Digitally-Enabled Independent Global Stocktake (DIGS)

Recent climate events and the findings of the latest climate report from the United Nations' Intergovernmental Panel on Climate Change (IPCC), show wide-ranging global impacts. To counteract these trends, successful implementation of the Paris Agreement goals depends on the ratcheting of global ambition. The Agreement includes a 'Global Stocktake (GST)' mechanism, which assesses national progress on a once-every-five-year basis. Informed by the GST assessment results, all Parties negotiate and update their nationally determined contributions (NDCs) to ratchet global emission reductions (Figure 1).

The first GST takes place in 2023, and is slated to occur every five years. Yet, despite its crucial importance, the current climate data accounting underlying the GST is fragmented and largely insufficient. Many countries still rely on manual processes to assemble and standardize their inventories, leading to lengthy and costly procedures. Despite their recognized importance, the current GST design does not provide information on the participation of subnational governments and companies (collectively referred to as non-state actors or NSAs). Currently, almost 30,000 NSAs are engaging in climate action, as reported by the UNFCCC Global Climate Action Portal, or GCAP, making this group an essential category of actors to drive ambitions (Hale 2020; NewClimate Institute et al., 2021).

To improve understanding of NSA contributions to the Paris Agreement, there are a growing number of initiatives conducting independent accounting and data aggregation. For example, CDP and ICLEI have worked with city-level climate initiatives, including C40 Cities for Climate Leadership, ICLEI Local Leaders for Sustainability, and the Global Covenant of Mayors for Climate and Energy, to standardize and centralize city-level emissions reporting. A consortium of research organizations, including the NewClimate Institute and Data-Driven EnviroLab, have produced an annual stocktake of the aggregate mitigation potential of city, region, and business climate commitments. These efforts, however, are limited in their coverage and only cover a subset of actors, and are largely limited to self-reported data from NSAs.

To develop timely and complete accounting of NSA climate pledges and progress to support and provide inputs to the GST, digital data collection tools and infrastructure could vastly improve the status quo. Given that the Paris Agreement does not involve

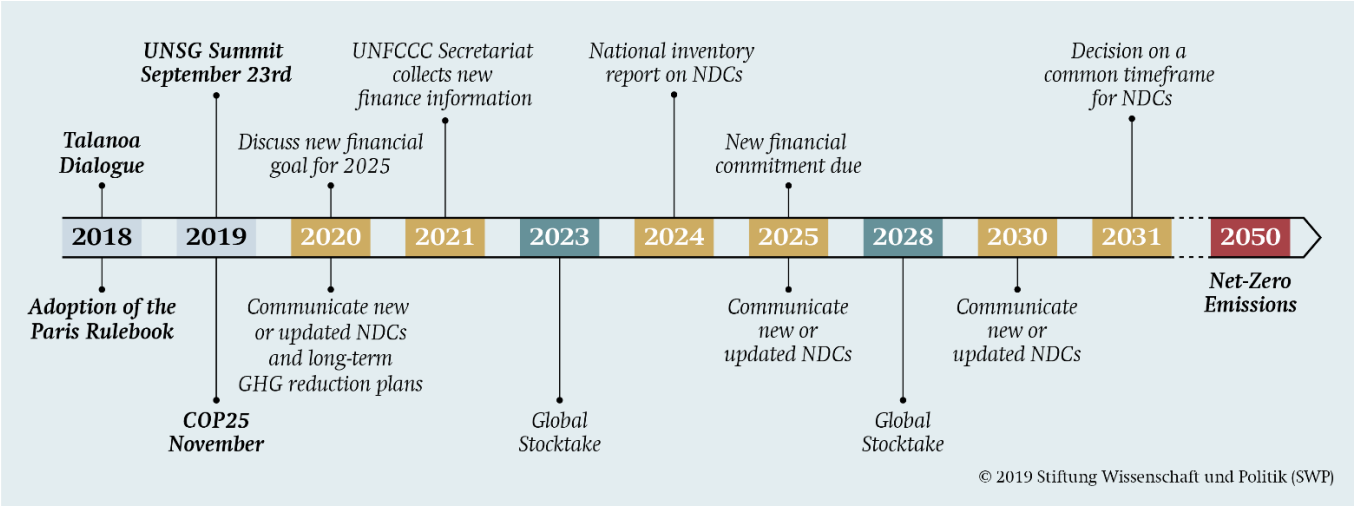

Figure 1 The Paris Agreement's 'ratchet mechanism' (Source: SWP)

NSAs directly, an independent accounting and data aggregation process leveraging emerging digital and data practices, operating in parallel to the GST, would allow for NSAs to voluntarily participate in similar accountability mechanisms and goals as state actors in the Paris Agreement (Figure 2). A "Digitally-Enabled Independent Global Stocktake (DIGS)," as the initiative is called, could revolutionize the infrastructure and processes underlying NSA climate action tracking, filling critical information gaps that hinder climate action transparency and reducing measurement and reporting burdens. Through this, the DIGS initiative makes NSA data available to the Paris Agreement and its GST process and develops data harmonization and digital infrastructure insights as part of a collective effort.

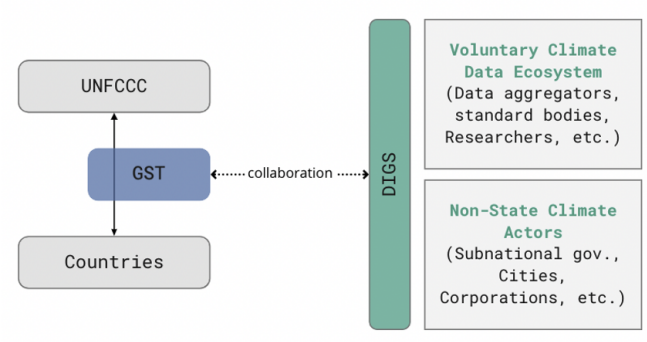

Figure 2 The DIGS initiative convenes NSAs and Data Providers to compile accounting and assessments that independently collaborates with the official GST process.

Together, the Open Earth Foundation (OEF), the Data-Driven EnviroLab (DDL), and the Camda secretariat, as part of the Climate Action Data 2.0 (CAD2.0) community, are collaborating with more than 60 other climate data expert organizations to form an independent climate accounting network (ICAN) of researchers and analysts to carry out the DIGS initiative.

Digital technologies (such as decentralized distributed ledgers for data storage and satellite and sensor-based data collection) would create alternative accounting infrastructure leveraging multiple data sources and enhancing trust and transparency through decentralized data governance. Combined with artificial intelligence and machine learning, data analysis and verification would be automated to reduce the analytical burden and improve efficiency. Existing datasets would be made interoperable and connected through digital infrastructure, yielding a system greater than the sum of its parts (Figure 4). Ultimately, the aggregated impact would be determined at various spatial and sectoral scales, preserving data privacy while allowing needed access for decision-makers to evaluate performance (see our recent publication for more details regarding this 'nested accounting' approach, Figure 3). Accordingly, the DIGS initiative seeks to improve interoperability between currently fragmented and heterogeneous accounting infrastructures to improve climate accounting and establish a global architecture to support the bottom-up and decentralized governance of the Paris Agreement.

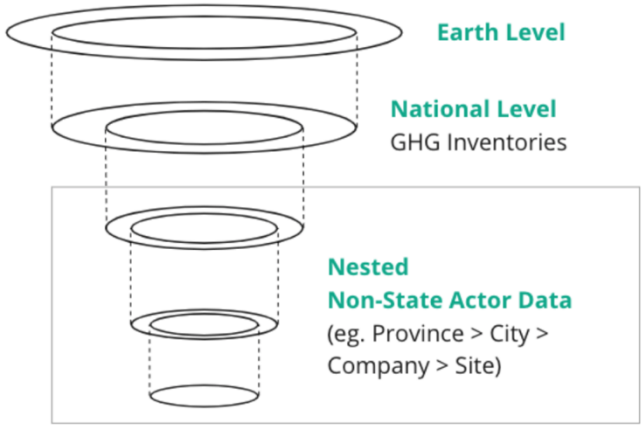

Figure 3 Jurisdictionally nesting NSA data using spatial protocols can lead to comprehensive national-level assessments with improved visibility on how NSAs contribute to Paris Agreement goals.

DIGS Activities

DIGS is a collaborative effort between different organizations and communities to grow an open and decentralized initiative jointly. The initiative is developed through monthly meetings and collaboration along three workstreams: data harmonization, policy, and digital infrastructure. We are leveraging the resulting insights to co-create a multilateral climate accounting and decentralized institutional framework architecture. This section details key collaborators and what they contribute to the initiative.

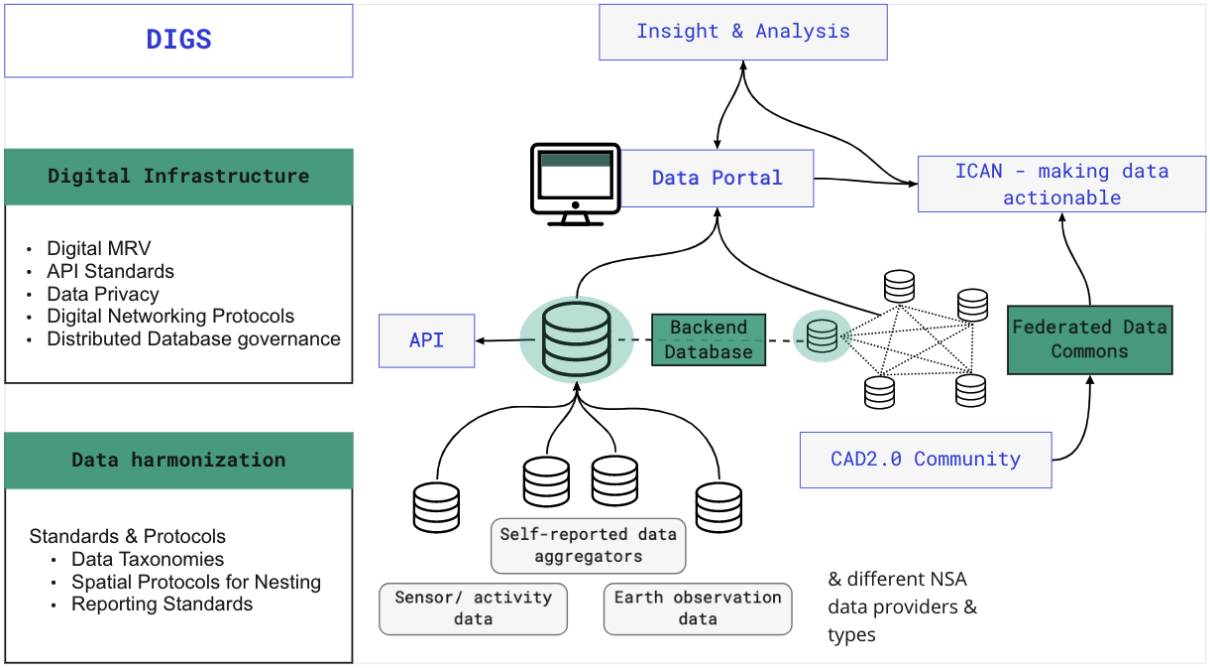

Figure 4 The DIGS integration map for NSA climate data.

CAD2.0 community

The CAD2.0 community (see 210617 CAMDA - Slides.pdf) developed a joint declaration that was launched during COP26 to create alignment and outline the mission of the community (for more information, see the CAD2.0 declaration and Race to Zero press release). Earlier this year, we also provided inputs to the newly formed UN SG Accountability task force and the Technical Dialogue of the Global Stocktake. Recently, we presented our current status and objectives at the presented at the UNFCCC High-level Champions event on "Taking stock of Progress" at the meetings of the Subsidiary Bodies (SB) of the Bonn Climate Change Conference.

OpenEarth - Open Climate

The Open Climate network is being designed as an open-source digital infrastructure for integrated climate accounting; automating data integration, verification and trusted data sharing across the wide range of individual NSA while preserving privacy (see the Open Climate website for more information). Open Climate features a user-interface dashboard to navigate the nested climate accounting potential following the inputs from the CAD2.0 and open source community. The prototype was showcased in the 2022 Bonn technical dialogues of the GST.

DDL - ClimActor

ClimActor is the largest harmonized subnational climate action global dataset and R statistical software package for data harmonization, including more than 10,000 city and regional governments (Hsu et al., 2020). It includes a database of subnational actors engaged in voluntary climate action, along with other contextual information (e.g., location, population) that can be joined with other datasets to facilitate a better understanding of the landscape of NSA climate action and support NSA data accounting and aggregation.

The software package also provides a series of cleaning functions based on phonetic and fuzzy string matching algorithms within an open-source R package to make it easy for anyone to immediately use the ClimActor dataset with other relevant data (Github). This package provides a workflow and methodology for entity matching across different data sources, allowing for accurate attribution of climate action and greenhouse gas emissions to NSAs and reducing the likelihood of overlaps in data accounting.

OS-Climate

The Linux Foundation's OS-Climate is building a non-profit, transparently governed public utility of climate data and analytics using Open Source best practices (OS-Climate). The non-profit organization provides open-source data and software tools to enable the global shift to

climate-aligned finance and investing (Linux Foundation). For this, the organization creates Global Data Commons using a Curated library of public and private sources to develop more accurate corporate historical and forward-looking climate and ESG metrics as a public good (Github). The data collected in the Data Commons can then be directly used to understand and assess how actors perform in terms of their climate commitments and progress towards those commitments.

Research

The CAD 2.0 community is actively engaged in research to understand NSA contributions toward global climate mitigation, adaptation, and finance. For example, the NewClimate Institute has conducted deep-dive analyses of net-zero corporate pledges, evaluating their rigor and credibility (NewClimate Institute, 2022). The Data-Driven EnviroLab has developed statistical models to evaluate the mitigation performance of subnational actors (Hsu et al., 2020). We are developing research that explores the interactions of the various actors in the climate data space across various governance levels (such as local, regional, national, and international). With this research, we are contributing to the science-policy academic literature investigating the role of NSAs, such as cities, as areas of local policy experimentation. We highlight the key role of NSAs to create bottom-up innovation and scale up to inform national policy development.

These research results inform the selection and design of the DIGS architecture for innovating climate action tracking and lowering transaction costs for monitoring and reporting, improving the institutional performance of the new post-Paris polycentric climate governance system. These contributions create the science-policy interface that examines emerging technology's impact on climate change governance to make climate data actionable.

Roadmap & Outlook

Our DIGS initiative focuses on creating interoperability in the climate data ecosystem to support the Paris' GST. For this, we identified the following activities (by COP27):

- **Data model and Open data dictionary of NSA climate action** – we are developing an NSA climate action data model that identifies key variables and indicators required to understand and track NSA climate action (e.g., baseline emissions data, emissions reduction targets and timelines, etc.). Metadata dictionaries that specify which data about datasets are required for transparency and understanding of NSA datasets will also be generated (e.g., methodological assumptions, etc.). These tools will be stored on an open Github repository.
- **Standards research – convene a spatial standards working group,** starting at the 2022 NY Climate Week, to define common spatial protocols that allow for jurisdictionally nesting data and climate actions, both for emissions and mitigation actions and nature-based projects.
- **Global Stocktake Climate Datathon –** In collaboration with the GST Co-Chairs of the Technical Dialogue, we organize through the CAD2.0 community an open call for data and tools to support the GST (both state and non-state actors) ahead of COP27
- **Architecture of federated data nodes –** given that the DIGS initiative is based on the premise of decentralization of data and actors, this process defines methodologies to link existing databases, datasets and platforms in a federated approach, whereby data providers have self-sovereignty, engage in peer-based verification, and the information aggregated in relevance to the GST.

We will summarize the learnings and results of these DIGS activities in a comprehensive Whitepaper to generate lessons and outputs that can support and inspire the GST process. At COP27 in Sharm El-Sheikh, we'll engage with the broader GST and climate expert data community to receive feedback on our DIGS activities and focus on further developing it based on the emerging needs of the Parties and NSAs towards the first GST in 2023.

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