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Copenhagen Primer.

In December, world leaders will meet in Copenhagen, Denmark, at the United Nations Climate Change Conference to negotiate a global strategy to confront climate change. Although the likelihood of reaching an agreement is unknown, the urgency of the need for global action is clear; never before have the need for action and the conditions to act been so aligned. The scientific community is in agreement that man-made greenhouse gases (GHGs) are affecting Earth’s climate. The consequences of unabated climate change on human health, the environment and the economy are becoming evermore apparent. Furthermore, the opportunity to effect change - to curb emissions and reduce the magnitude of those consequences - is closing. Countless individuals, organizations and states around the world have made tremendous investments to arrive at this point, yet significant uncertainty regarding the proper course of action remains.

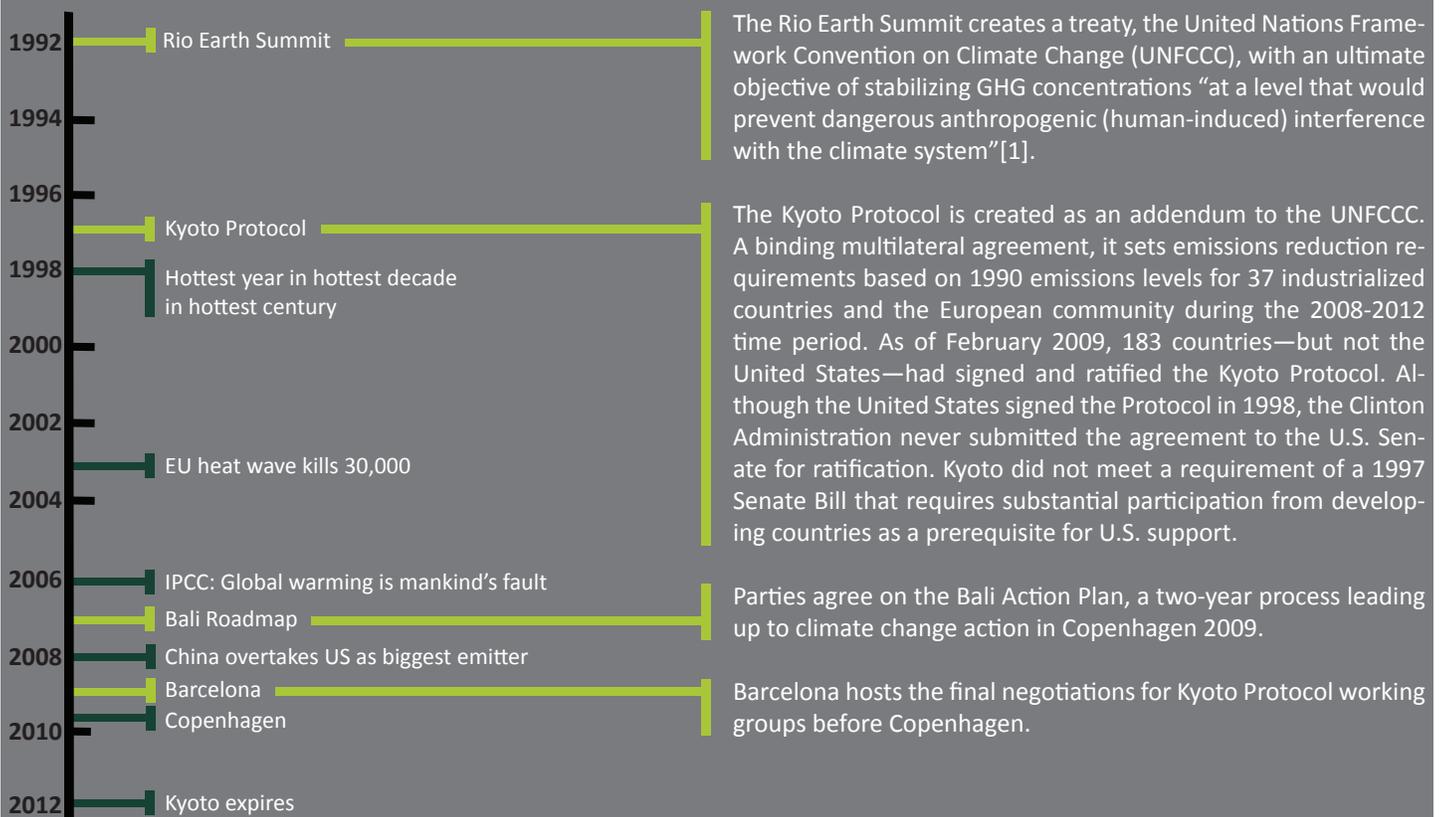
The purpose of this primer is to illuminate the issues that produce such uncertainty. It is an attempt to provide a clear description of the problem and the goals of the negotiations, as well as some of the major obstacles that may inhibit their success. Specifically, it seeks to answer three central questions:

Where does Copenhagen fit within political and environmental contexts?

What are the future stakes of today’s climate problem?

What are the critical issues facing Copenhagen negotiators?

FIGURE 1: UN Climate Change Conference Major Events



Adapted from United Nations Framework Convention on Climate Change (2009) and the Daily Telegraph (2009) [1, 2].

FIGURE 2: Global CO₂ Emissions & Mean Temperature

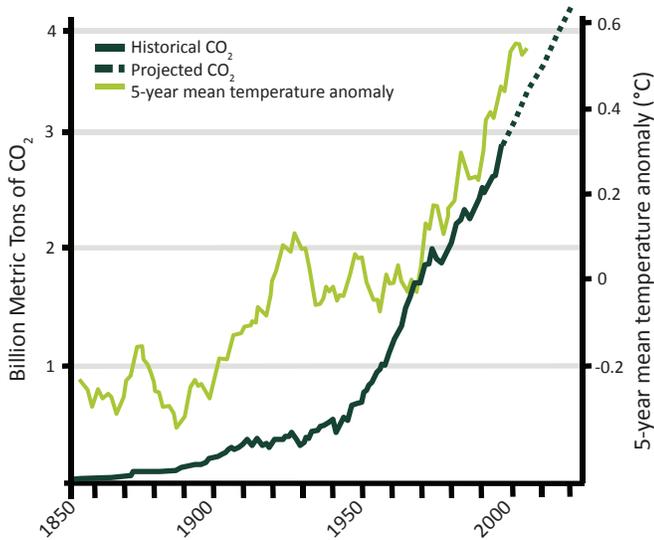
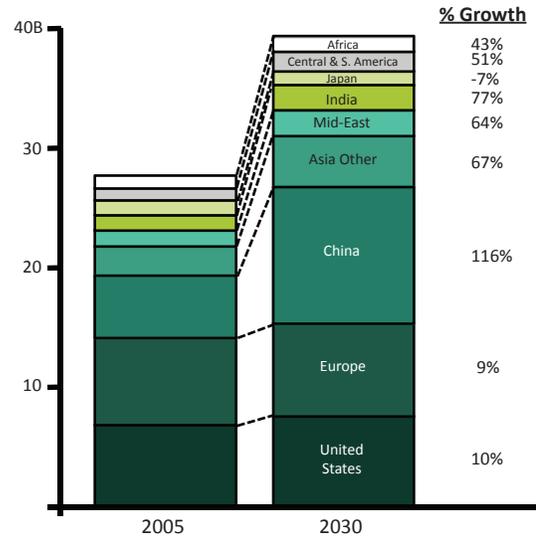


FIGURE 3: Global CO₂ Emissions by Region (Metric Tons)



Adapted from Marland, et al. (2007), International Energy Outlook (2009), Pew Center (2009), and NASA (2009) [3-6].

ENVIRONMENTAL AND HUMAN HEALTH IMPLICATIONS OF CLIMATE CHANGE

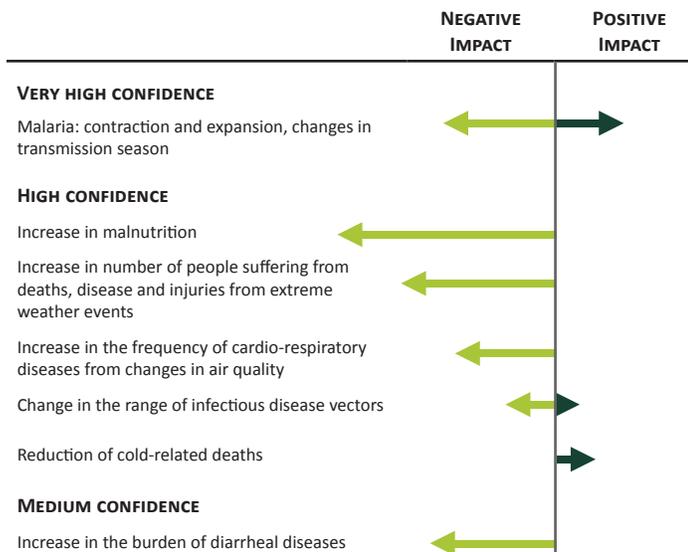
Although climate change is a global problem, certain regions and populations will be affected more than others. The Intergovernmental Panel on Climate Change (IPCC) predicts an increase in extreme weather events such as droughts, heat waves and flooding, but the implications for human populations are tied to a populations' ability to adapt and mitigate such impacts [7]. Developing countries are most vulnerable to climate change impacts, including water and food shortages and increased health and life risks, due to their limited technical, financial and institutional capacity to plan and implement adaptation [7, 8]. The same developing countries most susceptible to climate change's consequences may also have the most to gain from fossil-fuel based development. This presents a variety of regional issues, including the following:

Southern Asia: Despite an increase in CO₂ for plant uptake, studies predict large losses in crop production, up to 50% reduction in wheat alone compared to no-climate-change models [9, 10]; water resources will be compromised with predicted glacial melting and reduced snowpack [7].

Africa: Recurrent droughts, which already plague the region, are predicted to increase into the 21st century, decreasing rain-fed agriculture and increasing potential water conflict [11].

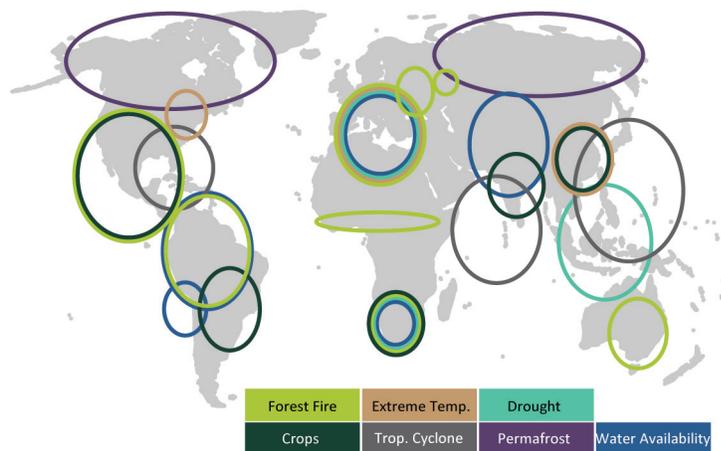
In addition to these regional impacts, worldwide plant and animal species loss, climate disaster-related population displacements and increased disease migration are likely consequences of climate change [8].

FIGURE 4: Public Health Impacts of Climate Change



Adapted from IPCC (2007) [12].

FIGURE 5: Impact of Global Temperature Rise of 4°C



Adapted from Act on Copenhagen (2009) [13].

GOALS OF COPENHAGEN

While there has been significant progress in negotiations on multilateral actions against climate change, there are still many large hurdles that stakeholders must overcome for a substantive treaty in Copenhagen. Yvo de Boer, Executive Secretary of the UNFCCC, outlines four goals that the Copenhagen agreement should accomplish [14].

1. Developed countries need to set ambitious emission reduction targets that reduce emissions by at least 50% by 2050.
2. Advanced developing countries (e.g. Brazil, Russia, India, China) must establish mitigation policy commitments in line with “common but differentiated responsibilities” of Kyoto [14].
3. Clear financing mechanisms should be established for developing countries to have access to adaptation and mitigation technologies.
4. Clear governance structure should be established so that all stakeholders have an equitable voice.

Central to the negotiation will be defining clear goals and actions for developing countries that are also acceptable to developed nations. *Table 2* (see next page) shows the current emission reduction policies and primary negotiating positions of prominent developed and developing countries/regions. The following section describes the main challenges for climate mitigation and adaptation negotiations.

FINANCING CLIMATE CHANGE MITIGATION AND ADAPTATION

Mitigation and adaptation from developing nations will depend on incentives and support from the developed countries, particularly because the majority of poorer nations are located in regions most vulnerable to the effects of climate change. Moreover, action should enhance and not interfere with the overall development and living standards of the developing countries. Copenhagen negotiations will focus on two key issues to finance climate change mitigation and adaptation: (1) reworking the clean development mechanism (CDM) and (2) the role of intellectual property in technology development and transfer.

TABLE 1: UNFCCC estimates of additional annual investment need by 2030 to cover costs of adaptation to climate change (billion dollars per year in present-day values)

Sector	Global Cost	Developed Countries	Developing Countries
Agriculture	14	7	7
Water	11	2	9
Human Health	5	Not Estimated	5
Coastal Zones	11	7	4
Infrastructure	8-130	6-88	2-41
Total	49-171	22-104	27-66

Source: UNFCCC (2007) [28].

COST ESTIMATES FOR MITIGATION AND ADAPTATION

To understand the scope of these challenges, it is helpful to first understand their projected scale. The IPCC reported in 2007 that the annual cost of stabilizing atmospheric CO₂ concentrations at 445 to 535 parts per million, which would limit long-term climate change to 2–3°Celsius, would be 3% of worldwide GDP by the year 2030. Similarly, a year earlier, the Stern Review estimated the annual cost of stabilizing atmospheric CO₂ equivalent concentrations at 550 parts per million to be approximately 1% of GDP by the year 2050 [15]. Considering that 1% of worldwide GDP equates to approximately \$400 billion, current mitigation cost estimates range from \$400 billion to \$1.2 trillion.

Global annual adaptation cost estimates range from \$4–37 billion at the low end to \$86 billion [16]. *Table 1* shows how the UNFCCC’s \$49–171 billion annual adaptation estimate breaks down by sector and across developed and developing countries.

REWORKING CDM

The Clean Development Mechanism (CDM) created under the Kyoto Protocol allows developed countries with emission cap limits to invest in carbon emission reduction projects in developing nations. Implemented projects can earn Certified Emission Reductions (CERs) that can be used to fulfill emission limits or traded in the open market.

The development of the CDM has not proceeded without complication. One large criticism has been that delays and inefficiencies in the registration process have limited the number of pre-approved projects that actually become registered to just one in three. In Copenhagen, negotiators aim to reform the CDM structure to streamline the registration process to maintain the credibility of the program [18]. Other evidence of CDM inefficiencies has been the inequitable distribution of offsets across countries. China, the largest emitter in the world, has dominated the carbon finance projects with 84% of transactions in 2008 [18]. On the other hand, poorer countries, particularly in sub-Saharan Africa, have only started to see their first projects come online.

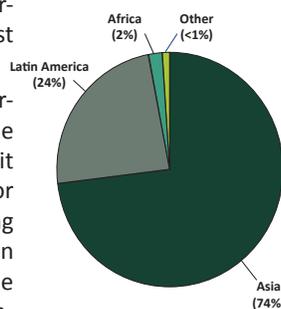
Given these inequalities, reform is urgently needed to change the architecture of the CDM. Negotiators have proposed to phase out the project-based CDM for advanced developing nations and replace it with a sector-based approach in which all facilities within a sector have to meet a collective standard [18]. Negotiators are also trying to include Reduced Emission from Deforestation and Degradation (REDD) - a policy to create positive incentives for the sustainable management and enhancement of forest carbon stocks in developing countries.

THE ROLE OF INTELLECTUAL PROPERTY

Climate change negotiations do not occur in a vacuum; the standards that Copenhagen aims to set inevitably interact with many other multilateral agreements, most notably on trade-related issues. One of the keys for success will be the development and transfer of technology by revisiting the policy framework of intellectual property rights. While intellectual property rights are an incentive for innovation and sharing of knowledge, excessive protection of private rights can be an obstacle to achieve these same goals. Given the controversy surrounding these issues, it is critical to ensure the balance between the protection of intellectual property rights and promoting the public objective of sustainable development [20].

Negotiation efforts will focus on three main points [21]:

1. Publicly funded research and development of climate change technologies by developed countries should include developing countries.
2. The poorest countries should have free access to climate change technologies without the hindrances of intellectual property rights (much like AIDS related medication).
3. A pooled fund should be established to help developing countries afford royalties for climate related technologies.



Adapted from UNFCCC (2009) [19].

FIGURE 6: Registered CDM Projects by Region

TABLE 2: Emission Reduction Targets and Political Agenda for Copenhagen

Current Emission Reduction Policy Status		Agenda at Copenhagen	
United States (US)	2010: 6.8 (22%)	2030: 7.7 (19%)*	
Energy bills circulating in Congress call for a 17-20% emissions reduction from 2005 levels by 2020 using a cap and trade model. Independent of these bills, the US Environmental Protection Agency is proposing greenhouse gas regulation through traditional command and control methods under the Clean Air Act.			Without clarity and commitment from the United States, it would be difficult to have any legally binding agreement at Copenhagen. In turn, expectations have been played down, culminating in an agreement to delay the framework until mid-2010 at the earliest. Much lies in the hands of the Senate, where the effort is currently stalled by health care reform and the recession. However, the recent announcement of US and China collaboration in a new energy cooperation program for climate-related technology research is movement in the right direction. [22, 23]
European Union (EU)	2010: 7.4 (24%)	2030: 7.9 (20%)	
Under the 20-20-20 plan, EU leaders have made a clear commitment to cut GHG emissions 20% from 1990 levels, achieve 20% total renewable energy use and improve energy efficiency by 20%, by 2020.			The EU has set clear targets to reduce GHG emissions by 95% by 2050 if a legal agreement can be achieved [24]. France has introduced a carbon tax levied on fossil fuels, while Germany and the UK have both set 40% 2020 reduction targets pending a legal agreement in Copenhagen.
Japan	2010: 1.3 (4%)	2030: 1.2 (3%)	
Japan, with its newly elected party, has a plan to cut emissions by 25% from 1990 levels by 2020.			Japan is eager to reestablish itself as a leader in the fight against climate change after missing emissions targets established by the Kyoto Protocol by 16% in 2008. Japan's pledge to reduce its emissions is contingent on a Copenhagen deal that regulates all major emitters, encouraging other countries to make their own pledges. [25]
China	2010: 7.2 (23%)	2030: 11.7 (29%)	
China aims to reduce its economic energy intensity (energy consumption per unit GDP) by 20% from 2005 levels by 2010. China also has a target of 15% renewable energy sources by 2020. [26]			China and other developing countries want developed countries to agree to binding emissions reductions of 40% below 1990 levels by 2020 [27]. China's stance is that because it has not contributed to historical pollution, its responsibility is to adhere to standards that curb future emissions growth. China is interested in creating incentives for technology development to address emission reduction. [28]
India	2010: 1.4 (4%)	2030: 2.1 (5%)	
In 2008, India's Prime Minister, Manmohan Singh, released India's first National Action Plan on Climate Change. According to the plan, India's per capita emissions will never exceed those of developed countries, and eight mission areas were created to promote more environmentally sustainable development ranging from energy efforts to sustainable agriculture ventures.			India emphasizes a per capita emission reduction target approach for developed countries. Domestically, India believes that its own economic development is critical to improve living standards and decrease vulnerability to climate disruptions such as extreme rainfall, coastal storms and droughts. [29]
Other Developing Countries			
Brazil has committed to a voluntary reduction of 18% from 2005 levels by 2020 [30]. Mexico has committed to a 50% reduction from 2000 levels by 2050 [30]. S. Korea has committed to a voluntary 4% reduction from 2005 levels by 2020 [31]. Africa as a whole does not have an emission reduction goal [32].			Under the "common but differentiated responsibilities" principle of the Kyoto Protocol, developing countries have not been required to commit to binding emissions reductions to date [14]. These countries share China's position on the importance of binding emissions reductions for developed countries and are not likely to commit to binding caps of their own. Because developing countries are expected to suffer severe consequences of climate change, negotiations will focus on securing significant funding for adaptation technologies.

*Country or Region 2010 and 2030 Emissions in Billion Metric Tons

REFERENCES

- United Nations Framework Convention on Climate Change. 2009 [cited 2009 October]; Available from: www.unfccc.int.
- Telegraph. Timeline of world's fight to tackle climate change. Daily Telegraph 2009 5 November [cited 2009 15 November]; Available from: <http://www.telegraph.co.uk/earth/earthnews/6509777/Timeline-of-worlds-fight-to-tackle-climate-change.html>.
- Marland, G., T.A. Boden, and R.J. Andres, Global, Regional, and National Fossil Fuel CO2 Emissions, in Trends: A Compendium of Data on Global Climate Change, C.D.I.A. Center, Editor. 2007, Oak Ridge National Laboratory: Oak Ridge.
- Energy Information Administration, International Energy Outlook 2009. 2009: Washington, D.C. p. Table A10.
- Pew Center on Global Climate Change. Historical Global CO2 Emissions. 2009 [cited 2009 October]; Available from: <http://www.pewclimate.org/facts-and-figures/international/historical>.
- NASA GISS. Global Land+Ocean Surface Temperature Anomaly. 2009 13 March [cited 2009 October]; Available from: <http://data.giss.nasa.gov/gistemp/graphs/fig.A2.txt>.
- Intergovernmental Panel on Climate Change, Fourth Assessment Report, M.L. Parry, et al., Editors. 2007: Cambridge, UK.
- UNFCCC, Fact sheet: The need for adaptation. 2009.
- Gilbert, N., Climate change will hit developing world harvests hardest, in Nature News, Nature.
- Rosenzweig, C. and M.L. Parry, Potential impact of climate change on world food supply. Nature, 1994. 367: p. 133-138.
- Kandji, S.T., L. Verchot, and J. Mackensen, Climate Change and Variability in the Sahel Region: Impacts and Adaptation Strategies in the Agricultural Sector. 2006, World Agroforestry Centre and United Nations Environment Programme.
- Confalonieri, U., et al., Climate Change 2007: Impacts, Adaptation and Vulnerability, in Fourth Assessment Report. 2007, Intergovernmental Panel on Climate Change: Cambridge.
- The impact of a global temperature rise of 4 degrees C. 2009 [cited 13 November 2009]; Available from: <http://www.actonopenhagen.decc.gov.uk/content/en/embeds/flash/4-degrees-large-map-final>.
- de Boer, Y. Four Essential Steps to the Copenhagen Agreement. COP15 2009 [cited 2009 October 14]; Available from: <http://en.cop15.dk/blogs/view+blog?blogid=992>.
- Stern, N., Stern Review on the Economics of Climate Change. 2006: London.
- Economic Aspects of Adaptation to Climate Change: Costs, Benefits and Policy Instruments. ed. S. Agrawala and S. Frankhauser. 2008, OECD.
- UNFCCC, Investment and Financial Flows to Address Climate Change. 2007, Climate Change Secretariat: Bonn.
- Capoor, K. and P. Ambrosi, State and Trends of the Carbon Market. 2009, IETA and The World Bank: Washington, D.C.
- UNFCCC. CDM Statistics. 2009 November [cited 2009 November]; Available from: <http://cdm.unfccc.int/Statistics/index.html>.
- Trade and Climate Change: Issues in Perspective, A. Cosbey, Editor. 2008, International Institute for Sustainable Development: Winnipeg.
- Sachs, J. It's Too Late to Seal a Global Climate Deal. The Guardian 2009 29 September [cited 2009 16 November]; Available from: <http://www.guardian.co.uk/commentisfree/cif-green/2009/sep/29/copenhagen-kyoto-carbon-capture-nuclear>.
- Vidal, J. Climate Talks End in Acrimony as U.N. and E.U. Accuse U.S. of Endangering Deal. The Guardian 2009 6 November [cited 2009 16 November]; Available from: <http://www.guardian.co.uk/environment/2009/nov/06/developing-nations-copenhagen-walkout>.
- Watts, J. China and US poised to break new ground in green technology partnership. The Guardian 2009 16 November [cited 2009 19 November]; Available from: <http://www.guardian.co.uk/environment/2009/nov/16/china-barack-obama-us-technology>.
- Traynor, I. Europe Offers to Cut Emissions 95% by 2050 if Deal Reached at Copenhagen. The Guardian 2009 21 October [cited 2009 16 November 2009]; Available from: <http://www.guardian.co.uk/environment/2009/oct/21/europe-carbon-emissions>.
- Mccury, J. Japan's New Prime Minister Promises Ambitious Greenhouse Gas Cuts. The Guardian 2009 7 September [cited 2009 16 November]; Available from: <http://www.guardian.co.uk/environment/2009/sep/07/japan-greenhouse-gas-cuts>.
- National Development and Reform Commission, China's National Climate Change Programme. 2007, People's Republic of China.
- Wall Street Journal. China Looks for Big Cuts in Emissions. 2009 22 May [cited 2009 17 November]; Available from: <http://online.wsj.com/article/SB124290515793142949.html>.
- Buijs, B., China, Copenhagen and Beyond. The Global Necessity of a Sustainable Energy Future for China. 2009, Clingendael International Energy Programme.
- Government of India: Prime Minister's Council on Climate Change. National Action Plan on Climate Change. 2008 30 June 2008 [cited 2009 15 October]; Available from: http://pmindia.nic.in/climate_change.htm.
- Fransen, T., et al., National Climate Change Strategies: Comparative Analysis of Developing Country Plans. 2009, World Resources Institute.
- Mee-Young, C. South Korea targets 2020 emissions at 30 percent below forecast. Reuters 2009 16 November [cited 2009 19 November]; Available from: <http://www.reuters.com/article/GCA-GreenBusiness/idUSTRE5AGDM20091117>.
- African Ministerial Conference on the Environment, Nairobi Declaration on the African Process for Combating Climate Change. 2009, United Nations Environment Programme: Nairobi.



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