Global Data Barometer

Climate Action module

Policy brief

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Acknowledgements

Suggested citation: Global Data Barometer (2022). Climate Action- Policy Brief – Global Data Barometer. ILDA

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Executive summary

The climate action data gap is strongly connected to the national governments' commitments to reduce greenhouse gas (GHG) emissions by countries worldwide. This policy brief discusses the barriers hindering the effectiveness of climate action plans by identifying the missing data and the lack of collection and harmonization processes needed to support climate action. The brief is informed by insights from Global Data Barometer (GDB) survey responses, upon which we developed the recommendations based explicitly on the identified limitations. The key recommendations are to ensure and harmonize data collection processes across the globe and address the unavailability of data impoverishing climate preparedness strategies, especially at the local and city level.

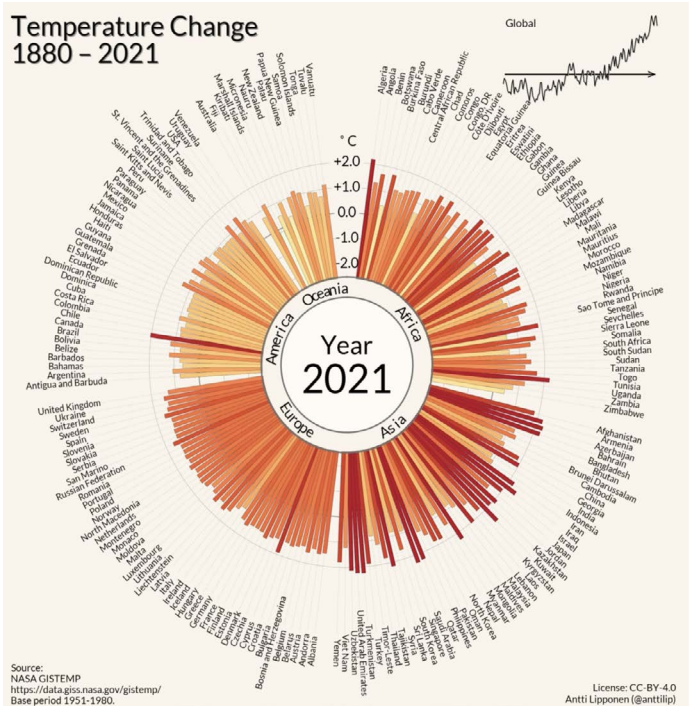
Introduction

The UN has defined 5 targets and 8 indicators for SDG 13, the Sustainable Development Goal (SDG) on climate action[1]. The indicators represent the metrics by which the world aims to track whether they achieved the targets. Three areas are relevant to SDG 13: climate mitigation, climate adaptation, and the linkages between climate change and the broader 2030 Agenda. For example, the indicator 13.2.1 - Integration of climate change into national policies - measures the number of countries signed on to multilateral agreements on climate change. This indicator does not reflect the levels of operationalization or implementation of climate mitigation and adaptation action. National commitments within the UNFCCC Paris Agreement vary by country depending on their Nationally Determined Contributions (NCDs), so they are not directly comparable.

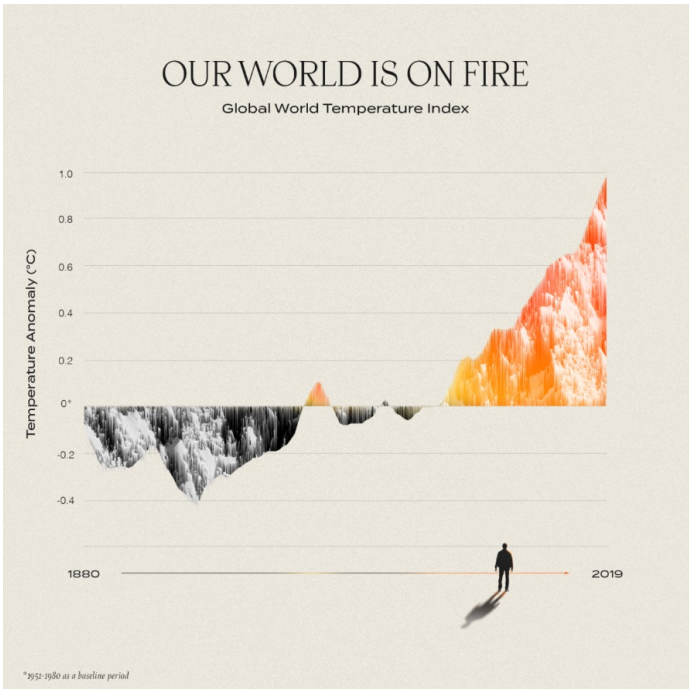
According to NASA's annual analysis of global average temperatures[2], the past seven years have been the hottest in recorded history. 2021 and 2018 are the warmest years registered on a record that extends back to 1880. Scientists at NASA's Goddard Institute for Space Studies (GISS) produce this record using data from instruments worldwide, validated by satellite data and update the record every year, maintaining one of the world's most important datasets to study the extent, pace and causes of warming on our home planet.

[1] Goal 13: Climate Action - SDG Tracker. https://sdg-tracker.org/climate-change

[2] NASA. Six Questions to Help You Understand the 6th Warmest Year on the record . 2022. https://www.nasa.gov/feature/esnt/2022/six-questions-to-help-you-understand-the-6th-warmest-year-on-record https://climate.nasa.gov/news/3139/six-questions-to-help-you-understand-the-6th-warmest-year-on-record/



The animation[3] by Anti Lipponen is based on the NASA GISS data



[3] The animation is available and free to use : https://live.staticflickr.com/video/51818338216/c5ba485321/1080p.mp4?s=eyJpIjo1MTgxODMzODIxNiwiZSI6MTY0MjMzMTYyMSwicyI6IjIi-YjMyZWJkYzk2YmE3NmExNDRiYzc1YTFiMWU3MGJhZDEwZjVjZWUiLCJ2IjoxfQ

The concern about the influence of carbon dioxide and other greenhouse gasses on Earth started to increase dramatically in the early 1970s with the research into the effect of high amounts of greenhouse gasses in Venus' atmosphere, which turned Earth's so-called twin into an uninhabitable world. Today, the analysis has helped explain how carbon dioxide emissions, deforestation, and other human activities drive global warming.[4] However, there's a considerable gap in emissions data[5], lowering the accuracy of climate preparedness strategies. Cities dominate greenhouse gas emissions and generate self-reported emission inventories, but their value to emissions mitigation depends on their accuracy, which remains untested. The ambitious commitments and promises of decarbonization, climate adaptation, and mitigation should require scaling up the tools for collecting and analyzing the correct information.[6]

We explore the climate action data gap throughout this brief using the Global Data Barometer[7] (GDB) survey results. The GDB findings focus on indicators: Emissions, Biodiversity, and Vulnerability. Emissions and, in particular, GHG emissions are the iconic dataset for understanding climate change; this indicator also contributes to analyzing the national governments' status regarding the existing and available data resources and examining the local or domestic availability of such data. Missing submissions from countries regarding the commitments from the macro to the micro-level and the lack of data quality are some elements that help collect the evidence needed to prepare effective climate action plans. To conclude, more action should be undertaken at the local level, especially at the city level, where the data collection often happens without accuracy, determining a poor quality and efficacy of plans to fight climate change.

[4] Six Questions to Help You Understand the 6th Warmest Year on record, available here at: https://climate.nasa.gov/news/3139/six-questions-to-help-you-understand-the-6th-warmest-year-on-record/

[5] Gurney, K.R., Liang, J., Roest, G. et al. Under-reporting of greenhouse gas emissions in U.S. cities. Nat Commun 12, 553 (2021). https://doi.org/10.1038/s41467-020-20871-0

[6] Muggah, R & Ratti, C. Cities and the Climate-Data Gap . 2022. Available at https://www.project-syndicate.org/commentary/cities-lack-climate-data-collection-monitoring-systems-by-robert-muggah-and-carlo-ratti-2022-01

[7] See Global Data Barometer. Climate Action Module. https://globaldatabarometer.org/module/climate/

The climate data gap

Reducing GHG emissions is the primary goal of national strategies adopted by governments worldwide to fight climate change, and National Greenhouse Gas inventories are the primary tool for tracking human-induced GHG emissions at the country, sector, and source category level (McGlynn et al. 2022). Over the next years, these inventories will support setting and measuring progress against each country's "nationally determined contributions" (NDCs) for reducing GHG emissions while also supporting domestic climate policy development and evaluation.

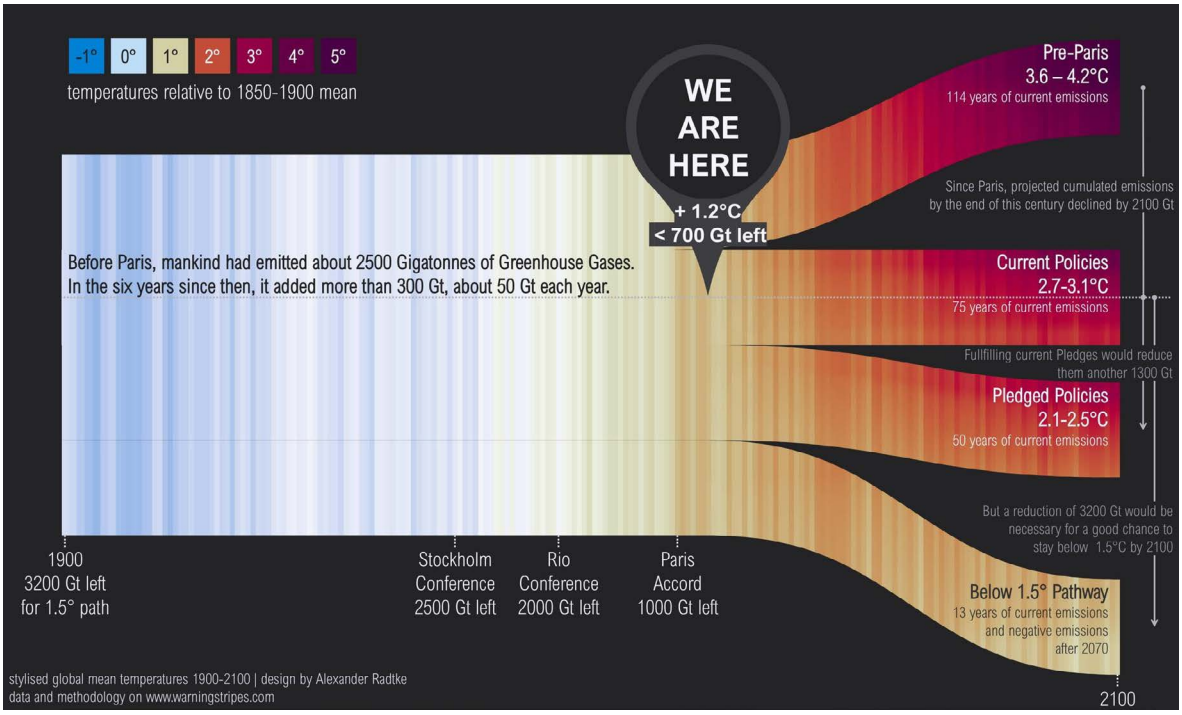
Data collection and interpretation need to be improved, especially at the local level. This is a critical aspect that reflects the lack of the tools for measuring progress in the cities that do not have a meaningful climate-preparedness strategy. In Asia and Africa, where a massive rise and rapidity of urbanization is expected to happen in the next thirty years, this climate data gap reveals to be even more dramatic. The post-Glasgow COP26 scenario is dominated by major emitters not stepping up with adequate reduction targets for 2030. A high number of Nationally Determined Contributions (NCDs) has been updated by countries, with variable quality of the submissions and a significant majority not raising ambition enough and, in many cases, not raising ambition at all. According to the Climate Action Tracker Initiative[8], more than three-quarters of countries representing near-global emissions coverage (over 95%) and close to 90% of the population have reported or submitted updates. Variations regarding the NDC targets have been registered, with some countries having submitted stronger targets and a few going beyond their initial announcements, including South Africa, Morocco, Ukraine, and Argentina. Under current policies, these targets are still within the expected emissions level in 2030. China has yet to commit to a peaking year for carbon dioxide emissions before 2030, nor set absolute emission reduction targets, which leads to uncertainty around its emissions trajectory to 2030 and it is far off a 1.5°C compatible pathway.

It is still difficult to assess whether the targets are stronger for other countries, given the lack of details. India[9] announced updated NDC targets during the World Leaders Summit at COP26 in Glasgow but provided few details. Its new intensity target is unlikely to have any real-world effect, as it falls above India's

[8] Climate Action Tracker. Warming Projections Global Update. 2021.https://climateactiontracker.org/documents/997/CAT_2021-11-09_Briefing_Global-Update_Glasgow2030CredibilityGap.pdf . 2021.

[9] https://climateactiontracker.org/countries/india/

likely 2030 emission level under current policies, while its 500GW non-fossil target will, at most, have a small impact on real-world emissions. Despite having one of the world's highest coal capacities and pipelines, Prime Minister Modi promised net-zero by 2070 but did not mention any plans to phase out coal, despite having one of the world's highest coal capacities and pipelines.



Warming Stripes by Alexander Radtke

The analysis conducted by the Climate Tracker Initiative shows that the early retirement of the existing capacity and reducing its pipeline could enable India to meet its fair share and save a quarter of a million premature deaths.

Governments can significantly improve how to make emissions data available and accurate. Global Data Barometer findings registered gaps related to quantity (omissions) and quality (update, etc.). According to the GDB survey responses, most countries publish mandated emissions data, but there are still significant omissions. While most respondents (82%, 90/109) did not report evidence of data gaps in their country, some reported evidence of "widespread omissions in mandated data" (12%, 14/109). Some said that "a portion of mandated data is missing" (4%, 5/109). Issues reported included: missing years, missing metadata and only very high-level reporting with no breakdowns or more granular information.

Most survey respondents showed adequate national coverage (71%, 78/109), with only a handful showing missing regions. Emissions data is not thoroughly or regularly updated. In over two-thirds of countries, a significant number of survey responses indicated that data was either not timely updated (54%, 59/109) or only partially so (15%, 17/109). Some respondents reported that the latest data they could find on official websites was from as far back as 2010 (Malawi), 2014 (Colombia), 2015 (India) or 2016 (Gambia, Cambodia).[10]

While many countries (54%, 59/109) affirmed that emissions data was available from the government or because of government actions, over a quarter (33%, 36/109) answered that data is not available online, and some (12%, 14/109 countries) responded that data is available, but not as a result of government action.

Most countries reportedly did not provide details on how land use affects emissions. Land use is said to have significant potential for reducing emissions. It may also affect how emissions are reported – including possibilities for countries to overestimate the role of land-based drawdown of emissions and under-report their emissions. Making available details of how land use affects emissions and how it is accounted for in emissions data may help make emissions reporting more accountable. For most countries, it was reported that emissions data either did not include details of land-use effects (65%, 71/109) or only partially provided details (7%, 8/109).

Some governments (e.g. Argentina, Chile) provided their pages to download documents that included these details in national inventories and reports.[11] Sweden provided an interface to select, preview and download data on "emissions and removals of greenhouse gasses from land use, land-use change and forestry". Canada provides a series of web pages dedicated to "land-based greenhouse gas emissions and removals", including tabular data, graphs, context, and links[12] and In some cases, civil society initiatives that played an important role in making this information accessible such as the GHG Platform India.[13]

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[10] This information was provided by survey respondents. Even in cases where data could not be found but may be available online for those who know exactly where to look – these results may still be taken as an indication of inaccessibility. Further details on questions and guidance for this indicator can be found at: https://handbook.globaldatabarometer.org/2021/indicators/A.CLIMATE.EMI/ mentions), Some websites mentioned were: the European Commission (26 mentions), as well as projects such as Worldometer.info (9 mentions), Climate Watch Data (7 mentions) and Our World In Data (7 mentions).

[11] See more: https://snichile.mma.gob.cl/documentos/ and https://inventariogei.ambiente.gob.ar/

[12] See more: https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/land-based greenhouse-gas-emissions-removals.html

[13] See more: http://www.ghgplatform-india.org/afolu-sector

Less than half of countries (48%, 53/109) were found to provide historical emissions data enabling changes and developments in emissions and emissions reductions to be tracked over time. Four countries make historical data available from 1960,[14] which is the base year for carbon emissions data reporting at the World Bank and other international institutions, earlier data is often based on estimates from the Carbon Dioxide Information Analysis Center (CDIAC) in the United States, using energy data from the United Nations Statistics Division. Over 20 other countries make data available from 1990, the default base year [15] UNFCCC emissions reporting.[16]

Regarding the availability and reusability of data, over half (64%, 70/109) of countries make data available free of charge. Data should be made available online on governmental websites, such as national data portals or the web pages of agencies responsible for emissions reporting (not only through international organizations or aggregators). Emissions data should be able to be downloaded without the requirement for payment or user registration.

Less than half (37%, 41/109) of countries provide emissions data in a way that was explicitly legally usable. Of those that do, some use generic open licenses such as the Creative Commons Attribution license (e.g. Czechia, Ghana, Malaysia, Netherlands, New Zealand, Thailand, Ukraine, Uzbekistan) or the Open Database License (e.g. Peru). Others use national data licenses or legal arrangements enabling re-uses such as Canada, Italy, Mexico, Uruguay, and the United Kingdom. Making data explicitly legally re-usable can be as simple as[17] displaying the license on pages where data is available. Also, less than half of countries (41%, 45/109) make data available in machine-readable formats amenable to computational analysis and re-use.

Emissions data should be readable for both people as well as machines. This includes the languages used in data fields as well as in associated documentation and materials. A little more than half of the countries (52%, 57/109) were found to make data available in official, national or major languages of that country–suggesting that more could be done to make emissions data locally accessible and meaningful.

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[14] E.g. Dominican Republic, Ghana, Rwanda, Saint Lucia.

[15] Such as Armenia, Australia, Belarus, Bolivia, Canada, Chile, China, Hong Kong Special Administrative Region, Colombia, Costa Rica, Czechia, Denmark, Finland, Germany, Ireland, Italy, Mexico, Mongolia, Netherlands, New Caledonia, New Zealand, Republic of Moldova, South Korea, Spain, Sweden, Taiwan, United Kingdom of Great Britain and Northern Ireland and Uruguay.

[16] United Nations Climate Change. How to find the data needed within the GHG data interface. https://unfccc.int/process/transparency-and-reporting/greenhouse-gas-data/how-to-find-your-data

[17] United Kingdom.Open Government Licence. https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

Less than a quarter of countries (22%, 25/109) provide "accessible and open official tools to help users explore data". Some of those provide an interface to browse, preview and export data (e.g. Denmark, Latvia).[18] Germany provides a series of re-usable tables, graphs and static visualizations exploring different aspects of emissions, with options to export associated data.[19] New Zealand has created an "Interactive Emissions Tracker", which allows users to browse emissions by sector by gas over time using an interactive charting tool.[20]

Less than half of countries (44%, 49/109) provide "detailed information on sources of greenhouse gas emissions". The details provided included breakdowns by year, type of pollutant, region, sector, and type of activity for those that did. Some countries also provided emissions indicators, such as the Argentinian data portal's emissions per capita, per unit of electrical energy, per head of cattle.[21]

Many survey responses mention UNFCCC National Inventory Submissions, including associated zip files of spreadsheets of tables produced according to the Common Reporting Format (CRF). While this reporting format[22] includes conventions for classifying emissions types, almost two-thirds of countries (69%, 76/109) did not contain unique identifiers that would enable comparability across inventories, reduction commitments, and sources. One notable example of where unique identifiers were successfully used was emissions data from Statistics Sweden, which included CRF references in brackets in its data tables and interfaces. It also has an API enabling users to reference directly, query and access specific parts of their emissions data.

Providing contextual information is important to interpret and make sense of what it means, where it comes from, what it shows and what it doesn't, in addition

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[18] Statistic Denmark. MRU1: Air Emission Accounts by industry and type of emission https://www.statbank.dk/MRU1. Statistics Finland. Greenhouse gas emissions in Finland, 1990-2020 https://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/StatFin__ymp__khki/statfin_khki_pxt_111k.px/ and Statistics Latvia. Air emission accounts (NACE Rev. 2) 2000 - 2020 https://data.stat.gov.lv/pxweb/lv/OSP_PUB/START__ENV__GP__GPE/GPE010/table/tableViewLayou t1/

[19] Umwelt Bundesamt. Datensuche. https://www.umweltbundesamt.de/daten/datensuche/?s=score&d=desc&a=Daten%20und%20Tabelle n&t=Klima&l=de

[20] Ministry for the Environment.New Zealand's Interactive Emissions Tracker. https://emissions-tracker.mfe.govt.nz/

[21] Datos Argentina. Indicadores de emisiones de gases de efecto invernadero (GEI) https://www.datos.gob.ar/dataset/ambiente-indicadores-emisiones-gases-efecto-invernadero-gei

[22] United Nations Climate Change. National Inventory Submissions 2021 https://unfccc.int/ghg-inventories-annex-i-parties/2021 and United Nations Climate Change. Reporting requirements. https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-c onvention/greenhouse-gas-inventories-annex-i-parties/reporting-requirements

to providing detailed data. As a recent report argues, different countries "have been following different reporting guidelines, reporting at different frequencies, and using different reporting formats". The importance of providing context for data is emphasized by recent research[23] advocating for "datasheets for datasets", attention to "data settings", and careful consideration of context as an important principle for fair and actionable data.[24]

Over a third of countries (38%, 42/109) include detailed information on greenhouse gas emissions and targets reported to the UNFCCC in nationally published data . The rest of the countries only report this data partially (18%, 20/109) and the rest do not report this information at all.

Providing context is also important to assess availability relative to the circumstances of emissions data production. For example, not all countries are required to produce the same data following the same conventions. The new Enhanced Transparency Framework[25], established as part of the Paris Agreement, has some transparency measures for developed countries that bear more historical responsibility for emissions which are not required for developing countries who have been less responsible. While tabular data is important, discussions around the UNFCCC Subsidiary Body for Scientific and Technological Advice have also suggested that a combination of formats ("tabular, graphical or textual") will be required for adequate reporting around progress on emissions reductions.26More granular data may also thus be accompanied by narrative, documentary and other material to provide additional context on emissions data concerning the circumstances of the reporting country.

[23] Falduto, C. and S. Wartmann (2021), "Towards common GHG inventory reporting tables for Biennial Transparency Reports: Experiences with tools for generating and using reporting tables under the UNFCCC", OECD/IEA Climate Change Expert Group Papers, No. 2021/01, OECD Publishing, Paris,https://doi.org/10.1787/38f54dbf-en

[24] See, for example,: D'Ignazio, C., & F. Klein, L. (2020). Seven intersectional feminist principles for equitable and actionable COVID-19 data. Big data & society, 7(2), 2053951720942544. and CIVIC Data Library of Context. https://civicsoftwarefoundation.org/library/

[25] United Nations Climate Change. Moving Towards the Enhanced Transparency Framework. https://unfccc.int/enhanced-transparency-framework

[26] https://unfccc.int/sites/default/files/resource/Non_paper_Oct2021_Transparency_0.pdf

Recommendations

The insights deriving from the analysis of the GDB survey results focus on issuing, collecting, distributing and publishing climate data The unavailability of data impoverishes climate preparedness strategies, especially at the local and city level, and we know that cities dominate GHG emissions. International solutions to the emissions data problem are unclear.

Data plays a critical role in keeping track of the emissions and progress towards reductions targets across countries, regions and sectors. Inaccuracy and availability are two major problems affecting the effectiveness of climate action plans. There is also a lack of standards for reporting CO2 emissions and their absorption. As pointed out by Ratti and Muggah (2022)[27], climate-preparedness plans are closely correlated with investment in climate action, including nature-based solutions and systematic resilience.

Strategies must be supported by scaling up data-driven monitoring platforms. These systems, powered by satellites and sensors, can track temperatures inside and outside buildings, alert city dwellers to air-quality issues, and provide high-resolution information on concentrations of specific GHGs (carbon dioxide and nitrogen dioxide) and particulate matter". These systems could help to downsize the under-reporting of data. The Washington Post[28] has calculated a billion tonnes a year of under-reported emissions.With no globally agreed system for measuring carbon emissions, the door is left open for countries to misrepresent the size of both their problems and solutions. Standards can help close that door by ensuring ongoing, accurate measurement of real progress in the fight against climate change.

According to a recent study published in Nature[29] on US Cities, for example, cities under-report their greenhouse gas emissions, on average, by 18.3%. Omissions relate to particular fuels, and source types emerge with a differentiated way to

[27] Ratti & Muggah, Cities and the Climate-Data Gap, https://www.project-syndicate.org/commentary/cities-lack-climate-data-collection-monitoring-systems-by-robert-muggah-and-carlo-ratti-2022-01

[28] The Washington Post. Countries' climate pledges built on flawed data, Post investigation finds. (2021).https://www.washingtonpost.com/climate-environment/interactive/2021/greenhouse-gas-emissions-pledges-data/

[29] Gurney, Kevin Robert, Jianming Liang, Geoffrey Roest, Yang Song, Kimberly Mueller, and Thomas Lauvaux. "Under-reporting of greenhouse gas emissions in US cities." Nature communications 12, no. 1 (2021): 1-7.

estimate transportation. The under-reporting of GHG emissions at the urban level has caused rising concerns about self-reported inventories in planning or assessing emissions. Estimating GHG and emissions data collection requires accuracy and precision, whether reported by a city, state, or country. The lack of an accurate emissions assessment makes prioritizing mitigation policy options difficult, leading to the misallocation of scarce mitigation resources. The Nature study on US cities raises serious concerns about the current self-reported approach to quantifying urban GHG emissions and these dynamics may be the same in other cities across the globe. There is progress on building a systematic emissions quantification system that promises a systematic approach to generating space/time-resolved, atmospherically calibrated emissions information for all cities in collaboration with local authorities. Urban GHG mitigation practitioners could devote time and resources to the activity under such a collaborative system, as they have the most significant knowledge and political influence over the best mitigation strategies for their city. This system should incorporate a clear and coordinated strategy for the data collection process. Climate data collection at the local level must be planned, and local governments must be better organized to guarantee reliability and improvements to the process. Climate action plans must be based on available and reliable data, and have commitments to improve climate data at the local level.

Otherwise, local policies languish on a city's websites after the publication, with no measurement and evaluation. There is a need for more investment in data capacity to track climate issues, and a more effective plan to improve climate data and track progress on targets is needed. Local governments have to publish data that people will understand. Local governments not only need to invest in building better climate data; they also need to ask people about the climate data they need and make that data public for communities to use.

National Greenhouse Gas inventories - the primary tool for tracking a human GHG emissions at the country, sector, and source category level - will support setting and measuring progress against each country's NDCs for reducing GHG emissions. Domestic climate policy development and evaluation recommendations should consider the evidence of the consequences of under-reporting, in all the aspects related to quantity and quality. Recommended requirements on emission data provisions regard not only tackling national omissions and data availability at the local level. Based on GDB survey data, we can identify the following requirements needed to improve data collection and processing: adequate coverage, regular update, timeliness, online availability, availability of historical data, reusability, machine-readability, accessibility and completeness.

Conclusion

Data to support climate action are often scarce and not available. Data collected by the Global Data Barometer survey in more than 100 countries worldwide reveals the urgency of filling the climate action data gap, particularly at the local government level, including big and small municipalities.

Cities are the main generators of essential data to fight climate change, however, the lack of skills and data-driven monitoring platforms is evident, demonstrating the need to resize every effort to track progress on targets and make progress on the action side. The GDB findings focus on a set of environmental indicators: Emissions, Biodiversity, and Vulnerability and contribute to analyzing the national governments' status regarding the existing and available data resources. he research strongly suggests we need to focus on the subnational level since the challenge for climate action starts f there.