

Summary of Studies Estimating the Cost of Climate Change Adaptation in the Developing World

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Over the past several years, a number of analysts have attempted to estimate the costs of adaptation for the developing world. The following table summarizes these studies, their findings, and the methods and assumptions behind each¹. Viewing them together, several observations emerge:

- **The estimates suggest that tens of billions of dollars per year will be needed.** However, specific ranges are broad, and the newest studies suggest that real costs could be substantially higher.²
- **Overall, estimates remain extremely uncertain** due to the unknown effects of climate change, and to the broad assumptions that must be made in calculating global costs.
- **The different estimates are closely related to each other, methodologically.** Several (1-4) are based on the methods presented in World Bank (2006), which focuses on the cost of “climate-proofing” financial flows for development. More recent studies (5-7) have tended to take a sector-by-sector approach to estimating adaptation costs.

Users of these estimates should recognize that they are all broad international studies aimed at a global audience. None are calculated by aggregating national or regional estimates, and many of their assumptions are necessarily based on limited evidence. For several estimates, the rationale for key assumptions is not made explicit in the relevant reports.

Study	Amount (per year, in US\$)	Through what Year? ³	Scope	Key Methodologies and Assumptions
1. World Bank ⁴ (2006)	\$9-41 billion	2015	The study estimates the potential costs of climate-proofing ⁵ Foreign Direct Investment (FDI), Gross Domestic Investment (GDI) and Official Development Assistance (ODA) flows.	<ul style="list-style-type: none"> • Assumes that 40% of ODA, 10% of FDI, and 2-10% of GDI are "climate sensitive," or vulnerable to the effects of climate change. For ODA, this is based on prior World Bank studies, but for FDI and GDI, no basis for selecting these percentages is given. • Assumes costs of "climate-proofing" ODA, FDI, and GDI will be 10-20% of financial exposure. No basis for selecting these percentages is given.
2. Stern Review ⁶ (2006)	\$4-37 billion	2015	This is an update of World Bank (2006), with modifications in some of the assumptions surrounding climate sensitivity and the costs of climate-proofing.	<ul style="list-style-type: none"> • Assumes that 20% of ODA, 10% of FDI, and 2-10% of GDI are climate sensitive. No basis for shifting from 40% of ODA in World Bank (2006) is given in this report. • Assumes costs of climate-proofing ODA, FDI, and GDI will be 5-20% of financial exposure, instead of the 10-20% figure used by the World Bank. No basis for shifting this range is given

3. Oxfam ⁷ (2007)	\$50 billion	2015	This estimate is based on World Bank (2006), but adds additional costs derived from developing country National Adaptation Programs of Action (NAPAs) ⁸ and civil society projects.	<ul style="list-style-type: none"> • Uses the World Bank (2006) estimate of \$9-41 billion as a starting point, and adds global estimates of the cost of a) scaling up the community-based projects and b) meeting “urgent and immediate” national adaptation needs as exemplified by projects outlined in 13 developing country NAPAs. • \$50 billion represents a minimum amount to “build poor-country resilience to climate change.”
4. UNDP ⁹ (2007)	\$47-109 billion	2015	This estimate is based on World Bank (2006) with modifications of the assumptions surrounding climate sensitivity and the costs of climate-proofing . It also includes estimates of the cost of poverty reduction/social protection strategies and stronger disaster response.	<ul style="list-style-type: none"> • Assumes that 17-33% of ODA, 10% of FDI, and 2-10% of GDI are climate-sensitive. • Follows Stern Review (2006) in assuming that costs of climate-proofing ODA, FDI, and GDI will be 5-20% of financial exposure. • Cost of climate-proofing financial flow is estimated to be \$5-67 billion/year. The report sets a target of "at least \$44 billion per year" (0.1% of developed country GDP in 2005) for climate-proofing financial flows. • A target of "at least \$40 billion per year" (0.5% of developing country GDP in 2005) for strengthening social protection programs, and \$2 billion for climate-related disaster response, resulting in a target of \$42 billion/year for these two areas. • No explanation is given for the selection of these GDP percentages as targets.
5. UNFCCC ¹⁰ (2007)	\$28-67 billion ¹¹	2030	This estimate aggregates costs from sectoral studies of agriculture, water, human health, coasts and infrastructure.	<ul style="list-style-type: none"> • The different sectoral studies follow different methodologies. • The studies and their estimates are more based on actual projects and adaptation activities than the World Bank-derived studies. • Uses the Stern Review (2006) 5-20% estimate for climate-proofing infrastructure.
6. Project Catalyst ¹² (2009)	\$26-77 billion ¹³	2030	This estimate covers the costs of knowledge-gathering, planning, development, and disaster management.	<ul style="list-style-type: none"> • Includes costs of investing in technology and knowledge-gathering, building capacity and planning, financing climate-proofing development, and improved disaster management/insurance. • Estimates of costs are based on a variety of sources, including UNFCCC (2007), NAPAs, UK Environment Agency¹⁴, Pilot Programme for Climate Resilience, and Munich Climate Insurance Initiative (2007).
7. World Bank ¹⁵ (2009)	\$75-100 billion	2050	This estimate is derived from sectorally-based studies of infrastructure, coastal zones, water supply and flood management, agriculture, fisheries, human health and forestry/ecosystem services.	<ul style="list-style-type: none"> • Identifies UNFCCC (2007) as the most similar study methodologically, since each is based on sectoral cost estimates. • Based on two climate models: one with relatively wet climate projections and one with relatively dry climate projections. The wetter scenario results in higher costs by about \$10B. • Favors "hard" adaptation (e.g. engineering projects) efforts over "soft" (e.g. policy changes and social capital mobilization) efforts. • Calculates adaptation costs as the difference between presumed baseline development trajectories without climate change and presumed development trajectories with climate change. • The regions of East Asia/Pacific and Latin America are projected to have the highest costs of adaptation.

Notes

¹ This table draws heavily upon Agrawala and Fankhauser (2008): *Economic Aspects of Adaptation to Climate Change*. OECD.

² Parry et al. (2009) estimate costs could be three times greater than the UNDP estimate, and the UN World Economic and Social Survey (2009) estimates costs could reach \$600 billion/year for mitigation and adaptation.

³ The listed year is how far into the future the study estimated the costs of adaptation. It does not represent a “completion” date for adaptation in the developing world.

⁴ World Bank (2006), *Investment Framework for Clean Energy and Development*. World Bank, Washington, DC.

<[http://siteresources.worldbank.org/DEVCOMMINT/Documentation/20890696/DC2006-0002\(E\)-CleanEnergy.pdf](http://siteresources.worldbank.org/DEVCOMMINT/Documentation/20890696/DC2006-0002(E)-CleanEnergy.pdf)>

⁵ Climate-proofing refers to the activities or changes necessary to prevent a development project from being vulnerable to the effects of climate change.

⁶ Stern, N. (2006), “The Economics of Climate Change”, *The Stern Review*, Cambridge University Press, Cambridge.

⁷ Oxfam (2007), “Adapting to Climate Change: What’s Needed in Poor Countries, And Who Should Pay”, Oxfam Briefing Paper 104.

<<http://www.oxfam.org/sites/www.oxfam.org/files/adapting%20to%20climate%20change.pdf>>

⁸ National Adaptation Programs of Action (NAPAs) are intended to convey the “urgent and immediate adaptation needs” of least developed countries. See “Guidelines for the preparation of national adaptation programmes of action,” UNFCCC 2001. <<http://unfccc.int/resource/docs/cop7/13a04.pdf>>

⁹ UNDP (2007), “Fighting Climate Change: Human Solidarity in a Divided World”, Human Development Report 2007/2008, Palgrave Macmillan, New York.

<http://hdr.undp.org/en/media/HDR_20072008_EN_Complete.pdf>

¹⁰ UNFCCC (2007), “Investment and Financial Flows to Address Climate Change.” <http://unfccc.int/files/cooperation_and_support/financial_mechanism/application/pdf/background_paper.pdf>

¹¹ The UNFCCC also estimated an annual \$49-171 billion would be necessary for global adaptation costs.

¹² Project Catalyst (2009), “Adaptation to climate change: Potential costs and choices for a global agreement.” <http://www.project-catalyst.info/Publications/Working%20Group%20papers/Adaptation%20Potential%20Costsand%20Choices%20for%20a%20Global%20Deal_27%20Mar%2009.pdf>

¹³ The report presents this number as €21-61 and assumes an exchange rate of €0.79 per \$1.

¹⁴ The study “benchmarks” its estimates of the cost for building adaptation capacity and planning against the UK Environment Agency’s budget for 2030.

¹⁵ World Bank (2009), “The Costs to Developing Countries of Adapting to Climate Change: New Methods and Estimates; The Global Report of the Economics to Adaptation to Climate Change Study.”

<<http://siteresources.worldbank.org/INTCC/Resources/EACCReport0928Final.pdf>>