

# Renewable Energy and Energy Efficiency in Developing Countries:

## Contributions to Reducing Global Emissions



# EXECUTIVE SUMMARY

*Developing countries are achieving low-cost emissions reductions through renewable energy (RE) and energy efficiency (EE) projects and initiatives. Evaluating the impact of these projects in terms of measurable greenhouse gas emissions' reductions, to help close the emissions gap needed to stay below the 2°C climate goal, is the focus of this report.*

Greenhouse gas (GHG) emissions reductions created by a sample of 273 internationally supported RE and EE projects in developing countries implemented between 2005 and 2016 amount to approximately 0.3 gigatons of carbon dioxide (GtCO<sub>2</sub>) annually by 2020. Of the analysed 273 projects, 197 are RE, 62 are EE, and 14 are both RE and EE. These efforts reduce emissions by displacing fossil fuel energy production with clean energy technologies and by conserving energy in industry, buildings, and transportation. The analysed sample's RE projects contribute approximately 0.084 GtCO<sub>2</sub>, EE projects contribute 0.113 GtCO<sub>2</sub> and RE/EE projects contribute 0.059 GtCO<sub>2</sub> to the total emissions reductions. These projects received direct foreign support totaling US \$32 billion. This analysis builds upon the second 1 Gt Coalition report, which examined data from 224 projects (see Annex I for more details).

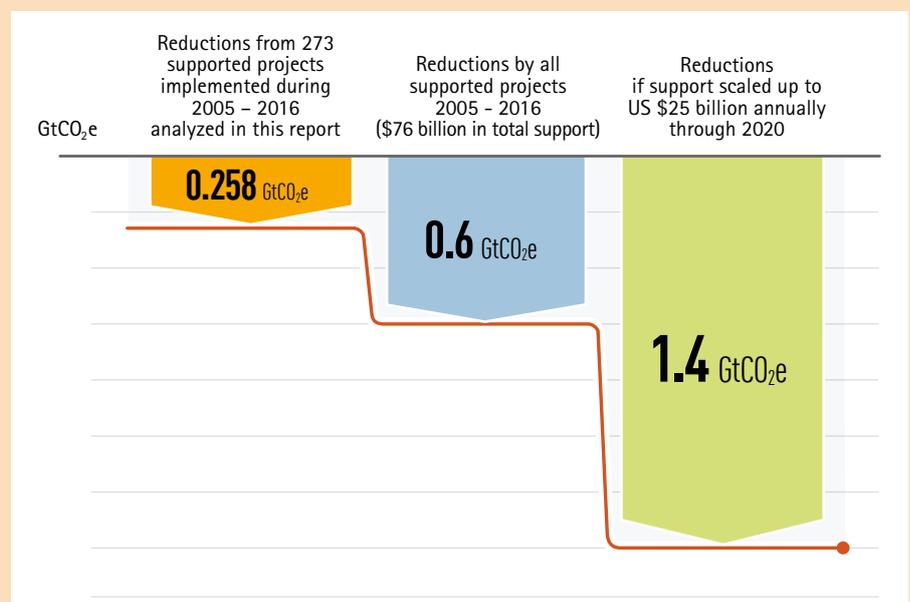
**Reductions in GHG emissions resulting from all internationally supported RE and EE projects in developing countries implemented between 2005 and 2016 could be 0.6 GtCO<sub>2</sub> per year in 2020.** This estimate is determined by scaling up the analysed sample's emissions reductions to a global level using the total bilateral and multilateral support for RE and EE from 2005 to 2016 (US \$76 billion). These international investments create crucial enabling conditions in developing countries and emerging economies, where there are significant barriers to private RE and EE investment.

**GHG emissions reductions from internationally supported RE and EE projects could be on the order of 1.4 GtCO<sub>2</sub>e per year by 2020 if committed public finance for climate mitigation is used to scale up these activities.** Developed countries agreed in 2010 to mobilize US \$100 billion per year by 2020 to help developing countries adapt to the impacts of climate change and reduce their emissions. To calculate the 1.4 GtCO<sub>2</sub>e estimate, it is assumed that a quarter of the US \$100 billion is public mitigation finance and deployed in the same way as for the 273 analysed projects.

Assessing an initiative's emissions mitigation impact has inherent drawbacks that must be overcome in order to evaluate a project, policy, or sector in light of international climate goals. Emissions reductions estimates, even when accurate, do not explain whether the described outcomes are compatible with global climate goals. This report takes steps to overcome this challenge, by developing criteria intended to assess a sector's compatibility with global climate goals. It also shows how these compatibility conditions can be applied to RE and EE projects, outlining a conceptual framework for future analysis.

**Criteria for sector-level compatibility with 1.5°C and 2°C goals were developed to evaluate emission savings from projects (Tables 1.1 – 1.15).** The sectoral criteria are displayed in compatibility tables, with each table listing 1.5°C- and 2°C-compatibility conditions drawn largely from the International Energy Agency's (IEA) Energy Technology Perspectives (ETP) 2017 report and its 2°C Scenario (2DS) and Beyond 2°C Scenario (B2DS). Schematics (Figures 7 – 11) demonstrate how the sectoral compatibility criteria could be applied at the project, firm, or policy level to identify projects considered 1.5°C- or 2°C-compatible. Two actual projects, selected from this report's RE and EE database, are used as proofs of concept. Information sharing and data availability prove to be key challenges to broadening the application of this approach.

Figure ES: Emission reduction from renewable energy and energy efficiency projects by 2020



City governments are increasingly collaborating with the private sector to address common challenges related to climate change and sustainable development. The Intergovernmental Panel on Climate Change (IPCC) has indicated that achieving a 1.5°C- or 2°C-compatible future is a very challenging task, yet almost all the technologies needed to build this future are commercially available today. This report shows that many countries are acting to reduce emissions through RE and EE programmes, and that when policies are well-designed, both local and global communities benefit. The six case studies presented in this report describe the social, economic, and environmental benefits that RE and EE programmes bring to the localities where they are implemented. They highlight innovative initiatives implemented in a diverse set of cities and regions:

- **NEW DELHI'S** municipal government has partnered with Infrastructure Leasing and Financial Services Environment (IL&FS Environment) to build a waste-to-energy plant that will save approximately 8.2 million tons of greenhouse gas emissions over its 25-year lifespan, while reducing the landfill's area and air and water pollution. The project helps transition former waste-pickers to new jobs, directly hiring 70 people at the new plant, and has created a community center that provides support and job training to approximately 200 local women.
- **NANJING**, China worked with the electric vehicle industry to add 4,300 electric vehicles to its streets between 2014 and 2015. This transition has helped the city reduce emissions by 246,000 tons of carbon dioxide equivalent (CO<sub>2</sub>e) in 2014, while saving over US \$71 million in lower energy bills.
- In the industrial **VALLE DEL CAUCA** corridor of Colombia, The Women's Cleaner Production Network developed action plans to reduce industrial pollution and address climate change in small and medium-sized enterprises. The initiative has created a host of benefits, including a 110 percent increase in enterprise production efficiency and a new residential solar installation program.
- In **LAGOS**, and in many other Nigerian cities, private companies are piloting new approaches to make solar energy more accessible and affordable. A partnership between a solar start-up and local telecommunications provider has brought solar power to 50,000 homes, clinics, schools, and businesses, benefiting more than 250,000 people and creating 450 new jobs.
- Uganda's capital city, **KAMPALA**, has partnered with businesses to scale up an array of clean cooking technology initiatives, installing 64 improved eco-stoves in 15 public schools, constructing biodigesters in 10 public schools, and funding companies that train women and youth to produce low-carbon briquettes from organic waste.

- **MEXICO CITY'S** Sustainable Buildings Certification Programme, developed and implemented in partnership with the local construction and building industry, covers 8,220 square meters of floor area across 65 buildings and has reduced 116,789 tons of carbon dioxide (CO<sub>2</sub>) emissions, saved 133 million kilowatt-hours (kWh) of electricity and 1,735,356 cubic meters of potable water, and created 68 new jobs between 2009 and 2017.



These case studies demonstrate the feasibility and benefits of a low-carbon future through the various RE and EE activities undertaken in cities in collaboration with private sector groups. Expanding this type of public-private sector engagement would harness expertise, funding, technology, and data from both arenas to help overcome barriers to action and accelerate the pace of climate action.

Governments and non-state actors will gather at COP 23 in November to discern a path forward for implementing the Paris Agreement's central provisions. Data sources needed to evaluate progress towards achieving the 1.5°C or 2°C climate goals are key points under discussion. This report provides pertinent information and evidence showing how internationally supported RE and EE projects and initiatives implemented in developing countries are contributing to narrowing the emissions gap – the difference between the status quo and the 1.5°C and 2°C goals. The report's case studies show the social and economic co-benefits associated with these emissions reductions, particularly when city governments partner with private companies to enact emissions savings programs. These initiatives have great potential to motivate countries and non-state actors to build new channels for collaboration, to raise their ambitions, and scale up their efforts. The 1 Gigaton Coalition will continue to promote RE and EE efforts, evaluate their emissions impacts, and show how they contribute to achieving both international climate objectives and Sustainable Development Goals (SDGs).

## KEY FINDINGS

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- **INTERNATIONALLY SUPPORTED RENEWABLE ENERGY AND ENERGY EFFICIENCY PROJECTS** implemented in developing countries between 2005 and 2016 are projected to reduce greenhouse gas emissions by 0.6 Gigatons of carbon dioxide (GtCO<sub>2</sub>) annually in 2020. When scaled up using international climate financing commitments, these efforts could deliver 1.4 GtCO<sub>2</sub> in annual reductions by 2020.
- **INTERNATIONAL SUPPORT FOR INVESTMENTS IN RENEWABLE ENERGY AND ENERGY EFFICIENCY IS VITAL FOR DECARBONISATION**, as this support provides key resources and creates enabling environments in regions critical to the global climate future. International assistance accounts for only 10% of all global renewable energy and energy efficiency activities, yet it has extensive impact for future climate mitigation.
- **DATA AVAILABILITY AND INFORMATION SHARING REMAIN A PERENNIAL CHALLENGE**, one that is preventing countries and supporting organizations from systematically evaluating their work's impact, although renewable energy and energy efficiency projects and policies are growing in developing countries. The 1 Gigaton Coalition has developed a database of about 600 internationally supported projects implemented in developing countries between 2005 and 2016.
- **EVALUATING PROJECTS, POLICIES, AND SECTORS' COMPATIBILITY WITH GLOBAL 1.5°C AND 2°C CLIMATE GOALS IS ESSENTIAL TO LINK ACTIONS WITH LONG-TERM OBJECTIVES**. This new method would enable bilateral and multilateral development organizations to measure the long-term impacts of supported projects.
- **NON-STATE AND SUBNATIONAL ACTORS HAVE TAKEN ON A LEADING ROLE IN SCALING UP CLIMATE ACTION**. The case studies in this report show that low-carbon forms of development – particularly city-based public-private partnerships – generate co-benefits that include improved environmental and human health, economic stimulus and employment creation, enhanced gender equality, and other societal gains that support the 2030 Agenda for Sustainable Development.