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CLIMATE CHANGE AND INTERNATIONAL ECONOMIC LAW

Namrata Gupta[1]

Climate change is a complex problem that requires solutions on many fronts. Ninety-seven percent of climate scientists agree that climate-warming trends over the past century are very likely due to human activities.[2] The current warming trend is of particular significance because most of it is very likely human-induced and proceeding at a rate that is unprecedented in the past 1,300 years.[3]Earth-orbiting satellites and other technological advances have enabled scientists to see the big picture, collecting many different types of information about our planet and its climate on a global scale. This body of data, collected over many years, reveals the signals of a changing climate.The heat-trapping nature of carbon dioxide and other gases was demonstrated in the mid-19th century.[4]Their ability to affect the transfer of infrared energy through the atmosphere is the scientific basis of many instruments flown by NASA. There is no question that increased levels of greenhouse gases must cause the Earth to warm in response. Ice cores drawn from Greenland, Antarctica, and tropical mountain glaciers show that the Earth's climate responds to changes in greenhouse gas levels. Ancient evidence can also be found in tree rings, ocean sediments, coral reefs, and layers of sedimentary rocks. This ancient, or paleoclimate, evidence reveals that current warming is occurring roughly ten times faster than the average rate of ice-age-recovery warming[5].

[1]**LLM (WBNUJS), junior research scholar(JRF), pursuing P.hD. from Allahabad University.**

[2] https://climate.nasa.gov/evidence/ accessed on 23rd march 2017
[3] V. Ramaswamy et.al., "Anthropogenic and Natural Influences in the Evolution of Lower Stratospheric Cooling," Science 311 (24 February 2006), 1138-1141
[4] In the 1860s, physicist John Tyndall recognized the Earth's natural greenhouse effect and suggested that slight changes in the atmospheric composition could bring about climatic variations. In 1896, a seminal paper by Swedish scientist Svante Arrhenius first predicted that changes in the levels of carbon dioxide in the atmosphere could substantially alter the surface temperature through the greenhouse effect.
[5] Supra n.3

SCIENTIFIC EVIDENCE FOR WARMING OF THE CLIMATE SYSTEM IS UNEQUIVOCAL.[6]

- Global sea level rose about 17 centimetres (6.7 inches) in the last century. The rate in the last decade, however, is nearly double that of the last century.[7]
- All three major global surface temperature reconstructions show that Earth has warmed since 1880. Most of the warming occurred in the past 35 years, with 15 of the 16 warmest years on record occurring since 2001. The year 2015 was the first time the global average temperatures were 1 degree Celsius or more above the 1880-1899 average. Even though the 2000s witnessed a solar output decline resulting in an unusually deep solar minimum in 2007-2009, surface temperatures continue to increase.[8]
- Since the beginning of the Industrial Revolution, the acidity of surface ocean waters has increased by about 30 percent This increase is the result of humans emitting more carbon dioxide into the atmosphere and hence more being absorbed into the oceans. The amount of carbon dioxide absorbed by the upper layer of the oceans is increasing by about 2 billion tons per year.[9]
- Both the extent and thickness of Arctic sea ice has declined rapidly over the last several decades.[10]
- Satellite observations reveal that the amount of spring snow cover in the Northern Hemisphere has decreased over the past five decades and that the snow is melting earlier.[11]

MAIN CAUSE OF CURRENT CLIMATE CHANGE

Most climate scientists agree the main cause of the current global warming trend is human expansion of the "greenhouse effect"[12] warming that results when the atmosphere traps heat

[6] Intergovernmental Panel on Climate Change
[7] Church, J. A. and N.J. White (2006), A 20th century acceleration in global sea level rise, Geophysical Research Letters, 33, L01602, doi:10.1029/2005GL024826.
[8] https://www.ncdc.noaa.gov/indicators/
http://www.cru.uea.ac.uk/cru/data/temperature
http://data.giss.nasa.gov/gistemp
[9] http://www.pmel.noaa.gov/co2/story/Ocean+Acidification . accessed on 14th march 2017
[10] L. Polyak, et.al., "History of Sea Ice in the Arctic," in Past Climate Variability and Change in the Arctic and at High Latitudes, U.S. Geological Survey, Climate Change Science Program Synthesis and Assessment Product 1.2, January 2009, chapter 7
[11] C. Derksen and R. Brown, "Spring snow cover extent reductions in the 2008-2012 period exceeding climate model projections," GRL, 39:L19504

radiating from Earth toward space.Certain gases in the atmosphere block heat from escaping. Long-lived gases that remain semi-permanently in the atmosphere and do not respond physically or chemically to changes in temperature are described as "forcing" climate change. Gases, such as water vapour, which respond physically or chemically to changes in temperature are seen as "feedbacks."

Gases that contribute to the greenhouse effect include:
Water vapor. The most abundant greenhouse gas, but importantly, it acts as a feedback to the climate. Water vapor increases as the Earth's atmosphere warms, but so does the possibility of clouds and precipitation, making these some of the most important feedback mechanisms to the greenhouse effect.

Carbon dioxide (CO2). A minor but very important component of the atmosphere, carbon dioxide is released through natural processes such as respiration and volcano eruptions and through human activities such as deforestation, land use changes, and burning fossil fuels. Humans have increased atmospheric CO2 concentration by more than a third since the Industrial Revolution began. This is the most important long-lived "forcing" of climate change.

Methane. A hydrocarbon gas produced both through natural sources and human activities, including the decomposition of wastes in landfills, agriculture, and especially rice cultivation, as well as ruminant digestion and manure management associated with domestic livestock. On a molecule-for-molecule basis, methane is a far more active greenhouse gas than carbon dioxide, but also one which is much less abundant in the atmosphere.

Nitrous oxide. A powerful greenhouse gas produced by soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.
Chlorofluorocarbons (CFCs). Synthetic compounds entirely of industrial origin used in a number of applications, but now largely regulated in production and release to the atmosphere by

[12] http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts

international agreement for their ability to contribute to destruction of the ozone layer. They are also greenhouse gases.

On Earth, human activities are changing the natural greenhouse. Over the last century the burning of fossil fuels like coal and oil has increased the concentration of atmospheric carbon dioxide (CO2). This happens because the coal or oil burning process combines carbon with oxygen in the air to make CO2. To a lesser extent, the clearing of land for agriculture, industry, and other human activities has increased concentrations of greenhouse gases.

The consequences of changing the natural atmospheric greenhouse are difficult to predict, but certain effects seem likely:

On average, Earth will become warmer. Some regions may welcome warmer temperatures, but others may not.Warmer conditions will probably lead to more evaporation and precipitation overall, but individual regions will vary, some becoming wetter and others dryer.

A stronger greenhouse effect will warm the oceans and partially melt glaciers and other ice, increasing sea level. Ocean water also will expand if it warms, contributing further to sea level rise.

Meanwhile, some crops and other plants may respond favourably to increased atmospheric CO2, growing more vigorously and using water more efficiently. At the same time, higher temperatures and shifting climate patterns may change the areas where crops grow best and affect the makeup of natural plant communities.

THE ROLE OF HUMAN ACTIVITY

In its Fifth Assessment Report, the Intergovernmental Panel on Climate Change, a group of 1,300 independent scientific experts from countries all over the world under the auspices of the United Nations, concluded there's a more than 95 percent probability that human activities over the past 50 years have warmed our planet. The industrial activities that our modern civilization depends upon have raised atmospheric carbon dioxide levels from 280 parts per million to 400 parts per million in the last 150 years. The panel also concluded there's a better than 95 percent

probability that human-produced greenhouse gases such as carbon dioxide, methane and nitrous oxide have caused much of the observed increase in Earth's temperatures over the past 50 years.[13]

THE MULTILATERAL TRADING SYSTEM AND CLIMATE CHANGE

Climate change is the biggest sustainable development challenge the international community has had to tackle to date. Measures to address climate change need to be fully compatible with the international community's wider ambitions for economic growth and human advancement. It is a challenge that transcends borders and requires solutions not only at national levels but at the international level as well.

The WTO is one part of the architecture of multilateral cooperation. It provides a framework of disciplines to facilitate global trade and serves as a forum to negotiate further trade openness. Freer trade is not an end in itself; it is tied to crucially important human values and welfare goals captured in the WTO's founding charter, the Marrakesh Agreement. Among these goals are raising standards of living, optimal use of the world's resources in accordance with the objective of sustainable development, and protection and preservation of the environment. The issue of climate change, per se, is not part of the WTO's ongoing work programme and there are no WTO rules specific to climate change. However, the WTO is relevant because climate change measures and policies intersect with international trade in a number of different ways.

First, trade openness can help efforts to mitigate and adapt to climate change, for example by promoting an efficient allocation of the world's resources (including natural resources), raising standards of living (and hence the demand for better environmental quality) and improving access to environmental goods and services.

Second, the WTO is relevant because national measures to mitigate and adapt to climate change may have an impact on international trade (as they may modify conditions of competition) and may be subject to WTO rules. The WTO “tool box” of rules can be relevant, therefore, to the

[13] https://climate.nasa.gov

examination of climate change measures. Moreover, WTO rules, as a whole, offer a framework for ensuring predictability, transparency and the fair implementation of such measures.

The past half century has been marked by an unprecedented expansion of international trade. Since 1950, world trade has grown more than twenty-seven fold in volume terms. A number of factors have given rise to this spectacular expansion in world trade. Foremost is technological change, which has considerably reduced the cost of transportation and communications. The information technology revolution has made it easier to trade and to coordinate production of parts and components of a final good in different countries.

A second factor is more open trade and investment policies. Countries have opened up their trade regimes unilaterally, bilaterally, regionally, and multilaterally. Measures that taxed, restricted or prohibited trade have either been eliminated or reduced significantly. These changes in economic policies have not only facilitated trade, they have also broadened the number of countries participating in global trade expansion.

Trade economists have developed a conceptual framework for examining how trade opening can affect the environment. This framework, first applied to study the environmental impact of the North American Free Trade Agreement (NAFTA), separates the impact of trade liberalization into three independent effects: scale, composition and technique. This framework can be used therefore to study the link between trade opening and climate change.

The “scale” effect refers to the impact on greenhouse gas emissions from the increased output or economic activity resulting from freer trade.

The effect on greenhouse gas emissions will depend on the sectors in which a country has comparative advantage. The “composition” effect will result in less greenhouse gas emissions if the expanding sectors are less energy intensive than the contracting sectors.

Improvements in energy efficiency by applying efficient “technique” so that the production of goods and services generates less greenhouse gas emissions. One concern about trade's role in

greenhouse gas emissions is its link to transportation services. International trade involves countries specializing in and exporting goods in which they have a comparative advantage and importing other goods from their trade partners. This process of international exchange requires that goods be transported from the country of production to the country of consumption. So international trade expansion is likely to lead to increased use of transportation services.

In the Marrakesh Agreement establishing the WTO, members established a clear link between sustainable development and disciplined trade liberalization — in order to ensure that market opening goes hand in hand with environmental and social objectives. In the ongoing Doha Round, members went further in their pledge to pursue a sustainable development path by launching the first ever multilateral trade and environment negotiations.

Aimed at furthering trade opening, a number of aspects of the Doha Round have a direct bearing on sustainable development and can therefore contribute positively to efforts to mitigate and adapt to climate change. As well, WTO's regular work provides a platform for addressing the linkages between trade and climate change.

NEGOTIATIONS ON ENVIRONMENTAL GOODS AND SERVICES

Under the ongoing negotiations on mutual supportiveness of trade opening with the environment, WTO members are working to eliminate trade barriers in the goods and services that can benefit the environment. Facilitating access to products and services in this area can help improve energy efficiency, reduce greenhouse gas emissions and have a positive impact on air quality, water, soil and natural resources conservation. A successful outcome of the negotiations on environmental goods and services could deliver a triple-win for WTO members: a win for the environment, a win for trade and a win for development.

Environmental goods can cover a number of key technologies that may contribute positively to the fight against climate change. Reducing or eliminating import tariffs and non-tariff barriers in these types of products will reduce their price and make them more accessible. Increased competition will foster technological innovation in areas related to protection of the environment and combating climate change. According to a recent World Bank study on trade and climate

change, elimination of both tariffs and non-tariff barriers to clean technologies could result in a 14 per cent increase in trade.

LIBERALIZING ENVIRONMENTAL SERVICES

In the negotiations on environmental services, WTO members are seeking GATS specific commitments on activities which may be directly relevant to policies aimed at mitigating climate change.During the Uruguay Round, negotiations focused on sewage services, refuse disposal services and sanitation services, which are listed in the environmental services sector of the Services Sectoral Classification List (MTN.GNG/W/120). Other environmental services, which are commonly understood to be covered by the category "Other" in this list, attracted limited attention at the time. Among them, services such as "cleaning of exhaust gases" and "nature and landscape protection services" are directly relevant to climate change mitigation measures. Cleaning of exhaust gases includes emission monitoring and services aiming to control and reduce the level of pollutants in the air, whether from mobile or stationary sources, which are mostly caused by the burning of fossil fuels.

AGRICULTURAL AND NON-AGRICULTURAL NEGOTIATIONS

Some benefits to climate change mitigation and adaptation, albeit indirectly, may result from the negotiations on agriculture and market access for non-agricultural goods. First, the elimination of tariff and non-tariff barriers and a reduction in agricultural support in developed countries may lead to a more efficient allocation of global resources and production.

Second, trade negotiations will lead to increased trade opportunities for developing countries which could lead to important income gains for these countries. Increased incomes may enable poorer countries to reduce their vulnerability to the effects of climate change by investing in irrigation, for example. In the longer term, the enhanced predictability associated with WTO commitments from the Doha Round, and associated monitoring and surveillance activities, could help to offset the less predictable shifts in weather and productivity. This will ensure that developing countries do not suffer disproportionately from the negative impacts of climate change.

The challenge of climate change has also contributed to the development of the bio fuel sector, as many countries see that bio fuels can assist them in meeting their reduction commitments for greenhouse gas emissions under the Kyoto Protocol. Since the production of bio fuels is concentrated mostly in the consuming countries, trade in bio fuels is not currently very significant. Trade in biodiesel tends to take place between EU countries as production and consumption is currently concentrated in the EU. However, trade in bio ethanol has been growing over the last few years, with Brazil emerging as the leading exporter.

THE COMMITTEE ON TRADE AND ENVIRONMENT (CTE)

The work programme of the Committee on Trade and Environment (CTE) covers the main issues at the intersection of trade and environment. A number of issues indirectly relating to climate change, such as the environmental benefits of removing trade restrictions in the energy and forestry sectors and the effect of energy efficiency labelling on market access, have been discussed in the CTE. The Committee serves as an incubator for ideas to advance the trade and environment agenda and is the main gateway should members decide to explore further the linkages between climate change and trade.

Broadly speaking, WTO rules and jurisprudence (the WTO "tool-box" of rules) that relate generally to environmental issues (including GATT Article XX, the PPMs (processes and production methods) issue, and the definition of a like product) are relevant to the examination of climate change measures. The general approach under WTO rules has been to acknowledge that some degree of trade restriction may be necessary to achieve certain policy objectives as long as a number of carefully crafted conditions are respected. A number of WTO rules may be relevant to measures aimed at mitigating climate change. These include:

- disciplines on tariffs (border measures), essentially prohibiting members from collecting tariffs at levels greater than that provided for in their WTO scheduled consolidation
- a general prohibition against border quotas
- a general non-discrimination principle, consisting of the most-favoured-nation and national treatment principles.
- rules on subsidies

- rules on technical regulations and standards, which may not be more restrictive than necessary to fulfil a legitimate objective. Technical regulations and standards must also respect the principle of non-discrimination and be based on international standards, where they exist. There are also specific rules for sanitary and phytosanitary measures which are relevant for agricultural products.
- disciplines relevant to trade in services, imposing general obligations such as most-favoured-nation treatment, as well as further obligations in sectors where individual members have undertaken specific commitments.
- rules on trade-related intellectual property rights. These rules are relevant for the development and transfer of climate-friendly technologies and know-how.

MITIGATION AND ADAPTATION

It is useful to think about climate change and global governance in terms of adaptation and mitigation. Climate change mitigation seeks to reduce the rate and magnitude of climate change by reducing greenhouse gas emissions or enhancing the absorption of carbon or carbon dioxide from the atmosphere by "sinks," such as oceans or forests. Adaptation seeks to diminish the negative impacts of climate change by increasing the ability of humans or ecosystems to cope with the changes. Mitigation and adaptation deal with different aspects of the risks imposed by climate change, but they are interrelated. Since mitigation would prevent the worst-case scenario from occurring, it increases the chances that the remaining climate risks can be successfully managed through adaptation. The benefits of mitigation are global, but the cost of reductions is primarily local. In contrast, adaptation costs and benefits are both primarily local. Mitigation benefits are long-term, whereas adaptation benefits are short- and medium-term. Because of these differences, national and international climate change response efforts have followed separate mitigation and adaptation paths, with a major focus on mitigation. However, some climate change impacts are unavoidable now, so adaptation efforts have begun. Nevertheless, the technological and financial capacity of countries to adapt to climate change differs significantly, as does their vulnerability to the effects of climate change.[14] These differences among countries

[14] WTO and UNEP, Trade and Climate Change (WTO Secretariat, Geneva 2009) 24–6.

are part of the reason for incorporating the principle of common but differentiated responsibilities into the UNFCCC.[15]

Incentives to take mitigation and adaptation measures are asymmetrical, since the costs and benefits of these measures are not the same for all countries.[16]Developing countries may insist that developed countries take responsibility for the cost of mitigation and adaptation. Regardless, at some point, some developing countries will have to focus on adaptation at the national level to address climate-related catastrophes, with or without the help of the developed countries. Some developed countries might find adaptation less costly than mitigation and just leave the most vulnerable to fend for themselves, absent significant spill over, such as climate refugees. However, discussing the costs and benefits of mitigation and adaptation in terms of developed and developing countries ignores the global nature of the problem, the potential seriousness of the consequences and the great variation among countries in their vulnerability to, and their capacity to adapt to, the effects of climate change.

TECHNOLOGY TRANSFER FOR MITIGATION AND ADAPTATION

Clean energy technologies are often cited as an example of the kind of technology that needs to be developed and transferred internationally in order to combat climate change. In international debates regarding the effect of IPRs on the transfer of environmental technologies, developing countries often draw upon the experience regarding pharmaceutical patents. However, IPRs play a different role in the renewable energy industries than they do in the pharmaceutical sector, and seem less likely to create barriers to technology access. New plant varieties represent another important technology that developing countries, in particular, will need in order to adapt to the effects of climate change.[17] The applicable intellectual property laws and the technology transfer issues are different for biotechnologies such as plant varieties, where IPRs may create barriers to access that are similar to the pharmaceutical sector. Thus, it is not possible to analyze the subject of intellectual property rights and international technology transfer in a generalized manner. The

[15] Christopher D. Stone, "Common but Differentiated Responsibilities in International Law" (2004) 98 AJIL 276.
[16] Hanh H. Danga, Axel Michaelowa, and Dao D. Tuan, "Synergy of Adaptation and Mitigation Strategies in the Context of Sustainable Development: The Case of Vietnam" (2003) 3 Climate Policy (Supplement 1) S81.
[17] The transfer of agricultural technology for adaptation to climate change is discussed in Intergovernmental Panel on Climate Change, *Methodological and Technological Issues in Technology Transfer*, ch. 11 〈http://www.grida.no/publications/other/ipcc_sr/?src=/climate/ipcc/tectran/index.htm〉 (accessed April 1, 2017).

analysis must be done according to specific categories of technology. In the case of clean energy technologies, the availability of competing technologies will diminish the impact of IPRs on their cost. In the case of new plant varieties, where a technology has no or few substitutes, or IPRs are concentrated in the hands of relatively few firms, IPRs will increase costs due to monopoly pricing power.

In general, developing countries are more vulnerable to the impacts of climate change on agriculture and subsistence farmers. The impact of climate change on agriculture will affect developing countries disproportionately, for several reasons. Climate change will have a greater impact on the viability of traditional plant varieties in developing countries in the tropics than in developed countries in temperate zones. This means that the need for genetically modified organism (GMO) seeds will be greater in developing countries. However, a larger percentage of the population depends on agriculture in developing countries (50 percent in India, for example) and the poorest in developing countries depend on subsistence agriculture. Their poverty means that they rely on collecting seeds from traditional plant varieties to sow future crops. However, climate change will make these varieties increasingly untenable. As production in these varieties decline, developing countries will require greater access to GMO varieties that can raise yields and adapt to climate change. However, the vast majority of the rights to these GMO varieties belong to corporations in the United States, Europe, and Japan. The percentage of GMO crops owned by Monsanto alone is: 91 percent of soy, 97 percent of maize, 63 percent of cotton, and 59 percent of canola. Thus, the food security of developing countries will depend on access to technology from developed countries, in particular private companies from developed countries. This will give a company like Monsanto tremendous bargaining power over developing country governments.The six large multinational companies (DuPont, BASF, Monsanto, Syngenta, Bayer and Dow) not only own the GMO crops, but they have patented 77 percent of all “climate ready crop genes” during June 2008 and June 2010.

Innovations in plant breeding play an important role in a number of public objectives, such as food security, environment, sustainability, and transitions in the rural economy. Farmers and growers have an interest in competition in the seed market. However, stronger intellectual property rights have combined with technological developments to produce increasing

consolidation among breeding companies. Strengthening intellectual property rights may conflict with development objectives. Strengthening intellectual property rights, by contributing to a decreasing diversity in breeding companies, also threatens innovation in plant breeding.[18] These negative impacts of intellectual property rights will become more apparent as climate change begins to have a greater impact on crop yields. The combination of climate change, increasing intellectual property rights for new plant varieties and growing demand for food supplies raises serious concerns regarding affordable access to new biotechnologies and food staples in developing countries. Some have proposed the negotiation of an agreement on intellectual property rights on technologies necessary for mitigation efforts in developing countries, based on the WTO decision on compulsory licensing of pharmaceuticals.The benefit of this approach is that the negotiation could take place separately from the negotiation of the Doha Round. As technologies mature and IPRs expire, their cost will go down. However, newer technologies may be more effective and, hence, more desirable. Many of the relevant technologies are owned by private interests in developed countries, not governments, and may be acquired by private interests in developing countries. Private firms are not likely to transfer technology in a way that would hamper their competitiveness and would be concerned about creating competitors among the recipients of the technologies.

With respect to clean energy technologies, while IPRs may have a negative impact on innovation, competition, and affordable access, we argue that the focus of the debate should not be on IPRs for clean energy technologies. First, achieving reforms to the international intellectual property regime is likely to prove difficult. Second, IPRs do not represent the main obstacle to innovation, competition and affordable access for clean energy technologies. For example, the fact that the United States has applied countervailing duties on imports of solar panels from China indicates that IPRs are not a sufficient barrier to competition in this sector. Otherwise, countervailing duties would not be necessary to protect the US solar panel industry from Chinese competition.

Multilateral cooperation and financing will continue to be an essential element in climate finance. The WTO will have to adapt subsidies rules, via judicial interpretations on a case-by-

[18] Niels Louwaars et al., "Breeding Business: The Future of Plant Breeding in the Light of Developments in Patent Rights and Plant Breeder's Rights" (2009) Netherlands Ministry of Agriculture, Nature and Food Quality (LNV), Wageningen, Centre for Genetic Resources (CGN)

case basis or via a negotiated response to agreements reached in other multilateral organizations. The increasing number of actors in climate finance activities will require more coordination and adaptation of roles among institutions such as the World Bank and the Green Climate Fund. The activities of these institutions will have to be coordinated with those of the private sector participants as well.

In the current political and economic context, multilateralism is not working in the UNFCCC and WTO systems. This requires unilateralism, but in a well-considered approach that creates economic incentives to engage the private sector and to push governments into effective multilateral agreements. For example, funding for adaptation and technology transfer should be made conditional on recipients implementing PPP-based mitigation measures, in order to channel funding and technology to combat climate change. This can be accompanied by unilateral trade measures on goods and services to create political will in developing countries; the private industry that opposes climate change action based on competitive concerns might change their stance if unilateral trade measures begin to affect market access and competitiveness. However, unilateral measures to combat climate change need to be taken in a manner that is consistent with existing obligations and principles of international environmental and economic law, as far as possible, in order to more effectively address this urgent global issue.

A single country or a single region cannot reduce the greenhouse gas emissions of other regions or countries. It may be possible to create incentives for other countries, for example with unilateral trade restrictions or foreign aid that is conditional upon emissions reductions. However, trade restrictions do not just impose costs on the exporting country. They also impose costs on the importing country, where importers are affected by the increased cost of inputs. In addition, few domestic markets are large enough for trade barriers to have an economic impact that would be sufficient to create an adequate incentive to reduce emissions. Foreign aid that is conditioned upon the use of inputs from the donor country also may violate WTO law. Moreover, foreign aid costs money for donor countries, too. Even if we resolve the problems of cost and WTO consistency of trade barriers and foreign aid, they remain partial solutions only because they will not achieve the desired level of emissions reductions.

We can estimate the future concentrations of greenhouse gases and we can estimate the probability of a range of temperature increases, but we cannot say precisely what the temperature increase will be, how that temperature increase will vary from one part of the planet to another, and what the ecological and economic effects will be. What we do know is that the risks are grave. Debating whether we have underestimated or overestimated the proximity and severity of those risks misses the point. We need to address those risks through mitigation and adaptation. To do so effectively will require creating incentives for multilateral action and removing obstacles to financing the dissemination of the technologies needed for mitigation and adaptation.