective of a strategic partnership between India and the European Union will only be realised if practical steps are now taken and a new level of enhanced cooperation implemented. Existing joint India-EU institutional mechanisms have identified important areas for collaboration in the fields of energy, research and technology transfer. They are not sufficient as they currently stand, however, to drive forward the range and scale of Flagship Projects envisaged by the EU-India Joint Statement, most especially the central task of enabling India to rapidly develop its capacity for solar energy.

**The High Level India-EU Dialogue does not concern itself with the detailed negotiations that will reach a critical stage in Copenhagen later in 2009.** Its distinctive purpose has been to explore new and practical ways to enable India to meet its economic and developmental goals while reducing its dependence on fossil fuels. **Its central conclusion is that enhanced cooperation would stimulate the creation of new, lasting and environmentally beneficial jobs in both India and Europe and unleash creative talent in both sub-continent.**

At the heart of the India-EU Dialogue has been the ethical concept of equity. In its National Action Plan on Climate Change, the Indian government states quite clearly its position on equity: *“We are convinced that the principle of equity that must underlie the global approach must allow each inhabitant of the earth an equal entitlement to the global atmospheric resource. In this connection, India is determined that its per capita greenhouse gas emissions will at no point exceed that of developed countries even as we pursue our development policies.”*

The Final Declaration of the Potsdam Symposium of Nobel Prize winners (October 2007) urged to *strive “for a long-term convergence to equal-per-capita emissions rights accomplished through a medium-term multi-stage approach accounting for differentiated national capacities.”*

In the absence of agreed global reduction targets and without prejudging the result of the Copenhagen negotiations, it is essential that resources be devoted to identifying how and when European and Indian per capita entitlements might converge. Such an exercise would make explicit the underlying economic objectives of both India and Europe and enable an objective scientific calculation on the interaction between those objectives and GHG emissions; it would also make a significant contribution to the global debate on equity.

The High Level India-EU Dialogue has held three meetings – in Potsdam in May 2008, in Delhi in February 2009 and in London in July 2009. The meetings were designed to allow the participants (listed in appendix III) to think creatively and discuss new ideas freely and openly, away from the restrictions of formal negotiations.

The conclusions of the Joint Chairmen of the Dialogue – Mr Nitin Desai and Sir Crispin Tickell – reflect the broad consensus of the meetings. Before the Delhi seminar, the following letter from the office of the President of the European Commission was received:

*“The Potsdam meeting that you (Action for a Global Climate Community & Potsdam Institute for Climate Impact Research) organised in May 2008 sought to discover imaginative and practical ways for the European Union and India to tackle together the important question of climate change.*

*In particular we should be interested to learn as to how the EU and India might work more closely on this issue. In particular, we should be interested to learn what suggestions have been made on institutional links that might lead to long term enhanced cooperation and on any practical projects, most specifically in the area of solar power, biomass and*

*combating the effects of black carbon, that have been proposed. It would be helpful to receive this information in time in view of the next EU-India summit.”*

This report will endeavour to answer these questions.



## 2. Needs and Opportunities

### The Challenge

It has become indisputable that a rise in global temperature will not only have a catastrophic effect on ecological stability and diversity, but will also have a major impact upon economic growth and development, particularly amongst those in the poorest communities where climate destabilization and poverty are closely interlinked. *“India’s huge majority of rural population and the poor, who depend on natural resources for their livelihood, will be most at risk due to climate change.”*<sup>ii</sup> It is also clear that there is still a vast gap between scientists’ warnings and political decision making, and that even brave decisions are now unlikely to contain the average global temperature increase within the 2° centigrade target suggested by the EU and others.

In a paper published in 2008, Professors V Ramathan and Y Feng stated that the observed increase in the concentration of greenhouse gases (GHGs) since the preindustrial era has most likely committed the world to a warming of 2.4°C (1.4°C to 4.3°C) above the preindustrial surface temperatures. This surpasses the currently perceived threshold range of 1°C to 3°C for dangerous anthropogenic interference and will have a profound impact on many of the climate-tipping elements such as the summer arctic sea-ice, Hindu-Kush Himalayan-Tibetan glaciers and the Greenland Ice Sheet. This rise in global temperatures could be catastrophic for our global ecology.<sup>ii</sup>

Of particular relevance to India is the fate of the Hindu-Kush Himalayan-Tibetan glaciers. As is recognised in India’s National Action Plan on Climate Change, sustaining the Himalayas is a priority for India. The geopolitical implications, let alone the human disaster, that would be caused by the rapid melting of the Himalayan glaciers would be devastating. **1.4 billion people depend for more than half of their drinking water on the rivers and spring systems that flow from the ice of the Tibetan plateau which is now melting at an alarming rate.** Stemming the decline of these glaciers is of critical concern. Black carbon, a component of soot, has been shown to be a major contributor to the decline of these glaciers. Addressing the source of black carbon therefore offers a vital way forward.

The Stern Report (2006) concluded that the costs of climate change over the next two centuries, under

business as usual, could be similar to a loss of 15% of global consumption per head, now and forever and that to stabilise eventually at 500-550 parts per million (ppm) CO<sub>2</sub> equivalent would cost around 1% of global GDP by 2050. The stabilisation target needed is now widely seen to be lower however. Some more recent analyses suggest that global cumulative costs of a more ambitious low-stabilisation scenario of 400 ppm equivalent (after overshooting) could be up to 2.5% GDP through to 2100.<sup>iii</sup>

India is particularly vulnerable to extreme weather events. India’s National Action Plan on Climate Change makes it clear that heavily populated regions such as coastal areas are exposed to climatic events, such as cyclones, floods and drought, and large declines in sown areas in arid and semi-arid zones occur during climate extremes.<sup>iv</sup> Furthermore, the Plan makes it clear that current government expenditure in India on adaptation to climate variability exceeds 2.6% of GDP, with agriculture, water resources, health and sanitation, forests, coastal-zone infrastructure and extreme weather event being specific areas of concern. These are costs that will have a direct impact upon India’s economic growth and are, in large measure, the results of over a century and a half of fossil fuel consumption in the developed world.

As risks from climate change develop, insurance costs will rise dramatically with a major impact on both corporations and disposable income. Over 95% of deaths from natural disasters in the last 25 years occurred in developing countries. Direct economic losses (averaging Rs 2.4 trillion/€ 35.3 billion per annum in the last decade)<sup>v</sup> were more than twice as high in low-national-income countries as in high income ones.<sup>vi</sup>

In 2007, Dr Lawrence Saez and Mr Mahesh Vipradas suggested that: *“The sustainability of India’s long term economic growth is jeopardized by the fact that the demand for energy far outstrips the country’s ability to produce it.”*<sup>vii</sup>

### India's electricity capacity

India's electricity installed capacity as on 30 April 2009 is 148,265 MW. The capacity at the end of the 10<sup>th</sup> Plan (31 July 2007) stood at 132,329 MW. With a planned capacity addition of 78,000 MW in the 11<sup>th</sup> Plan, this is likely to grow to some 200,000 MW by 2012.

In April 09, there was a 12.2% deficit towards peak demand of 110,946 MW and energy shortage of 10.4% from a requirement of 65,125 MU.

The 2001 census finds nearly 700 million people without access to modern energy. Nearly 300 million people do not have access to electricity and 625 million do not have access to modern (cooking) fuel <sup>viii</sup>

India is, therefore, vulnerable to both supply risks – associated with the maintenance of a reliable supply of oil – and market risks related to sudden increases in oil prices caused by a disruption. Furthermore, domestic coal supplies, which provide 53% of India's energy, will not last beyond 2040/2050. <sup>ix</sup>

Alternative energy supplies are therefore critical.

### Benefits of Enhanced Cooperation

Achieving environmental and energy security by increasing its supply of renewable energy lies at the heart of Indian government policy, as outlined in the National Action Plan on Climate Change. Within that policy lies an opportunity to build and develop - in partnership with the European Union - a strong green economy. Such an economy could not only limit the use of environmentally damaging GHGs but also play a major role in stimulating demand and employment both in India and in the EU.

Such a partnership could help to trigger a 'Third Industrial Revolution' and reduce carbon dependence. It could also lead the way in showing the possibilities of a Global Deal on Climate Change as outlined by the LSE's Grantham Research Institute, The Potsdam Institute on Climate Impact research (PIK) and the European Commission, the key elements of which include:

- the establishment of a global carbon market;
- technology cooperation and sharing;
- action to slow deforestation;
- funds to assist adaptation to residual climate change in developing countries. <sup>x</sup>

The impact of climate change under business as usual will be devastating for growth and employment in both the EU and India and will hold back India's ability to meet its Millennium Development Goals (MDGs). India's National Action Plan on Climate Change makes it abundantly clear that "*with an economy closely tied to its natural resource base and climate sensitive sectors such as agriculture, water and forestry, India may face a major threat because of projected changes in climate*".<sup>xi</sup> Bearing in mind recent scientific predictions, it is perhaps reasonable to change the word 'may' to 'will'. The Plan also makes it clear that "*India's development path is based on its unique resource endowments, the overriding priority of economic and social development and poverty eradication, and its adherence to its civilizational legacy that places a high value on the environment and the maintenance of ecological balance*".<sup>xii</sup>

In this context, a high growth rate is essential for increasing living standards of the vast majority of its people. The development achieved must be sustainable however. This is an area where the weight of historical responsibility lies heavily upon the developed world to take immediate action in support of developing nations. The cumulative emissions from 1850-2002 show that the EU-25 (as it was then) had been responsible for 26.5% of total emissions while India only 2.2%.<sup>xiii</sup> There is clearly a requirement for those primarily responsible for emissions to assist with adaptation costs in those who are bearing the burden of their impact.

For India and the EU to lead the way would not just show what was possible, it would confer considerable competitive advantages, most especially in the field of renewable energy research and development (R&D) and implementation.

Also of key concern is how investments in renewable energy sources can be best financed and where external subsidy, whether public or private, might best be directed. Without effective storage systems, the inherent intermittent nature of renewable energy sources leads to lower capacity utilisation patterns and relatively high capital costs when compared to conventional power systems. As a result, there will be a requirement for an interim period, for preferential tariffs to make good interactive renewable power a commercially attractive proposition. And for off grid applications, there are problems associated with incapacity to pay, especially in rural areas.

Both national and state authorities in India play a role in determining energy policy. The Indian constitution grants the central government exclusive jurisdiction over regulation and development of oil fields, mineral resources and the development of atomic energy (and mineral resources necessary for its production). State governments are granted exclusive jurisdiction over gas, gas works, water supplies, and taxation on the consumption and sale of electricity. Subjects under which the central government and the states have concurrent jurisdiction include the generation, transmission and distribution of electricity. Although not explicitly mentioned in the Indian Constitution, renewable energy and electrical power seem to be a subject of concurrent jurisdiction.<sup>xiv</sup>

The role of Indian states in the generation, transmission and distribution of energy generated from renewable sources is therefore critical. Given that there are 28 Indian states and 27 members of the European Union, a conference that draws together representatives from both Indian and EU states might begin to reveal common problems and find common solutions to the climate destabilisation problems faced by both India and Europe, as well as building important human links.

While it is the case that India will suffer most immediately and severely from climate destabilisation, the effects on Europe on the long run will also be severe. Already parts of Europe, most notably in the south, have been affected by drought, but there has also been an increase in flooding and in changing weather patterns throughout the continent. Furthermore, worries about energy security, as well as the fear of global warming are driving European states and the European Union collectively to examine and invest in alternative sources of energy.

The opportunity, therefore, for joint India-EU partnerships to develop and co-finance the production of

energy using clean and renewable technologies is immense and would have a direct impact on India's development goals. The first stage, however, will be to focus on Flagship Projects that can both test and further the process of enhanced cooperation, while in the medium term, in India as in Europe, the decisive step required will be the establishment of a stable and rising carbon price to mobilise lucrative investment in the post carbon economy.

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<sup>i</sup> Thakkar, H. (2009) *There Is Little Hope Here, India's National Action Plan on Climate Change, A Civil Society View*, Delhi, South Asia Network on Dams, Rivers and People

<sup>ii</sup> Ramanathan, V. and Feng, Y. (2008), *On avoiding dangerous Anthropogenic interference with the Climate System: Formidable Challenges Ahead*, Proceedings of The National Academy of Sciences of the USA, vol. 105, n. 38, pp. 14245-14250

<sup>iii</sup> Knopf et al (2009) *The Economics of Low Stabilisation: The Implications for Technological Change for Policy*. In Hulme, M. and Neufeldt, H. (eds) *Making Climate Change Work For Us: European Perspectives on Adaptation and Mitigation Strategies*, Cambridge, Cambridge University Press

<sup>iv</sup> Government of India, Prime Minister's Council on Climate Change, *India National Action Plan on Climate Change*, June 2008

<sup>v</sup> Throughout the report, the exchange rate used is as of 1<sup>st</sup> July 2009

<sup>vi</sup> International Institute for Applied Systems Analysis Calculations, 2005

<sup>vii</sup> Saez, L. and Vipradas, M., *Barriers and Opportunities for EU-India Renewable Energy Collaboration, ENCARI Briefing Paper*, n.3

<sup>viii</sup> Parikh, J. (13 October 2005) *Women in India should be more assertive regarding their fuel needs*, Business Standard

<sup>ix</sup> Dr Anil Patni, Head of Communications and External Affairs, Tata BP Solar, for the High-Level India-EU Dialogue in Delhi, 3-4 February 2009

<sup>x</sup> Stern et al 2008; Edenhofer et al 2008; EC 2009

<sup>xi</sup> Government of India, Prime Minister's Council on Climate Change, *India National Action Plan on Climate Change*, June 2008

<sup>xii</sup> Ibid

<sup>xiii</sup> Baumert, K.A., Herzog, T., and Pershing, J. (2005) *Navigating the Numbers, Greenhouse Gas Data and International Climate Policy*, World Resources Institute

<sup>xiv</sup> Ibid Saez & Vipradas

### 3. Flagship Projects

“Flagship projects improve our technological understanding and lead to new products by proving the feasibility of new technologies and making success widely visible. Flagship projects are large in scale. As they offer the possibility for trial and error, not all need to succeed. Some projects may fail but still lead to a better understanding of the options in various fields and help to develop new solution approaches. Flagship projects involving low carbon technologies are only likely to be profitable for private investors if a price is put on carbon emissions. Even with carbon pricing, if the associated risks are borne by investors and project developers, without them being able to appropriate fully the rewards if the project turns out to be successful (because imitators enter the market), they will be discouraged from participating. State intervention can be an appropriate means to solve this incentive problem.”

*‘Towards a Global Green Recovery’ Ottmar Edenhofer and Lord Nicholas Stern, 2009*

**There is clear scope for a number of Flagship projects in the India – EU context.**

**Set out below are four such projects, (although the relevance and applicability of this concept is not necessarily limited to these four).**

#### Solar Energy

##### India and the sun

In most parts of India, clear sunny weather is experienced 250 to 300 days a year.

The country receives about 5,000 trillion KWh/year equivalent energy through solar radiation.

Just 1% of India’s land area can meet India’s entire electricity requirements till 2030.

India’s potential for solar energy is enormous. India is largely located in the equatorial sun belt of the earth and receives abundant energy from the sun. Solar energy could play a vital role achieving energy security through displacement of coal and petroleum.

“Solar based power technologies are an extremely clean form of generation with practically no emissions at the point of generation. Transmission losses are very low in decentralized systems. Deployment can be done independently of the national grid and integrated within the national grid where necessary.”<sup>xv</sup>

Ajit Gupta, Former Adviser to the Indian Ministry of New and Renewable Energy, has said that “*India has made considerable progress in harnessing new and renewable sources of energy such as solar, wind, biomass and small hydro. A renewable power capacity of over 13,500 MW has been installed, which is about 8% of the total installed capacity in the country*

*and contributes about 3% to the electricity mix. A major contribution of 9500 MW has come from wind power. Renewable energy is also being deployed for a variety of decentralized applications. Over 1.5 million solar lighting systems have been deployed, mostly in the rural areas.*”<sup>xvi</sup>

There is a need to develop new technologies to make solar cost competitive with coal by 2020. Through the Indian Solar Technology Initiative India will need 4 trillion units of electricity by 2030. Replacing 25% by solar at a cost of Rs 15-20 compared with Rs 4 or 5 for coal, so 1 trillion units of solar would require in the order of \$100 billion subsidy. The initial development of plants needs subsidies to achieve economies of scale, but it has to be done in a way that creates competitive pressure on private sector.

There are many areas that show promise, such as microgeneration, but the two areas with great potential, though need for cost reduction, are

1. Concentrated Solar Power (CSP);
2. Solar Photovoltaic (PV).

The vast potential for India of solar energy – both **CSP** and **PV** – has meant that it has been accorded a high priority in the National Action Plan on Climate Change. A National Solar Mission was included as one of eight National Missions, with the goal of generating 20,000 MW of solar power by 2020. The Solar Mission will aim to enable India to “leapfrog” ahead in the development of solar energy and thus place it in a global leadership position.

Solar energy clearly offers an enormous potential for enabling India to provide electricity for the hundreds of millions of its people presently without access to an electricity supply and to reduce its dependence upon fossil fuels.

**To concentrate on a major joint flagship project that includes not just R&D but also the installation of agreed Solar Power Generating Systems using grid-related CSP and/or decentralised PV generation should be a matter of immediate priority.**

Ajit Gupta argues strongly for demonstration projects being undertaken because *“they are effective in giving high visibility to new developments, in involving and developing stakeholder confidence, and leading to wider implementation and replicability. In the area of solar thermal power, apart from established technologies, several new technology configurations are being investigated in Europe.”*<sup>xvii</sup>

### Concentrated Solar Power (CSP)

#### Cost of CSP

Investment cost of stand alone solar thermal power plants in India: Rs 20-22 cr/MW (€ 3 million – 3.3 million/MW).

Estimated cost of generation: 20-25 Rs/KWh (€ 30-37 cents/KWh).<sup>xviii</sup>

The capital costs involved in CSP are considerable, as shown in the above table. It also requires storage facilities to make it economic and a distribution infrastructure and a competitive grid tariff price.

The challenge of providing sufficient heat storage to make solar thermal power plants economic for up to 24 hours a day, however, is also being tackled by the EU - Middle East and North Africa (EU-MENA) programme, which is examining the potential for supplying Europe with energy captured in the Sahara desert.

There have been a number of technological advances that could also benefit the development of CSP in India, such as the development of 10 hour heat storage solutions for large scale systems,<sup>xix</sup> and the use of Stirling engines for smaller systems.

There is great potential for synergy between the EU-MENA project and the solar goals set in India's National Action Plan on Climate Change. Defining and establishing a creative research and development relationship could be of major benefit to all those countries involved but would require coordinated strategic direction.

Another potential Flagship Project is the Rajasthan Integrated Solar Combined Cycle (ISCC) which could be revisited and redesigned keeping in view the current technology status. The demonstration project should be implemented as a joint India-EU initiative at a suitable site in Rajasthan.

The most appropriate technology configuration based on long term Indian requirements and local conditions will need to be selected and a detailed project report prepared for inviting bids for the project to be executed through a Public Private Partnership (PPP) process involving outside investors and participation by the local power utility.

Alongside, a Technical Assistance programme would need to be developed to strengthen local capacities and capabilities in resource assessment, site selection, feasibility and design studies, and grid interface issues for promoting commercial CSP power plants in India in the near and medium term. Taking advantage of local factors of production such as labour, raw materials and industrial infrastructure, solar thermal power equipment could be produced in India for future commercial CSP projects. In order to catalyse commercial solar power development, information could be exchanged and experiences shared on policy and regulatory frameworks and models for large-scale solar power projects.<sup>xx</sup>

A detailed study is also needed to understand the kind of grid needed for greater use of solar or micro power

### Photovoltaic for rural area energy access

The Indian government has made it clear that it wishes to provide *‘energy to all’* by 2012. The declared aim, under the Rajiv Gandhi Gramin Vidyutijaran Yojana (RGGVY Programme) to electrify all remaining villages by 2009 and all households by 2012, looks unrealisable but remains a vital objective. The villages and hamlets that may not be connected to the grid can be provided with clean energy through decentralized renewable energy systems including solar photovoltaic systems. Such systems can also be deployed where grid connectivity exists provided there is unmet demand and they are found to be cost effective.<sup>xxi</sup>

Solar PV based power is popular with many engaged in civil society, and especially development NGOs because it provides a decentralised form of energy that is suited for rural communities unconnected to

the grid. It is, however, expensive to install and brings with it problems of training, maintenance and security.

Photovoltaic technology is developing extremely fast, especially in Europe, and the issue of intellectual property rights and the cost of technology transfer is contentious.

#### **Cost of PV**

Investment costs of solar PV based power systems: Rs 30-32 cr/MW (€ 4.5 - 4.8 million/MW). This includes the cost of the solar panels and balance of system (BOS).

Unit cost of generation: 15-20 KWh (€ 22-30 cents/KWh), but may fall significantly with thin film technologies.

Rural solar photovoltaic applications, however, could be pursued under public-private partnerships where feasible and the issue of technology transfer and the role of intellectual property rights addressed. This is an area where EU-Indian agreement will be of great importance. There is insufficient research to determine exactly how far the application of solar energy technologies in India is presently handicapped by IPR regulations, but a commitment to both clarification and the absorption of the costs by the EU could be of considerable importance in paving the way towards their use.

#### **EU-India cooperation**

Following the India-EU Summit on 30<sup>th</sup> November 2007, a joint statement was issued which stated that "the two sides agreed to work towards a new flagship project on R&D in solar energy." One year later, the revised joint action plan following the India-EU Summit in September 2008 encouraged the "co-operation on solar energy with a view to jointly developing a flagship programme in solar energy". So far, this critical objective has not progressed either far or fast enough. The EU-India Energy Panel has held a number of useful and important meetings but the minutes indicate that no major flagship project that could significantly contribute to the realisation of India's solar energy ambitions has yet been agreed.

Based on a common vision and shared partnership and co-investment of resources, India-EU cooperation has the potential to contribute to the emergence of solar energy in the medium term as a commercially attractive, socially and economically viable, envi-

ronmentally friendly and sustainable clean energy option for India.

For Europe, it could be a major stimulus to the development of a key new industry and a practical source of essential experience and know-how. This is particularly relevant if Europe is to satisfy a major part of its own energy needs from solar energy in Africa and at home.

#### **Adaptation**

The problem of setting an exact figure to the cost of adaptation is that the number of variables is exacerbated by what Professor James Lovelock has memorably described as 'surprises'. Already India has experienced some of these 'surprises' with a change in monsoon patterns. An Environmental Resources Management (ERM) report identified a range of hazards facing India that will be caused by an all-round warming over the Indian subcontinent associated with increasing greenhouse gases. These include a change in monsoon patterns including increased summer precipitation, impacts in coastal regions owing to an increase in mean sea level and an increase in extreme sea level events (storm surges), impacts on agricultural productivity (60% of India is drought prone), forests, and water resources, an increase of vector borne diseases and the impact of Himalayan glacier melt.<sup>xxii</sup>

As Prime Minister Singh stated at the first meeting of his Council on Climate Change in 2007, "our food security comes largely from irrigated areas of Punjab, Haryana and Uttar Pradesh whose waters are fed by glacier melting in the Himalayas. The Himalayas are rightly called the Water Tower of Asia and contain the largest body of ice outside the polar regions providing critical dry season and long term water storage. 1.5 billion people live in the basins of rivers that rise in the Greater Himalayas. There is a gap in our understanding of the Himalayas and we need to build a knowledge-based partnership of affected countries."

#### **Retreat of the Himalayan glaciers**

Many Himalayan glaciers are retreating faster than the world average and are thinning by 0.3-1 metre per year. The rate of retreat for the Gangotri glacier over the last three decades was more than three times the rate during the last half century.<sup>xxiii</sup>

To understand which adaptation opportunities will be most cost-effective, and have the greatest value, emphasis must be given to characteristics of system vulnerability, such as resilience, critical thresholds, and coping ranges, which are highly dependent on regions and nations... Detailed and reliable regional scenarios of climate change need to be developed and used in rigorous vulnerability analysis (e.g. low probability/high consequence events, risk perceptions).<sup>xxiv</sup> Adaptation and development must work together. It is clear that adaptation involves anticipatory actions, which will require capital investment that will take away from resources available for development. Priority areas for adaptation are agriculture, water (including water efficiency), sustainable habitat, forests, coastal zone protection, and disaster preparedness; India is vulnerable to all. Impacts and implications for infrastructure need to be assessed in both the rural areas and the cities.

An important flagship project that could make a contribution to India's adaptation needs would be assistance with comprehensive modelling of the effect of climate change on some of the most vulnerable cities and Indian states, for example Mumbai, Chennai and coastal states such as Maharashtra.

However, the purpose of this report is not primarily to identify the areas for enhanced cooperation but to stress the urgency of joint action if future environmental disasters, with enormous attendant adaptation costs, are to be avoided.

### **Clean Development Mechanism**

Although the Clean Development Mechanism (CDM) is playing a part in providing sources of finance for mitigation in India, its impact on adaptation is minimal. The National Action Plan on Climate Change notes that 32% of the projects registered with the UNFCCC's CDM Executive Board come from India and 28.3% of the Certified Emission Reduction certificates (CERs) issued come from India. However, this has not led to technology transfer from developed countries and high transaction costs prevent the small scale business sector from participation. By its very nature, the CDM is piecemeal and subject to global and national economic fluctuations. It is not sufficient, nor ever will be sufficient, by itself, to cope with the scale of the adaptation that will be required when the effects of climate destabilisation increase in line with global warming. What is required is a concerted strategic programme, including an agreed policy on IPR and technology transfer, costs of which

might be borne by the European Union, to tackle key areas of vulnerability.

### **India-EU cooperation**

In May this year, the European Union launched the 'High Noon' - a research project in India, which aims at assessing the impact of Himalayan glaciers' retreat and possible changes of the Indian summer monsoon on the distribution of water resources in Northern India. The project further aims to provide recommendations for appropriate and efficient adaptation strategies to hydrological extreme events through a participatory process. The EU has earmarked 3 million euros (approximately Rs 19.5 crores) for this 3 year project which will also bring together leading institutions in The Netherlands, UK, Switzerland and India.

The main aspects of the project will include:

- developing scenarios for snowmelt and monsoon patterns based on improved regional climate simulations;
- developing realistic regional socio-economic scenarios to assess changing water resources using regional models;
- providing new methods for prioritisation of adaptation measures to be used as a design tool in the selection of adaptation options.

This is a most useful approach and can provide experience that would be valuable for much larger scale programmes that will be needed if adaptation of the scale required in India over the next two decades is to be met.

### **Black Carbon**

The issue of black carbon is extremely relevant to both mitigation and adaptation. It is now recognised as a major contributor to global warming, second only to CO<sub>2</sub>. It is highly relevant to India and merits focused attention.

Black carbon is a component of soot and is a potent climate-forcing agent. It can be found in Atmospheric Brown Clouds, for which there are a number of hot-spots around the world.<sup>xxv</sup>

### Radiative forcing of black carbon

The radiative forcing of black carbon was estimated by the IPCC at 0.44 +/- 0.25 Watts/sq.m.<sup>xxvi</sup> Following separate estimates by Hansen and Jacobson ranging from 0.64 to 1.05,<sup>xxvii</sup> Ramanathan now estimates the radiative forcing of brown clouds to be 0.9, some 55% of the radiative forcing of carbon dioxide.<sup>xxviii</sup> With the snow and ice albedo effect, the radiative forcing rises to 1.0 – 1.2.<sup>xxix</sup>

The bulk of the black carbon emitted in South Asia arises from the use of biomass, such as wood, carbon and dung for cooking purposes<sup>xxx, xxxi, xxxii</sup>. There are two significant consequences: the first is severe deterioration in the health of many poor people, especially women, who are reliant on these cooking materials, and the second is the effect of the black carbon emitted on the Himalayan ecosystem.

As is recognised in the National Action Plan on Climate Change, sustaining the Himalayas is a priority for India, as is the improvement in health for millions of women presently suffering respiratory diseases due to their use of carbon producing cooking facilities. But sustaining the Himalayas should also be a major priority for Europe. Over 1 billion people depend on the Himalayan ice melt to fill the rivers and provide fresh water. In addition to the human disaster, the geopolitical implications in terms of environmental security that would be caused by the rapid melting of the Himalayan glaciers would be devastating, as highlighted by Air Marshal Singh at the Delhi High Level India-EU Dialogue.

Already the effect of the Himalayan ice melt is noticeably changing the composition of the Ganges delta and leading to higher water levels but a rapid decline in the size of the glaciers could bring flood, drought and changes in weather patterns that would together affect the security of the whole world.

The Centre for Clouds, Chemistry and Climate, in conjunction with The Energy and Resources Institute, has recently launched a study called Project Surya<sup>xxxiii</sup> to evaluate the impact of black carbon from cook stoves on global warming and local climate. If the research confirms the link between cook stoves, respiratory health, brown clouds and the albedo effect, the extension of the programme in rural India could provide the basis for a further major EU-India Flagship Project consistent with both India's National

Action Plan on Climate Change and the EU's committed aims.

### Biochar

Biochar is an ancient practice that is now emerging as a potentially significant contributor to addressing climate change and sustainable development.

Biochar can sequester massive amounts of carbon in the soil for hundreds to thousands of years.<sup>xxxiv</sup> It has the potential to be an efficient carbon sink whilst providing strong co-benefits. Pre-Columbian Amazonian Indians used it to enhance soil productivity and made it by smouldering agricultural waste. They called it "Terra Preta de Indio." Its modern equivalent is being developed using pyrolysis to heat biomass in the absence of oxygen. Modern biochar production can be combined with biofuel production in a process that is energy positive - producing 3-9 times more energy than invested, and carbon negative<sup>xxxv</sup> - withdrawing CO<sub>2</sub> from the atmosphere and rebuilding geological carbon sinks.

There are four complementary and often synergistic objectives which may motivate biochar applications for environmental management, namely **soil improvement, waste management, energy production and climate change mitigation**. Originally biochar was promoted primarily by the soil community, who were drawn by its remarkable soil enhancement properties. Now, however, the significance of the climate change benefits offered by biochar is becoming a key driver. Biochar is potentially an important tool for decarbonising the atmosphere.<sup>xxxvi</sup> There has been much discussion in the press and the literature regarding the scope for Carbon Capture and Storage – that is sequestering CO<sub>2</sub> gas. The scope for carbon sequestration with biochar however may be just as significant.

In India, charcoal production has been a major feature for thousands of years. Research into pyrolysis is currently under way in several research centres, but as yet, active engagement with biochar in India is limited.

There would appear to be two distinct opportunities in India in relation to biochar. The first is in the rural areas, helping to replace the traditional cooking fires. An NGO, Geo-ecology Energy Organisation (GEO), has been developing a number of biochar stoves,<sup>xxxvii</sup> and carrying out biochar soil improvement on a pilot basis.<sup>xxxviii</sup> Similarly, another NGO, Social Change



and Development (SCAD), has been working with Mysore University, distributing their Anila pyrolysis stoves<sup>xxxix</sup> and carrying out soil research with biochar. The individual amounts of biochar may be small, but such traditional fires are numbered in the tens of millions. Community-based social marketing could grow to make a significant contribution to biochar production, although linking such activity into a system of formal incentives may prove problematic.<sup>xi</sup>

The second opportunity is the production of biochar on a non-domestic scale. This could either be in

- a fixed location, linked, say to a cement kiln;
- a distributed system, where a lower technology pyrolysis kiln is used by each farmer or small group of farmers, using the energy generated from such kilns for processing the harvest and producing electricity for local needs;
- a mobile pyrolysis plant which could be driven to different sites, obviating the need to transport the biomass.<sup>xii</sup>

**Biochar has the potential in rural India to make a major contribution to soil improvement, public health and climate change mitigation. A broad study of the potential of biochar in India is advocated.**

It is important to focus on good practice that aids agriculture and takes carbon from the atmosphere. An analysis on how much carbon is stored on a life-cycle basis would be needed. Not enough attention has been paid to the issue of soils in the climate negotiations, in contrast to, say, forests. A large scale study would therefore be very useful.

The study could include a multifaceted research programme to determine the potential for pyrolysis-based cookstoves in India. An appropriate programme of promotion and deployment of pyrolysis stoves, and pyrolysis / biochar more generally, could then be launched, in the light of the research results. A research on greater penetration of biomass gasifiers/pyrolysis units for agri-processing and cottage/rural industry to replace highly inefficient boilers in the rural/small scale industry sectors would also be needed.

<sup>xv</sup> Government of India, Prime Minister's Council on Climate Change, *India National Action Plan on Climate Change*, June 2008  
<sup>xvi</sup> Gupta, A, research paper for High-Level India-EU Dialogue in Delhi, 3-4 February 2009  
<sup>xvii</sup> *ibid*

<sup>xviii</sup> Scientific American, January 2008  
<sup>xix</sup> Müller-Steinhagen, M., Drück, H. and Tamme, R. (2007) *Heat storage for Temperatures from 50 - 500°C*, Heat-SET 2007, 18-20 April 2007, Chambéry, France  
<sup>xx</sup> *Ibid* Gupta  
<sup>xxi</sup> *Ibid* Saez & Vipradas  
<sup>xxii</sup> Environmental Resources Management report, 2004  
<sup>xxiii</sup> Jianchu, X., Shrestha, A., Vaidya, R., Eriksson, M., and Hewitt, K. (2007) *The Melting Himalayas, Regional Challenges and Local Impacts of Climate Change on Mountain Ecosystems and Livelihoods*, Kathmandu, Nepal, ICIMOD  
<sup>xxiv</sup> IPCC Third Assessment Report: Climate Change 2001  
<sup>xxv</sup> UNEP Atmospheric brown clouds - Regional assessment report with focus on Asia SUMMARY, Nairobi 2008  
<sup>xxvi</sup> IPCC, *Changes in Atmospheric Constituents and in Radiative Forcing*, in CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS. CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 129, 132 (2007), available at <http://www.ipcc.ch/ipccreports/ar4-wg1.htm>. (Magnitudes and uncertainties added together, as per standard uncertainty rules).  
<sup>xxvii</sup> Zaelke, D., *Reducing Black Carbon May be the Fastest Strategy for Slowing Climate Change*, IGSD/INECE Climate Briefing Note, December 2008, p9  
<sup>xxviii</sup> Zaelke, D., Supra note xxvii, p2  
<sup>xxix</sup> Zaelke, D., Supra note xxvii, p9  
<sup>xxx</sup> Ramanathan, V. and Carmichael, G, *Global and regional climate changes due to black carbon*, 1 NATURE GEOSCIENCE 221-22 (23 March 2008)  
<sup>xxxi</sup> Reddy, M. & Venkataraman, C. Atmos. Environ. 36, 677 (2002) in Gustafsson, O. *Brown Clouds over South Asia: Biomass or Fossil Fuel Combustion?* Science 323,495 (2009)  
<sup>xxxii</sup> Reddy, M. & Venkataraman, C.: Supra note xxxi, 699  
<sup>xxxiii</sup> Ramanathan, V., & Balakrishnan, K. *Project Surya, Reduction of Air Pollution and Global Warming by Cooking with Renewable sources* Scripps Institution of Oceanography University of California, San Diego, Sri Ramachandra Medical College and Research Institute, Chennai, India  
<sup>xxxiv</sup> Zaelke, D., *Significant Climate Mitigation is available from Biochar*, IGSD/INECE Climate Briefing Note, p1, December 2008 <http://igsd.org/docs/Biochar%20Note%2015%20Dec%202008.pdf>  
<sup>xxxv</sup> Lehmann, J, *Bio-energy in the black*, 5 Front Ecol Environ 381, 385 (2007) available <http://www.css.cornell.edu/faculty/lehmann/publ/FrontiersEcolEnv%205,%20381-387,%202007%20Lehmann.pdf>  
<sup>xxxvi</sup> Lehmann, J., Joseph, S., eds (2009), Policy to address the threat of climate change – a leading role for biochar, in *Biochar for Environmental Management*, Earthscan, London  
<sup>xxxvii</sup> <http://e-geonews.blogspot.com/2008/11/biochar-food-security-nutrition.html>  
<sup>xxxviii</sup> Down to Earth - [http://www.downtoearth.org.in/full6.asp?foldername=20080515&filename=sci&sec\\_id=12&sid=6](http://www.downtoearth.org.in/full6.asp?foldername=20080515&filename=sci&sec_id=12&sid=6)  
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Terra Preta Info - <http://e-terrapreta.blogspot.com/>  
<sup>xxxix</sup> <http://www.bioenergylists.org/en/taxonomy/term/1375>  
<sup>xl</sup> Lehmann, J., Joseph, S., eds (2009), *Biochar for Environmental Management*, Earthscan, London  
<sup>xli</sup> Zaelke, D. Supra Note xxxiv

## 4. Engagement of the Private Sector and Public-Private-Partnership

The main driver for investments in low carbon technologies is the fact that there are unexploited investment opportunities in this sector, as exemplified by the recent interest in solar technology. A recent report by HSBC<sup>xlii</sup> analysed the climate investment opportunities in India. The main message is that compared with the industrialized world, India has a 'wider spectrum of choices' as it confronts the global threat of climate change, with a large potential for technological leapfrogging. The Government of India has started to intensify its response to this strategic issue. On the back of its National Action Plan on Climate Change and a range of existing policies to promote the low carbon power and energy efficiency, HSBC has identified an initial set of investible themes focusing on the mitigation potential from curbing carbon emissions. These include wind, solar, hydro, bio-power, biofuels, buildings efficiency, industrial efficiency, power efficiency, cleaner coal, fuel switching and nuclear. The HSBC report estimates that Rs 7.65 trillion (€ 113 billion) in investments will be made in these themes for the years 2008-17, yielding annual emission cuts 18% below 'business as usual'.

Venture capital and private investment in Indian clean technology more than doubled between 2006 and 2007, approximately from Rs 6.7 billion (€ 99 million) to Rs 13.8 billion (€ 205 million). The third quarter of 2008 marked an all time high for venture capital investments and the country is now the second largest destination for such funds.<sup>xliii</sup> **This influx of clean technology investments appears to be a response to attractive returns and regulatory incentives.**

Though some reassurance can be gleaned from the interest of the investment market, there is a need for public/private expenditure to be carefully directed and well coordinated.

Experts have recommended employing large amounts of public spending, financed by government borrowing, to counter the economic depression. Some useful global steps were signalled at the G20 meeting in London in 2009. In particular the International Monetary Fund (IMF) itself was given a new lease of life, notably through a major expansion of its Special Drawing Rights (SDRs), especially for developing countries.<sup>xliiv</sup> The immediate purpose of these changes is to ease the impact of the current economic crisis; the IMF is seen more as fire brigade than long term facilitator of sustainable development.

Over time, however, the goal should be to expand the issue of SDRs to developing countries to support medium term programmes of post-carbon sustainable development including renewable energy. If the expansion of this "global currency" were targeted primarily in this way, rather than at reflating a consumption binge in the rich north, it could set a policy framework able to leverage private investment and contribute to a new and sustainable world recovery. The transformation of both the IMF and World Bank in this direction could be a key theme for Euro-Indian dialogue and partnership. It would also mark a step beyond "hegemony", if the Europeans contribute, as they must, to a fairer sharing of votes and power within the two bodies.

In relation to other international financing options, the proposal for support by the Clean Technology Fund to the extent of 10% of the cost of a major CSP intervention in the MENA Region could also be considered for an Indian Project. Another option could be grant support by Global Environment Facility of up to 10% which could leverage concessional financing from European Investment Bank, Asian Development Bank and other bilateral lenders such as KfW of Germany. Equipment financing could be considered under export credit schemes in operation in several EU countries.

The global slump marks the end of the delusion that unregulated financial markets, without effective global governance, can lead to a "trickle-down" development that will eventually lift the world's poor out of poverty. The huge and urgent effort of investment to lift the world's majority out of poverty must now be achieved in parallel with an unprecedented effort of austerity and innovation towards clean and more productive use of energy and resources. The new conditionality of the global institutions should pursue these goals.

In a paper entitled '*Leveraging International Financial Flows for Climate Change*', (see Appendix I) Uday Khemka calls for the creation of a 'fund of funds' for green infrastructure investment for each carbon-emitting region to explore "*whether combining the financial resources of some of the largest sources of international investment (pension funds, endowments, insurance companies etc) with risk mitigation instruments managed by the World Bank Group and other multi-lateral development banks (MDBs) could lead to structural solutions to risk/return limitations, in*

*order to dramatically increase the pools of capital for climate-friendly investment. The potential impact of such a strategy is enormous in addressing one of the biggest barriers to international cooperation on climate change: the absence of sufficient financing for the costs of shifting to a global economy consistent with carbon constraints... While high carbon prices will be helpful in improving the overall set of investible opportunities from a capital market standpoint, they do not address the paucity of institutional intermediary structures, practitioners and transactions. To do this may require the creation of significant private and public sector 'Fund of Funds' partnerships."*<sup>xlv</sup>

An India-EU partnership would be ideally placed to explore this concept on a bilateral basis using the expertise and increased resources of the European Bank for Reconstruction and Development and the European Investment Bank. The establishment of a significant private and public sector Euro 50-100 billion 'Fund-of-Funds' partnership could be a way forward.

Many businesses are already responding swiftly and creatively to the climate crisis not only because it is perceived to be a business risk and because it is an opportunity to demonstrate public and social responsibility but because also, in many cases, it has been shown to cut energy costs substantially and lead to innovation that has been amortised surprisingly quickly. Business requires a clear and consistent framework, however, if it is to be able to plan ahead and operate within the proverbial 'level playing field'.

Work is already being undertaken globally and bilaterally to develop such a framework, but it is again an area where enhanced India-EU cooperation could take the lead, which would give their own business communities a major competitive advantage.

Finally, it is proposed that the India-EU Summit could mandate a round table on finance and infrastructure, to discuss how to invest \$100 billion in infrastructure for sustainable development, to look at the policy environment in both source and destination countries, to look at issues such as reducing transaction costs of cooperation for SME's, and to build an innovation network between EU and India that will drive forward innovation in renewable energy technologies. This private sector round table could include institutional investors, fund managers, insurance and pension funds, credit and debt providers, government sovereign funds, and the Indian Ministries of Power and of New and Renewable Energies. It would be mandated by the EU-India Summit to give it greater authority.

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<sup>xliii</sup> Robins, N. et al, (November 2008), *Wide Spectrum of Choices, India's climate investment opportunities*, HSBC

<sup>xliiii</sup> Cleantech Group quoted by Mehra, M. (21 January 2009), India's Green Horizons, *Green Futures*

<sup>xliiv</sup> Spilimbergo, A. et al, (2008), *Fiscal Policy for the Crisis*, IMF Staff Position Note

<sup>xlv</sup> Khemka, U., (2009) *Leveraging International Flows for Climate Change*

## 5. Institutional Mechanisms

### Existing Institutional Mechanisms

The growing importance of EU-India relations on a whole raft of key issues, especially the need for an exchange of information on many aspects of energy and environment policy, has spawned a number of joint working groups, committees and initiatives, in addition to existing mutual diplomatic representations between India and the European Community.

While these mechanisms are undoubtedly playing a crucial role in facilitating greater cooperation in a number of important fields of activity, their combined effect cannot be said to be greater than the sum of their collective activities. They are primarily technical committees that bring together senior administrators, scientists and technical specialists to consider areas of direct cooperation, capacity building and the regular exchange of information. Without overall coordination within a strategic framework, they lack the capacity to impact the problem on the scale that is necessary to confront and avoid dangerous climate destabilisation.

India-EU relations go back to the early 1960s; the first EU-India institutions - the EU-India Business Summit and the EU-India Civil Society Round Table - were created after 2000, following the first EU-India Summit held in Lisbon on 28<sup>th</sup> June 2000. EU and India have been strategic partners since the 5<sup>th</sup> India-EU Summit in November 2004, which strengthened cooperation between them and created further bilateral institutions, including the EU-India Energy Panel and the Initiative on Clean Development and Climate Change. These joint mechanisms, outlined in Appendix II, deal with a wide range of issues such as technology, energy, business and civil society, many of which are linked to climate change or sustainable development.

Working groups have been set up to focus attention on specific issues, for example, the EC-India Joint Working Group on Environment, the Working Group on Coal and Clean Coal Technologies and the Working Group on Energy Efficiency and Renewable Energy. The infrequency of their meeting, however – usually annual – handicaps their potential for effective action.

The Action Plan Support Facility, that provides financial support to the implementation of the Joint Action

Plan, was created in 2008 to improve sector policy analysis and knowledge, and to enhance mutual understanding and cooperation, the regulatory function and institutional capacity of the Indian administration, and dialogue among civil society organisations. However, activities in this sector ‘will be developed in later years of the project’, as indicated on the website. The Action Plan Facility is a temporary body and essentially an agency/client relationship to assist in capacity building; it is not envisaged to be operating at the political level required to set strategic direction.

Other recent initiatives include the establishment of the European Business and Technology Centre and the European Parliament Delegation for Relations with India.

All these joint mechanisms deal with a wide range of issues such as technology, energy, business, politics or civil society, many of which are linked in one way or another to climate change or sustainable development. They are all different in construction as well as objectives and have different mandates - consultative, decision-making, dialogue improving. Most meet annually with little substantive activity between meetings and no single coordinating body, however, has been set up yet.

While the EU-India Summit sets the general policy direction, it has no mechanism for evaluating and assessing the impact of the existing institutions or their progress in implementing the crucial joint projects that are needed. The decision to develop a flagship programme in solar energy (mentioned at the 2007 Summit and 2008 Summit) is a good example: the decision has been made but no action has yet followed. The Flagship Projects suggested in this paper would impact upon many of the existing institutions and would suffer without some form of coordinating mechanism.

### EU-India Research Cooperation

Agreements between the European Union and India on specific projects are made through the Directorate General for Research of the European Commission and its Framework Programmes, which is the main EU funding instrument for research in Europe. Although Indian researchers and Indian organisations can submit a funding proposal if they have a European partner, the programmes remain largely fo-

cused on European research. The Science & Technology Cooperation Agreement needs to be strengthened to increase research and funding for both sides on a broader base than the 7th Framework Programme of DG Research.

The Sixth Framework Programme (FP6) which ended in 2006 involved Indian organisations in about 80 projects,<sup>xlvi</sup> of which 20 were on "Sustainable Development, Global Change and Ecosystems". None of them were on solar energy, black carbon or biochar. One – the ADAM project – involved The Energy and Resources Institute (TERI) on adaptation. It was not, however, primarily focused on India and it was not a Flagship Project.

The Seventh Framework Programme (FP7) stretches from 2007 to 2013 and is expected to gather more Indian projects than during FP6. It has gathered so far 7 projects<sup>xlvii</sup> on Environment/Climate Change issues involving Indian researchers or organisations, but none of them are on solar energy, black carbon, biochar or adaptation.

In addition to DG Research's Framework Programmes, a decision to launch a flagship programme in solar energy was made during the EU-India Summit in 2007 and re-visited during the following Summit in 2008. Two workshops on adaptation and India were organised in May and December 2006 through the EU-India Initiative on Clean Development and Climate Change and following the work of the EU-funded BASIC<sup>xlviii</sup> project (2005-2007). The progress in implementing the flagship programme in solar energy is still very slow and the two adaptation workshops along with the BASIC project, although providing useful analysis of the impacts of and vulnerability to climate change, have not led to any adaptation modelling or Flagship Projects. Regarding black carbon and biochar, nothing has been put on the EU-India agenda yet.

## **Bilateral Cooperation**

At the India-EU member states level, there have been a variety of bilateral agreements.

For example, the UK Department for the Environment, Food and Rural Affairs (DEFRA) funded a collaborative project with the Indian Ministry of Environment and Forests (MoEF). The study, which involved eight Indian institutes looking at the impacts of climate change, found that India was likely to face significant adverse effects in a range of sectors,

including agriculture, health, forestry and infrastructure.

A second phase of the project will provide improvements in climate modelling and consider the impacts on four sectors in a more integrated way than was possible in the first phase.

In a joint statement (2008), France and India agreed to build a specific partnership, in the framework of their global strategic partnership, for fighting against climate change in order to reconcile, in their bilateral exchanges, the legitimate quest for a mutually beneficial economic growth, with environment-friendly measures, especially the fight against climate change. They decided to create a Franco-Indian working group on the environment dealing with clean technology transfers and their financing.

In 2007 India and Germany agreed to enhance scientific collaboration and networking, focusing on reducing the impact of climate change and developing clean energy technologies and jointly funding a joint science and technology centre.

Similarly, Spain, which is a leader in the development of solar energy technology, has been in discussions with the Indian government on the development of Concentrated Solar Power.

At an international level, a number of collaborative programmes have been undertaken such as the four-year project launched with UNEP to help accelerate the market for financing solar home systems in southern India.

Finally, it is also worth noting that the Clinton Foundation, in collaboration with various domestic and international stakeholders, is investigating what would be by far the world's largest solar energy project in the western Indian states of Gujarat and Rajasthan. Over five times the size of the current largest solar project, the project would be an 'integrated Solar City' and would comprise several stand-alone CSP projects of approximately 150 MW each, set up by individual investors.

## **The Need for Coordination**

If there is to be a joint programme of a scale necessary to enable India to move swiftly beyond dependence on fossil fuel energy, the existing network of EU-Indian committees and working groups may not be sufficient to deliver the results in time to avoid cli-

mate catastrophe. The High Level Dialogue meetings in Potsdam and Delhi heard evidence that the India-EU relationship was handicapped by both too many and yet insufficiently focused institutional links. Both India and the EU are coping with rapid change and with immense internal challenges.

As has already been stated, both the EU and India have a large number of internal institutions whose competences overlap with one another. The EU, especially, is still evolving and at present a third party must navigate through many different institutions and directorates to discover how policies are translated into action. The European Commission, the Council of Ministers and the European Parliament all have a role to play as do the 27 directorates and the governments and parliaments of the member states. All these bodies have to weigh up and synthesise views from the scientific, business and industrial worlds. In India, a number of ministries are centrally involved in climate and developmental policies, so are the 28 states' governments. Though the delineation of authority is defined by the constitution, it is not altogether clear to European institutions, private companies and NGOs exactly where decision-making powers lie in all cases. Implementation policies also vary significantly from state to state.

The development of Flagship Projects will require joint decision making mechanisms that derive political authority from the India-EU Summit decisions and that are based on the principle of symmetry, reciprocity, and mutual benefit. Clearly, reports on progress would be submitted to the annual India-EU summit meetings but there would also be the need for political engagement from both sides on a continuing and continuous basis between summits.

There will be a need to

- draw together the reports of the various working groups into a coordinated body of agreed recommendations;
- propose clear targets for enhanced cooperation on flagship projects, joint research and modelling and adaptation to the annual India-EU Summit meeting;
- oversee the execution of decisions taken by the annual India-EU summits;
- evaluate key projects for recommendations to the India-EU summit;
- encourage dialogue with civil society organisations able to assist in the implementation of strategic goals;

- prepare the agenda and the necessary papers for the annual India-EU summit meetings working closely with all the directorates general of the European Commission, Indian ministries and relevant EU member states' administrations.

Strengthening, coordinating and enhancing India-EU partnership could unleash new energies and tap into the skills, talents and entrepreneurial potential of people in India and the EU member states and be in the vanguard of what Ottmar Edenhofer and Lord Stern have called *'The Third Industrial Revolution'*.

Many of the existing EU-India bodies feed their reports and recommendations to the annual India-EU summit meetings that take place alternately in India and the Member State that holds the EU Presidency. The last such meeting was held in Marseille under the French Presidency of the EU in September 2008 and concluded with a strong statement of commitment to joint action to climate change and energy security. The joint communiqué affirmed that: "*the EU-India Initiative on Clean Development and Climate Change, the EU-India Energy Panel and the EU-India Science and Technology Steering Committee are the relevant fora under which bilateral cooperation can be advanced on these important global issues.*"

One of these mechanisms, for example the EU-India Energy Panel, should be given the clear lead and political authority, flowing from the Summits, to take forward work in the area of climate stabilisation. It could then play a vital role in coordinating the work of the many separate technical committees and working groups thereby providing a strategic direction and maximising their effectiveness.

Parliamentary links are also of critical importance in creating a dynamic joint India-EU strategy and its success depends upon it having a democratic legitimacy. There should be a Parliamentary input into the EU-India climate partnership to ensure that the overall strategy carries a popular mandate (in addition to more emphasis on climate change for the European Parliament Delegation for Relations with India).

As well as political direction, there will be the need for secretarial and clerical support. If such a joint mechanism were based in India, those additional costs would be moderate.

The Panel or Committee could be strengthened with a small permanent secretariat of civil servants from India and the EU, based in Delhi and overseen by an Action Group or Task Force of six senior people – representing the Commission, the Presidency (on behalf of the Council of Ministers) and Parliament from EU, and the Ministry of Foreign Affairs, Prime Minister’s Climate Panel and Lok Sabha from India –

to give the strategic partnership political weight between Summits, to prepare the Summits.

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<sup>xlvi</sup> The full list of projects involving Indian Researchers or organisations is accessible at

[http://www.delind.ec.europa.eu/en/stcoop/fp6\\_ind.pdf](http://www.delind.ec.europa.eu/en/stcoop/fp6_ind.pdf)

<sup>xlvii</sup> The full list of projects involving Indian researchers or organisations is accessible at

[http://euroindiaresearch.org/rd\\_projects\\_FP7.asp](http://euroindiaresearch.org/rd_projects_FP7.asp)

<sup>xlviii</sup> [www.basic-project.net](http://www.basic-project.net)

## 6. Conclusion

***“Do politicians understand just how difficult it could be, just how devastating four, five, six degrees centigrade could be? I think not!”***

*Lord Stern, April 2009*

There is no question but that facing up fully to the impact of climate destabilisation will be a massive challenge for all governments. Unless there is cooperation between governments from both the developed and developing worlds in finding practical ways

to tackle both the development of alternative sources of energy and adaptation, there is a danger that tipping points will be passed before negotiations on mitigation targets reach any conclusion.

The High Level India-EU Dialogue has set out some clear steps that could be taken, which could help to bring about a safer future for both India and the EU and serve as a model for other countries to follow.



## Appendix I: Leveraging International Financial Flows for Climate Change

Uday Khemka

### Context

Alarming, current investment levels are a fraction of what is required to retool the planet's largest carbon-emitting economies and there is little likelihood that the massive redirection of investment required will occur at the scale and within the time needed due to a combination of political, technology and market risks. With or without the economic crisis currently underway, it is entirely unrealistic to expect massive fiscal subsidies between countries to be achievable as a way of fixing the problem. (Illustratively, transfers post-Rio have been a fraction of what was promised and anticipated.) The UNFCCC has estimated that 86% of the incremental financing required to mitigate and adapt to climate change will have to come from private sources largely outside direct government control and influence.

Since Rio this has been understood by economists and climate negotiators who have designed a carbon framework intended to increase the internal rate of return (IRRs) to private investment through the creation of a global carbon market. While absolutely critical, the carbon market is not enough. Firstly, the extent to which it narrows the gap between risk – weighted expected IRRs and IRRs actually offered by carbon-mitigating opportunities is limited. Secondly, the market will take time to become liquid, transparent and well-functioning. Thirdly and most importantly, as with any 'pull'-based price signalling approach, market signals will take too long a period of time to allow large scale green infrastructure investment to happen in the timeframe actually required.

What is missing is the creation of institutional mechanisms that reduce risk more directly and are structured and created less by economists than by investment practitioners and capital markets intermediaries able to mitigate risks more directly and therefore bring to bear the huge capital resources of the capital markets themselves to bear. Without these mechanisms, the gap between required returns and actually available returns and the demands of a competitive marketplace and legal and fiduciary responsibilities limit private sector institutional investors (who otherwise may be willing to step up their climate

investments) in their ability to increase overall investment in carbon-mitigation opportunities. In addition, although influential investors of this sort are beginning to show interest and have stepped up their commitment to investing in climate-friendly opportunities on a global basis, their lack of engagement in climate policy discussions limits their ability to understand and shape the opportunities for investments.

### Vision

To create a series of large 'fund-of-funds' for green infrastructure investment for each major carbon emitting region. To explore whether combining the financial resources of some of the largest sources of international investment (pension funds, endowments, insurance companies etc) with risk mitigation instruments managed by the World Bank Group and other multi-lateral development banks (MDBs) could lead to structured solutions to risk/return limitations in order to dramatically increase the pools of capital for climate-friendly investment. The potential impact of such a strategy is enormous in addressing one of the biggest barriers to international cooperation on climate change: the absence of sufficient financing for the costs of shifting to a global economy consistent with carbon constraints.

### Regional Infrastructure 'Fund of Funds'

While high carbon prices will be helpful in improving the overall set of investible opportunities from a capital markets stand point, they do not address the paucity of institutional intermediary structures, practitioners and transactions. To do this may require the creation of significant private and public sector 'Fund-of-Funds' partnerships.

One example of the power of this institutional / "meso" level approach is CalPERS "Green Wave" programme, which anchored the birth or expansion of clean energy and clean technology funds across the USA. This approach could be replicated on a much larger global scale through the creation of major 'green' infrastructure "fund-of-funds" for the most important carbon emitting regions of the world (for example, the US, EU, Japan, India and China). To

move the needle, these funds would need to be at least \$50-100 billion in size.

Although superficially daunting as a number, this scale is feasible because:

- a) It would be founded on larger private sector private capital flows, not MDB or sovereign 'tax-payer' capital.
- b) Equity required would only be \$15-25 billion per fund with the rest provided as traditional infrastructure debt.
- c) This equity requirement would be further broken down into a series of \$5 billion funds anchored to the extent of 20% limited partner commitment (\$1 billion) by the regional 'fund-of-funds'.
- d) This opportunity would be 'RFP-ed' to the largest private fund managers in the world e.g.

TPG, Carlyle, KKR etc whose own fund raising machinery would be incented to raise the rest. The amounts involved are not large from the perspective of the big buy-out and infrastructure players.

- e) Institutional investors such as pension funds, seeking to get long term annuity – like infrastructure level rates of return, would anchor the funds alongside the endowment and insurance communities and others filling in the "LP" bucket.

In this case, institutional investors would seek to engage the MDBs and sovereign concessional aid priorities specifically to see how MDB capital and risk taking ability can help ease risk return constraints through creative structuring and risk sharing.

## Appendix II: Existing EU-India Institutional Mechanisms

### High-Level Mechanisms

#### EU-India Summit

The EU-India Summits are annual meetings, with agendas that cover many aspects of the cooperation between the European Union and India, including climate change and sustainable development. The first Summit was in Lisbon on 28 June 2000. The 5<sup>th</sup> Summit in 2004 declared India and the EU to be Strategic Partners and in 2005, a Joint Action Plan was agreed. The Joint Action Plan was recently revised during the 9<sup>th</sup> Summit held in Marseille, France, in September 2008. Taking place alternately in India and the Member State that holds the EU Presidency, Summits are attended by, on the European side, the President of the European Commission, the President of the European Council, the Foreign Minister of the country presiding the European Council, the High Representative for the EU's Common Foreign and Security Policy, and the European Commissioner for Trade. India is generally represented by the Prime Minister, the Minister for Commerce and Industry, the Minister of State for External Affairs and the National Security Adviser.

The Annual Summits are part of the general external policy of the European Union – the European Union holds annual summits with each key player around the world. The Summits are used to make a general assessment of relations and to establish new priorities for the coming year. They have notably given the impetus to create most of the bilateral bodies related to climate change and sustainable development.

#### EU-India Troika Ministerial meeting

On the same model as for the Summit, the European Union holds a Troika with each key player around the world as part of its general external policy. Much older than the Summits, the EU-India Troika has been held annually for 20 years. The latest Troika meeting, the 20<sup>th</sup> meeting, was in Prague on 29 June 2009. Attending are the Foreign Minister of the member state holding the EU presidency, the Foreign Minister of the member state holding next the EU presidency, representatives of the European Commission and the Council, and the Indian foreign minister. Together with the EU-India Summit, the Troika is the key institutional structure facilitating regular high level

contact between India and the European Union. It enables the exchange of views on global, international, bilateral and regional issues; climate change and sustainable development are discussed when the context is appropriate.

### Consultative Mechanisms

#### Civil Society Round Table

The decision to set up an EU-India Civil Society Round Table was made at the EU-India Ministerial meeting in Helsinki in December 1999 and endorsed at the first EU-India Summit in Lisbon in June 2000. The first Round Table was held in New Delhi on 29-30 January 2001 and the latest one was held in Paris, France, on 15-16 July 2008. The two-day annual Round Table consists of 30 members, 15 from each side, the European Union being represented by the European Economic and Social Committee, and India represented by equivalent key people from business and industry, media, academic, NGOs and the Indian Ministry of External Affairs. Defined as a "forum for civil society cooperation", the Round Table deals with many topics likely to affect civil society in the European Union and India and is free to decide the agenda. Climate change and sustainable development are frequently discussed, as they were, for example, during the latest meeting in July 2008.

Recommendations from Round Table meetings are submitted to the EU-India Summit, which decides whether or not to act upon them. Having an informal approach, the Round Table aims to strengthen the dialogue between civil societies but no concrete decisions or actions are necessarily taken. An India-EU Civil Society Internet Forum was set up in May 2007 in order to give a greater visibility to the Round Table.

#### EU-India Business Summit

The Business Summit was launched as a result of the first EU-India Summit in Lisbon, in June 2000. It annually brings together high-level business and political leaders from India and the EU, including the Indian Minister for Commerce and Industry, the EU Trade Commissioner and the Prime Minister of the Member State presiding the European Union. It is organised by the Confederation of Indian Industry, the Federation of Indian Chambers of Commerce and

Industry, and their European counterparts. Similar in nature to the Civil Society Round Table, the Business Summit is a forum for key Indian and European leaders where they can discuss and “understand the internalization processes and the dynamics of sector specific wants and needs of both the EU and India”. Discussions have already included energy (renewable energy, energy efficiency, energy security), climate change, research and development, GHG emissions coming from business and industries, and business and technology centre. The Business Summit proposed the establishment of a broad-based trade agreement, which was endorsed by the political EU-India Summit in 2006.

### **European Parliamentary Delegation for Relations with India**

The Delegation was established very recently, on 12 April 2007, but the first contacts between MPs from both sides started in 1981. From 1981 until 2007, the European Parliament maintained contact with its Indian counterpart (Lok Sabha) through the Delegation for Relations with the Countries of South Asia and the South Asian Association for Regional Cooperation (SAARC). Responding to pressing requests and needs to set up a separate Delegation, the Delegation for relations with India was eventually created. The Delegation was chaired by British MEP Neena Gill until June 2009 (she also chaired the Delegation to SAARC) and is composed of 21 other MEPs, plus 21 substitutes. A new chair is still to be decided. Members of the Delegation meet less than once a month. External participants can be invited to take part in the meetings, including representatives from the European Commission, the Council, the European Court of Auditors, or also Indian business. Representatives of the Indian Embassy are always present, which constitutes the main Indian contact point for the Delegation. Concrete contacts between MEPs and Indian MPs are also made through visits of the Delegation’s members to India and irregular visits from the Speaker of the Lok Sabha. There are also occasional visits from State Legislatures’ delegations to the European Parliament.

The objective of the Delegation is to enhance political, economic and cultural relations with India, with a particular emphasis on parliamentary diplomacy. Climate change and sustainable development are not systematically debated but instead discussed when the political context is appropriate. Members debate current political events, report on other meet-

ings/summits involving India and the EU and plan the visits of the Delegation to India.

On the Indian side, no equivalent Delegation has been created yet except for a “parliamentary friendship group” which has “nearly” been established since June 2008, after regular requests from the European Parliament. It is composed of 22 members from both the Lok Sabha and the Raja Sabha. The minutes of the 4<sup>th</sup> November 2008 European Delegation’s meeting stated that “there is no formal supportive structure in India for these friendship groups” so no visits of the group have taken place yet.

The European Parliament has also suggested some new ideas, such as the creation of a “Joint EP-India Parliamentary Assembly” (meeting of 11 June 2007) or the organisation of “activities outside the regular delegation’s meetings, including cultural events” (meeting of 11 June 2007).

### **Technical Mechanisms**

#### **EU-India Science and Technology Steering Committee**

The Science and Technology Cooperation Agreement signed on 23<sup>rd</sup> November 2001 began collaboration on science and technology between India and the EU. The Science and Technology Steering Committee gathered for the first time in March 2004 and meets annually in order to implement the Agreement (the latest meeting was held in Brussels on 2 October 2008). The Committee is composed of representatives from DG Research, and the Department of Science and Technology of the Government of India. Their meetings decide on the focus areas of cooperation, establish EU-Indian funded work programmes and have organised several EU-India thematic workshops in areas such as materials research, transport research, health, biotechnology, climate change and the launch of a coordinated call for proposals. For example workshops were organised on climate change and sustainable development, on clean coal technologies and carbon capture storage, on climate change research needs and on renewable energy research and technology development.

In addition to this bilateral collaboration, India has been taking part in the European Framework Programmes since mid-80s and participated (through Indian researchers or organisations) in 80 projects during the 6<sup>th</sup> Programme (FP6), spanning from 2002

to 2006, of which 20 fell into the category "sustainable development, global change and ecosystems".

### **EU-India Energy Panel**

Following the decision at the 5<sup>th</sup> EU-India Summit in 2004 to create an Energy Panel, the Panel was officially set up in June 2005. It meets every year with the participation of DG Energy, the Indian Foreign Secretary and the Indian Ministry of Power. The Panel acts as a platform to analyse the joint and individual progress made in the energy sector (clean coal technologies, energy efficiency, environment friendly energy, energy market), to share experience and knowledge, and to explore areas of cooperation and joint projects. Four working groups have been created: EU-India Coal and Clean Coal Technologies; Energy Efficiency and Renewable Energy; Fusion Energy/India's participation in the ITER project; Petroleum and Natural Gas. They all meet once a year and report to the Energy Panel. Four studies in coal/clean coal and energy efficiency/renewable energy are planned to be financed by the Action Plan Support Facility. The last meeting of the Energy Panel was on 8 September 2008 and the next one is likely to be in summer 2009, the exact date still to be decided. The Panel, together with its working groups, is the main EU-India body that deals with energy related to climate change.

### **EU-India Initiative on Clean Development and Climate Change**

The Initiative was launched in 2005 during the 6<sup>th</sup> Summit in New Delhi. The focus is on voluntary practical measures, clean technology cooperation, the Clean Development Mechanism, adaptation and policy dialogue. The initiative has led to various workshops/seminars (for example on CDM and adaptation – the last one was in May 2009) and has set up a Joint Working Group on Environment between the European Commission and India. This joint working group takes place annually and exchanges information on environment policies, compares views on multilateral developments and aims to enhance the bilateral cooperation. The next meeting of the joint working group is likely to be in October 2009. The Initiative, together with its joint working group on environment, is the main body that deals with climate change and sustainable development as a whole.

## **Financial Mechanism**

### **Action Plan Support Facility**

Following the EU-India Summit in 2005, the Action Plan Support Facility was created to generate financial support for implementing the EU-India Joint Action Plan. The Support Facility is based in New Delhi and has its own staff. It deals with five key areas, of which one is dedicated to environment. Support for the environment component comes through providing technical assistance, advice and expertise in five priority sectors: waste, water, climate change, air pollution and chemicals. The project began in February 2008 and the activities started in December 2008. The sector of climate change will be addressed during the second year of the project, from 2010.

## **Practical Cooperation Mechanism**

### **European Business and Technology Centre**

The European New Delhi-based Centre has been operating since October 2008 and acts as a platform between business, science and research institutions in order to build stronger business links and foster collaboration between India and the EU. It was set up by Eurochambres and 16 other European partners including business organisations, academic and research institutes. A high-level group of Indian business and technology experts - the Indian Counterparts Committee - is planned to meet twice a year and act in an advisory and expertise capacity for the Centre.

The objectives of the EBTC are multiple: to develop business to business links, research co-operation, assist technology transfer and foster public and private partnership, in sectors such as environment, energy, clean development, climate change. The main objective of the Centre is to "establish a sustainable centre that will become the point of reference for European companies and researchers keen to enter the Indian market". The Centre plans to organise seminars, workshops and trade fairs in order to strengthen the exchange of knowledge and technology and develop the network of European and Indian stakeholders. It will also act as a "Service Provider Pool" in order to deliver expertise and knowledge to companies and research institutions. The annual working plan has recently been released and includes four selected key sectors: biotechnology, energy, environment and transport.

## Appendix III: Participants to the High-Level India-EU Dialogue

Maria João Albernaz	Advisor, Bureau of European Policy Advisors
Clara Martinez Alberola	Member of President Barroso's Cabinet
Claire Albus	Assistant, Bureau of European Policy Advisors
Titus Alexander	Director, AGCC, London
Fergus Auld	First Secretary, Climate Change and Energy, DFID, High Commission, Delhi
Paul Baer	EcoEquity, USA
Matthew Baldwin	Member of President Barroso's Cabinet
José Manuel Barroso	President, European Commission
Rosário Bento Pais	Deputy Head of Climate Change Unit, DG Environment, European Commission
Peter Betts	Director General, International Climate Change, DECC, London
Dr Jürgen Bischoff	Director, GTZ-ASEM, Delhi
Bernadette Bord	Deputy Head, Legal Department, German Embassy in London
Jens Burgdorf	Director, GTZ Indo-German Energy Programme, Delhi
Reinhard Hans Bütikofer	Member of the European Parliament; Former President, Green Party, Berlin
Prof Maria da Graça Carvalho	Member of the European Parliament; Former Principal Advisor, Bureau of European Policy Advisors
Raj Chengappa	Managing Editor, India Today, Delhi
Amit Chugh	Co-founder and Managing Director, Cosmos Ignite Innovations Ltd, Delhi
Dennis Clare	Law Fellow, Institute for Governance and Sustainable Development, Washington
Anna da Costa	Co-Director, Indian Climate Solutions; Worldwatch India Fellow
Jürgen Cuno	Head of External Affairs, BP, Berlin
Chandrashekhar Dasgupta	Former Ambassador to China and the EU; Distinguished Fellow, TERI, Delhi
Dr Pierre Dechamps	Advisor, Energy and Climate change, Bureau of European Policy Advisors
Nitin Desai	Co-Chairman, India-UK Round Table; former UN Under-Secretary General for Economic and Social Affairs, Delhi
Sandeep Dikshit	Indian Member of Parliament, Delhi
Robert Donkers	Environment Counsellor, European Commission Delegation to India, Delhi

Prof César Dopazo	Professor, Departamento de Ciencia y Tecnologia de Materiales y Fluidos Universidad de Zaragoza, Zaragoza
Prof Ottmar Edenhofer	Deputy Director and Chief Economist, Potsdam Institute for Climate Impact Research, Potsdam
Benoit Faraco	Climate Change and Energy co-ordinator, Fondation Nicolas Hulot, Paris
Jennifer Frankel-Reed	Technical Advisor, Climate Change, GTZ, Delhi
Dr Prodipto Ghosh	Former Secretary, Ministry of Environment and Forests; Distinguished Fellow, TERI, Delhi
Mary Louise Gifford	Researcher, Potsdam Institute for Climate Impact Research, Potsdam
Dr Oliver Gnad	Director of AgenZ Frankfurt, GTZ, Frankfurt
Akshay Gujral	Former intern, AGCC, London
Ajit K Gupta	Former Adviser, MNRE, Delhi
Jörg Haas	Former head of Department of Ecology and Sustainable Development, Heinrich Böll Foundation, Berlin
Harald Händel	Delegation spokesperson, European Commission Representation in Germany, Berlin
Sven Hansen	Editor Asia-Pacific desk, Die Tageszeitung, Berlin
Prof Sugata Hazra	Director, School of Oceanography, Jadavpur University, Kolkata
Nicolas Hulot	Founder, Fondation Nicolas Hulot for Nature & Mankind, Paris
Jeff Huntington	Head of Programme, Environmental Assessment, European Environment Agency, Copenhagen
Dr Arun Jaura	Former Chief Technical Officer, Mahindra & Mahindra Ltd, Mumbai
Owen Jenkins	British High Commission, Delhi
Dietlind Jering	Head of the European Commission Representation in Germany, Berlin
Dr Susanne Kadner	Research Analyst, Potsdam Institute for Climate Impact Research, Potsdam
Aditi Kapoor	Lead Specialist, Oxfam India, Delhi
Prof Dr Claudia Kemfert	Head, Department for Energy, Transportation, Environment, Deutsches Institut für Wirtschaftsforschung, Berlin
Dr Nitya Khemka	Director, The Nand and Jeet Khemka Foundation
Uday Khemka	Managing Trustee, The Nand and Jeet Khemka Foundation
Dr Michael Köberlein	Director, Heinrich Böll Foundation, Delhi
Martin Kremer	Former Counsellor/Head Science, Technology and Environment, German Em- bassy, London

Arun Kumar	President, Development Alternatives, Delhi
Ritu Kumar	Director of TERI-Europe, London
Brice Lalonde	Ambassador for Climate Change, France
Prof Alan Larsson	Former Swedish Minister; former Director-General of the European Commission, Stockholm
Christopher Layton	Honorary Director General, European Commission, London
Suzanne Lee	Sir Crispin Tickell's Assistant, Oxford
Claes Leijon	Counsellor, Embassy of Sweden in India; Sida Representative, Delhi
Prof Dr Anders Levermann	Professor of Dynamics of the Climate System, Potsdam Institute for Climate Impact Research, Potsdam
Johan Lilliestam	Scientist, Potsdam Institute for Climate Impact Research; SuperSmart Grid Project, Berlin
Holger Liptow	Carbon Procurement Unit, GTZ, Berlin
Becky Luff	Programme Assistant, AGCC, London
Peter Luff	CEO, Action for a Global Climate Community; Chair, the European Movement UK, London
Nick Mabey	CEO, E3G, London
Claude Mandil	Former Executive Director, International Energy Agency, Paris
Dr Ajay Mathur	Director General, Bureau of Energy Efficiency, Delhi
Prof Jacqueline McGlade	Director, European Environment Agency, Copenhagen
Malini Mehra	Founder and Chief Executive, Centre for Social Markets, London
Don Mohanlal	President and Chief Executive Officer, The Nand and Jeet Khemka Foundation, Delhi
Jennifer Morgan	Climate Change Programme Director, E3G, Berlin
Asoke Mukerji	Indian Deputy High Commissioner, London
Dr Hermann Ott	Head, Berlin office, Wuppertal Institute, Berlin
Dr Rajendra K. Pachauri	Chair, Intergovernmental Panel on Climate Change; Director, The Energy and Resources Institute, Delhi
Baijayant Panda	Indian Member of Parliament, Delhi
Prof Jyoti Parikh	Executive Director of Integrated Research and Action for Development, Delhi
Dr Kirit Parikh	Former Member, Planning Commission, Delhi
Anil Patni	Head of Communications and External Affairs, Tata BP Solar, Delhi



Dr jur Jörg Pietsch	Head of the Executive Staff, Potsdam Institute for Climate Impact Research, Potsdam
Prof Malgorzata Pilawska	Professor, Cracow University of Technology, Cracow
Hon'ble Suresh Prabhu	Former Indian Member of Parliament; former Industry Minister, Environment Minister and Energy Minister, Delhi
Dr K. V. Devi Prasad	Science and Technology Counsellor, Embassy of India, Berlin
V. Raghuraman	Former Principal Adviser and Chief Coordinator, Energy, Environment and Natural Resources, Confederation of Indian Industry, Delhi
Prof Lavanya Rajamani	Associate Professor, Centre for Policy Research, Delhi
Prof V. Ramanathan	Victor Alderson Professor of Applied Ocean Sciences; Distinguished Professor of Climate and Atmospheric Sciences, San Diego
Peter Rösgen	Leiter Gruppe Infrastrukturpolitik, German Chancellery, Berlin
Estelle Rouhaud	Research and Programme Assistant, AGCC, London
Prof Carlo Rubbia	CERN, (Geneva) Nobel Laureate 1984 (Physics), Geneva
Mark Runacres	Consultant, AGCC; former UK Deputy High Commissioner, Delhi
Prof Ambuj Sagar	Indian Institute of Technology, Delhi
Dr Delia Salmieri	International relations, office of Professor Carlo Rubbia, Geneva
K. Madhava Sarma	Former Executive Secretary, Secretariat for the Vienna Convention and the Montreal Protocol, UNEP, Delhi
Prof John Schellnhuber	Director, Potsdam Institute for Climate Impact Research, Potsdam; Chief Scientific Advisor on Climate Change to the German Chancellor, Berlin
Ashutosh Shastri	Founding Director, EnerStrat Consulting, London
Air Marshal AK Singh	Former Air Officer Commanding in Chief, Western Air Command, Delhi
Prof Viriato Soromenho-Marques	Professor catedratico na Faculdade de Letras da Universidade de Lisboa, Lisbon
Melanie Speight	Head Policy, International climate change and Energy, UK Department for Energy and Climate Change
Tom Spencer	Vice-Chairman, Institute for Environmental Security, London
David Stephen	Director and Chairman, AGCC, London
Pavan Sukhdev	Green Indian States Trust, Chennai
Peter Sutherland	Chairman BP, London; Chairman, Goldman Sachs International; Chair of LSE Council, London
Sir Crispin Tickell	Director of the Policy Foresight Programme in the James Martin Institute, Oxford University, Oxford

Jürgen Trittin	Former Environment Minister, Berlin
Barbara Unmuessig	President, Heinrich Böll Foundation, Berlin
Sanjay Upadhyay	Director, Enviro Legal Defence Firm, Noida, Delhi
Douglas Varchol	Director of the Media Program, Institute for Governance and Sustainable Development, Washington
George C. Varughese	President, Development Alternatives, Delhi
Sanjay Vashist	Programme Advisor, Heinrich Böll Foundation, Delhi
Sasank Vemuri	Technical Manager, GTZ, Delhi
Marek Wallenfels	Managing Director, 2°Deutsche Unternehmen für Klimaschutz, Berlin
Paul Watkinson	Coordinator of International Questions, Interministerial Mission of the Greenhouse Effect, French Ministry of Ecology (MEEDDM)
Robert Whitfield	Director, AGCC, London
Prof Lutz Wicke	Institut für Umweltmanagement ESCP-EAP Europäische Wirtschaftshochschule, Berlin
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Durwood J. Zaelke	Director, INECE Secretariat; President and Founder, Institute for Governance and Sustainable Development, Washington



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