TECHNICAL ASSISTANCE REPORT

COLOMBIA

Report of the Diagnostic Mission on Macro-relevant Climate Change Statistics (July 17–21, 2023)

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Prepared By

Michael Stanger and Paulo Nunes

Authoring Departments:

STATISTICS

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Acronyms and Abbreviations

BANREP	Central Bank of Colombia
CF	Central Framework
CONPES	National Council of Economic and Social Policy
DANE	National Administrative Department of Statistics
DNP	National Department of Planning
EA	Ecosystem Accounts
ECLAC.	Economic Commission for Latin America and The Caribbean
GHG	Greenhouse Gas
IDEAM	Institute of Hydrology, Meteorology and Environmental Studies
LAC	Latin American and Caribbean
MADS	Ministry of Environment and Sustainable Development
MINCIT	Ministry of Trade, Industry and Tourism
MHCP	Ministry of Finance and Public Credit
MINAM	Ministry of Environment and Sustainable Development
MME	Ministry of of Energy and Mines
SECO	Swiss State Secretariat for Economic Affairs
SEEA	System of Environmental-Economic Accounting
SNA	System of National Accounts
UNGRD	National Disaster Risk Management Unit
UNSD	United Nations Statistics Division
WAVES	Accounting and Valuation of Ecosystem Services

Section I. Summary of Mission Outcomes and Priority Recommendations

1. A diagnostic mission was conducted during July 17–21, 2023, to develop a roadmap to guide the enhancement on the compilation of climate statistics for Colombia to address policy needs for data. The mission was conducted under the auspices of the Swiss State Secretariat for Economic Affairs (SECO) funded Environment and Climate Change Statistics Capacity Development Program. The program is a two-year project with the objective to assist countries in developing timely and internationally comparable statistics to support the design and monitoring of policies to address the environmental, financial, economic, and social implications associated with climate change.

2. Discussions were conducted during plenary and bilateral sessions with key national stakeholders representing data compilers and users to take stock of work already undertaken on climate change related statistics for Colombia, ongoing capacity development initiatives with other agencies, policy needs, available data and data gaps. These discussions were facilitated by provision of introductory description of climate change indicators. Participating agencies included the National Administrative Department of Statistics (DANE), the Central Bank (BANREP), the Ministry of Environment and Sustainable Development (MADS), the Ministry of Finance and Public Credit (MHCP), the Ministry of Energy and Mines (MME), the National Department of Planning (DNP), the Ministry of Trade, Industry and Tourism (MINCIT), the National Unit of Disaster Risk Management (UNGRD), the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), and Diorama Consulting.

3. Colombia is strongly committed to climate change policies as reflected on the Law N° 1931 (2018) where the congress established the guidelines for climate change management. The law outlines the actions to adapt to climate change and mitigate greenhouse gases emissions, and aims at reducing the vulnerability of the country's population and ecosystems to its effects and promoting the transition towards a competitive, sustainable economy and low-carbon development. Moreover, a Climate Action Law (2169) was approved in 2021, which establishes goals and minimum measures to reach carbon neutrality. On the data side, DANE is committed to developing integrated environmental and economic information and regularly compiles and disseminates selected accounts of the System of Environmental-Economic Accounting (SEEA) (Table 2).

4. Given the current dissemination practices, the mission discussed with the authorities the main priorities and identified that the most feasible developments include enhancements to the SEEA energy and emissions flow accounts, and mineral and energy asset accounts, as well as the development of domestic carbon footprints. While DANE currently compiles both energy and emissions flow accounts in physical terms, the agency noted the need to: i) express the assets accounts in monetary values, and ii) the compilation of carbon footprints for Colombia. In addition, and based on the available statistical infrastructure within the national accounts section, DANE has indicated its strong interest in i) deriving the energy flow accounts in monetary terms, and ii) enhancing the coverage of the flow emission accounts to include emissions coming from agriculture, land use, industrial processes, and waste. It is worth noting that DANE plans to start a feasibility assessment to develop the ecosystem accounts in the near future.

5. A secondary priority includes the compilation of a series of environmental activity indicators/accounts. While the source data for these statistical products are already available, some enhancements are required, such as improve the classification and more detailed record of government

"environmental" transactions. Also, DANE considers that a more granular framework will benefit the analytical use of these accounts. Some agencies expressed their interest in and highlighted the relevance of the physical and transition risk indicators, including exploring the use of geo-spatial tools so as to have information at sub-national level.

6. While the priority statistics are built from existing infrastructure, additional resources are required to guarantee a successful completion of the project. The environment statistics unit at DANE noted that with the current dissemination commitments, it would be difficult to undertake new initiatives unless new human resources are made available. The authorities committed to providing additional resources as an assessment is made by the unit.

7. To support progress in the development of macro-relevant climate change statistics, the mission made the following priority recommendations:

TABLE 1. Priority Recommendations

Target Date	Priority Recommendation	Responsible Institutions
December 2024	*Mineral and energy asset accounts – Monetary values*	DANE
December 2024	*National Footprints*	DANE
December 2024	*Energy flow accounts – Monetary values*	DANE
December 2024	*The Air Emission Accounts -including agriculture, the change of land use, industrial processing, and waste*	DANE

Further details on the priority recommendations and the related actions/milestones can be found in the action plan under Detailed Technical Assessment and Recommendations.

Section II. Detailed Technical Assessment and Recommendations

A. INTRODUCTION AND OBJECTIVES OF THE PROJECT

8. Under the auspices of the Swiss State Secretariat for Economic Affairs (SECO) funded Environment and Climate Change Statistics Capacity Development Program, a diagnostic mission was conducted in Colombia during July 17–21, 2023, to develop a workplan for enhancing the environmental and climate change statistics necessary for policy making. The diagnostic mission is part of a two-year multi-country project, that will also include trainings and targeted hands-on technical assistance to support development and mainstreaming of macro-relevant environmental and climate change indicators to inform policy and monitor the impact of their climate change mitigation and adaptation measures.

9. The main objective of the project is to support Colombia in designing and implementing a macro-relevant climate change statistics program to address its climate change mitigation and adaptation policy data needs. The project will build on IMF's existing capacity development efforts in the areas of macroeconomic statistics and seek to provide Colombia with the tools, resources, and technical capacity to develop a range of environmental and climate change statistics that can inform financial and macroeconomic policies. The project will also build on other initiatives that are currently taking place in Colombia.

10. The mission met with key national stakeholders, with data producers and users, to identify policy priorities and related climate change and environmental statistics data needs. The mission, hosted by DANE, took stock of the main existing climate change and environmental statistics for Colombia and ongoing capacity development initiatives with other international organizations. The mission met with officials from the National Administrative Department of Statistics (DANE), the Central Bank (BANREP), the Ministry of Environment and Sustainable Development (MADS), the Ministry of Finance and Public Credit (MHCP), the Ministry of Energy and Mines (MME), the National Department of Planning (DNP), the Ministry of Trade, Industry and Tourism (MINCIT), the National Unit of Disaster Risk Management (UNGRD), the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), and Diorama Consulting. The mission also met with the SECO representative in Colombia, Mrs. Luisa Julian.

B. POLICY PRIORITIES AND INTERNATIONAL COMMITMENTS

11. The Government of Colombia has made significant steps towards improving statistics with special emphasis on wellbeing and sustainability. DANE has recently appointed a new Director General who has re-vamped the priorities and commitments of the institutions towards a broader set of statistics. On the national accounts, DANE was one of the SECO-supported countries to start producing quarterly sectoral accounts (including household), and currently is engaging to develop new items such as Social and Environmental Accounts, Distributional Accounts, Water Accounts, and Energy Accounts. Moreover, DANE is also developing material flow accounts to enable monitoring the circular economy, and bio-economy accounts to understand the contribution of biodiversity to the economy. DANE has a unit within the National Accounts Directorate that works on Alternative Concepts Satellite Accounts, in charge of developing new experimental accounts.

12. DANE has several years of experience dealing with Environmental Statistics. Colombia was part of the initial six pilot country countries developing the Wealth Accounting and Valuation of Ecosystem Services (WAVES), back in 2010. Since then, Colombia has been reporting statistics according to the Central Framework, on an annual basis and expressed in physical terms. More recently DANE is also pursuing to implement the SEEA-Ecosystem Accounts (EA).

13. Colombia has a traditional and well-established process to establish and monitor public policies – including those related to climate change and development of statistics. The governance structure is established around the National Council of Economic and Social Policy (CONPES - Consejo Nacional de Política Económica y Social) which works as anchors to policy demands and benchmark for monitoring the developments. In this respect, the Government has launched several climate-related COMPES, for example: the Green Growth Policy (3934); the National Policy for the Control of Deforestation and Sustainable Forest Management (4021); and the Public Policy to reduce disaster risk conditions and adapt to climate variability phenomena (4058). Moreover, an overarching law (# 2169) on the national on the Nationally Determined Contributions (NDC) and Climate Change was signed in 2021. Such governance framework could play a significant factor supporting the SECO project.

C. RELEVANT STAKEHOLDERS AND INITIATIVES

14. During the mission, multi-agency meetings were convened, allowing organizations engaged in climate and environmental statistics, data production, and policy formulation to showcase their ongoing projects. These presentations covered the projects' background, overarching goals, and the frameworks guiding the development of the various indicators covered. Institutions also outlined their medium- to long-term strategies and emphasized the importance of collaboration.

Swiss State Secretariat of Economic Affairs (SECO)

15. SECO highlighted the longstanding partnership with Colombia, demonstrated through its numerous projects with DANE and the Central Bank of Colombia. The country's dedication to these initiatives and their successful execution have continually garnered SECO's support across various workstreams. An example of this support is the current project that focuses on climate issues, where the development of environmental statistics is targeted to support policies for and understanding of the interaction of climate change with the macroeconomy. This two-year project underscores the urgency of the topic and reaffirms the Swiss government's commitment to assisting Colombia in advancing its Climate/Environmental transition agenda. The project aims to harness program synergies, including interinstitutional collaboration and thematic integration within the climate change agenda, and leveraging Colombia's regional leadership in statistical compilation, dissemination, and policy integration in this domain.

16. The project stands to significantly influence the field of climate change statistics by gathering key data producers, statistics compilers, and policymakers. This collaborative effort aims to identify and collectively address data gaps in a coordinated approach. Additionally, the project is poised to support and benefit from the ongoing revision of the System of National Accounts (SNA) Furthermore, it will contribute to enhancing the statistical infrastructure, facilitating the early adoption of new sustainability recommendations and possibly future updates.

17. Considering the comparative advantages identified in Colombia, SECO is open to contemplating the establishment of a Centre of Excellence focused on climate statistics. This initiative would involve collaboration with local partners, other economies, and regional organizations.

Alternatively, leveraging Colombian expertise could facilitate south-south cooperation, offering technical support to neighboring countries in the collection of source data and the generation of climate-change-related statistics.

National Administrative Department of Statistics (DANE)

18. DANE introduced the teams responsible for National and Environmental Accounts, outlining their work priorities and programs. The Environmental Accounts team emphasized their ongoing efforts on the System of Environmental-Economic Accounting (SEEA), covering both the Central Framework and Ecosystem Accounts. The team expressed strong interest in further developing this area, leveraging their strong foundation and the current legislative environment. More specifically, the team is keen on enhancing the integration of SEEA-Ecosystem Accounts (EA) and Central Framework (CF) to the broader NA directorate, moving beyond their traditional role as satellite accounts. This includes a focus on SEEA-EA and aligning these efforts with the current policy landscape, particularly the energy/ecological transition. The discussion also touched on the importance of capacity building and of exploring the potential of creating a dashboard as a strategic tool. This initiative aims to add significant value to the data produced by enhancing its accessibility and utility as a public good, thereby ensuring its widespread availability.

19. The Chief Statistician Dr. Piedad Urdinola expressed strong support for the project. A meeting with the SECO representative, DANE and IMF, started with a SECO providing an overview of the objectives and context of the two-year project, followed by DANE's presentation on their efforts with SEEA-Central Framework (CF) and SEEA-Ecosystem Accounts (EA). The IMF then outlined the work plan. Dr. Urdinola expressed strong enthusiasm and support for the collaboration. All parties concurred that this meeting marks the beginning of a continuous journey. They committed to ongoing collaboration and follow-up, establishing a robust foundation for both the current project and future initiatives.

20. DANE is positioned to play a pivotal strategic role in the development and strengthening of an environment and climate change statistics program. Considering its expertise in the implementation of the SEEA and its leadership in the region, DANE is uniquely suited to lead a pilot project on environment and climate change statistics. DANE could play an important role in the Latin American and Caribbean (LAC) region by supporting countries in the region in the implementation of environmental accounts and climate change statistics through sharing their experience. The meeting was unanimously deemed highly successful, signaling a positive trajectory for future work.

21. DANE closed the meeting underscoring the critical need to implement the SEEA, both Central Framework and Ecosystem Accounts and develop climate change information in line with international statistical standards. DANE is committed to further contributing to this effort, advocating for a coordinated action plan to address the evident need for enhanced collaboration.

Ministry of Mines and Energy (MME)

22. The MME expressed its appreciation for the detailed presentations given during the mission and highlighted the need for interinstitutional coordination and international collaboration. The SECO project provides an excellent opportunity for fostering collaboration among national partners, as demonstrated by this inception meeting, and for facilitating international collaboration with agencies such as the United Nations Statistics Division (UNSD) and the Economic Commission for Latin America and the Caribbean (ECLAC).

23. MME staff noted that there is a strong demand within the Ministry for climate change data to inform adaption to climate change impacts and advancing ecological/energy transitions. In this

context staff highlighted the concept of "Justica Climatica" (Climatic Justice) and the execution of Climate Action Plans at the sectoral level. Such plans are crucial for assessing distributive impacts within sectors and supporting the UN 2030 Agenda. The involvement of the private sector was emphasized as part of a multi-stakeholder process that needs to be put in place as part of the project.

24. MME mentioned ongoing climate change initiatives within its portfolio, stressing the importance of adopting commonly agreed methodology and standardized application. The relevance for climate change policy of information on emissions, deforestation (not attributed to MME activities), renewable energy in support of development of indicators, including on the private sector's role in climate finance were discussed.

25. Collaboration with official partner institutions was noted as an important step to optimize resources, and to avoid duplications of efforts. It was agreed that DANE will compile an inventory of existing data sources related to climate change available in various government agencies, including the periodicity of data collection and data quality. This will serve as an iput to identify overlaps and data gaps and develop a strategy towards streamlining the production of data and the development of an agreed data sharing protocol.

26. The officials from MME underscored that MME collects and compiles data that could be useful for the activities of the project. In particular, they highlighted that they are working in collaboration with the National Agency of Mining and hydrocarbons as well as with the Energy Planning Unit (UPME) which could be useful to obtain data for the compilation of mineral and energy asset accounts. Further, they compile energy balances which are an input in the energy accounts and have on-going work on the compilation of private environmental protection expenditures.

27. A common issue from most institutions represented, noted by MME, was that statistical areas face important constraints in human resources. For instance, compilers are unable to establish a direct contact with the firms when it comes to compiling climate change data. The discussion also highlights the need for a more fluid dialogue with DANE and that this project presents an excellent opportunity to re-enforce ongoing dialogue and possibly highlight the importance of securing additional financial resources.

National Planning Department (DNP)

28. DNP stressed the importance of data sharing, accessibility, and dissemination. DNP noted the lack of effective data sharing and dissemination across different ministries and proposed the establishment of a task team to address these challenges and embody the principle that "Information is for all." This team would be dedicated to disseminating data more broadly and effectively to all stakeholders.

29. DNP has outlined its comprehensive mandate on climate change, which incorporates an inter-sectoral approach to its activities which include.

- Transformation of Land Use Planning: The impact of climate change on water availability nationwide and the subsequent risks posed to the agriculture sector are under evaluation.
- Regional Convergence: Climate change's role in Colombia's National Development Plan, particularly its effect on income/wealth distribution, is highlighted. The adverse impacts of climate change disproportionately affect native and rural female populations, underscoring the need for effective measurement tools for these impacts.

- Decarbonization: In alignment with Colombia's commitments to international agreements like the Paris Agreement, the necessity to monitor decarbonization efforts is emphasized.
- Financing Sustainable Development: There is lack of data to inform targeted financial interventions, specifically in areas where the socio-economic marginal benefits of carbon sequestration are highest. This gap extends to the prioritization of finance and investment for regional convergence and addressing climate migration.
- Indicators: The expansion and refinement of existing indicators to measure progress are crucial. This includes fostering collaboration with the private sector.

30. The final discussion highlighted the need for alignment and potential synergies between the DNP and the objectives of the SECO project. In this sense, DNP's efforts are characterized by: i) continuous collaboration with DANE and other stakeholders, guided by requests from the National Council for Economic and Social Policy (CONPES) and central government directives; ii) how its work is connected to the "Política Nacional de Cambio Climático" (National Climate Change Policy), focusing on areas such as carbon taxes and biodiversity finance, in close cooperation with BIOFIN/UNDP; iii) its focus on Natural Capital --DNP's initiatives extend to the valuation and management of natural capital, emphasizing water resources, including its collaboration with the Natural Capital Project and the use of InVEST software, in partnership with Stanford University (underscoring DNP's dedication to incorporating Geo-Spatial information and statistics into its strategies); and iv) its contribution to TERRIDATA, a platform that serves as a significant statistical resource on land use planning ("Ordenamiento Territorial"), reflecting DNP's commitment to data-driven policy and planning.

Ministry of Finance and Public Credit (MHCP)

31. MHCP emphasized the importance of methodological rigor in reporting climate change, highlighting the need to tailor statistical exercises to meet end-user requirements efficiently without duplicating existing efforts.

32. Staff identified several areas where climate change data is vital to MHCP's work program. These include the management and analysis of green taxes, climate-related expenditures, monitoring of plastics and carbon taxes, and subsidies to various economic sectors. The role of effective communication with the public sector was also underscored, with an aim to collaboratively identify sectors most affected by climate change, the costs associated with emission reductions, and areas for potential intervention.

33. During the discussions, MHCP's leadership in developing a taxonomy and methodological framework for capturing climate change-related data, particularly in the private sector, was highlighted. Decisions making based on quality data is backed by solid scientific evidence, ensuring that data collection and analysis are grounded in credible research. Also, the potential for investments in green transportation was explored as part of the discussion, highlighting MHCP's interest in sustainable infrastructure development.

34. The utilization of compiled climate change data in collaboration with MHCP for designing fiscal schemes was further discussed. This includes analyzing carbon for taxation purposes, estimating potential revenue from green taxes, and considering their distribution among regions.

Ministry of Environment and Sustainable Development (MADS)

35. MADS stressed that climate change is very much present in their mandate and data needs, including the overall inventory, and monitoring, of the GHG emissions. The significance of a comprehensive inventory and monitoring system for greenhouse gas (GHG) emissions, including the

detailed measurement and inventory of forest areas, was underscored. This is essential for accurately assessing and managing the country's environmental impact.

36. Staff agreed on the necessity of coordinating data collection efforts with other organizations is very important. Emphasis should be given to a participatory approach that considers the multi-dimensionality of climate change and leverages the comparative advantages of all partners involved. Resources are scares, and data production, collection and sharing needs to be efficient to maximize its use and avoid duplications. Reference is made to the MAPEO[1] tool as a valuable resource for managing climate change data and addressing governance issues. This tool could play a crucial role in organizing and analyzing climate-related information.

37. The importance of articulating efforts within and with other countries in the Region was mentioned, suggesting a unified approach to addressing climate change and enhancing data sharing and best practices. To fulfill the national purposes, it was identified the need for establishing an official platform dedicated to climate change information. This platform should ensure free access to all, promoting transparency, informed decision-making, and public awareness across institutions and even within the region. On the international arena, a broader discussion is needed including with donors and international organizations and to awareness of the several current initiatives making use and promoting freely available global data.

Ministry of Commerce, Industry, and Tourism (MINCIT)

38. Addressing the outlined concerns and objectives regarding the integration of climate change data into the tourism industry and capacity building involves several strategic steps. It is crucial to i) understand and assess how climate change affects tourism destinations, including but not limited to, changes in weather patterns, sea-level rise affecting coastal tourism, and the increased frequency of extreme weather events; ii) Engage in comprehensive data collection efforts to understand the current and projected impacts of climate change on the tourism sector (including in collaboration with meteorological organizations, environmental experts, and utilizing tools like the MAPEO tool for climate data management); iii) use the collected data to inform policy and investment decisions aimed at both mitigating the negative impacts of climate change on tourism and adapting tourism practices to a changing climate (for instance, investment on sustainable tourism infrastructure, promoting off-season tourism to manage, and developing tourism products that are less climate-dependent).

39. For this initiative to succeed, MCIT staff would require additional knowledge or skills related to climate change and its impact on tourism. This climate change initiative could help develop targeted training programs, facilitate the establishment of partnerships with academic institutions, international organizations, and experts in climate science and sustainable tourism to facilitate knowledge transfer and provide training to MCIT staff; develop a repository of learning resources, including guides, case studies, and best practices in managing tourism under climate change scenarios; and promote a culture of continuous learning within MCIT, encouraging staff to stay updated on the latest research and developments in climate science and sustainable tourism. For this case, the SECO project could address the need by supporting the development of regional forward looking physical risks indicators.

Colombia's Central Bank (BANREP)

40. A remote meeting with the Banco de la República Colombia (BANREP) research center based in Cali discussed the use of climate data by the center's micro-econometric via partial

[1] Open-source tool to document environmental information to protect ecosystems. (MIT Solve | Mapeo - Overview).

equilibrium analyses within the agricultural sector. The center specializes in examining the effects of climate change on agricultural productivity and food prices. However, the source of climate change data utilized in these studies was not explicitly detailed - although from DANE. The center's work spans several areas, including the development of public information data infrastructures and assisting the Banco Agrario by providing vital information for disbursement decisions. They also contribute data to the manufacturing industry, emphasizing the importance of geo-spatial information. A reference was made to the insurance sector, but specific data targets remain undefined.

41. The center has access to a comprehensive suite of econometric tools primarily focusing on the agricultural sector, price orientation view analysis, and experienced in panel data. While there is an expressed interest in conducting spatially explicit econometric analyses, this area is not yet fully developed. Moreover, the center currently lacks experience in connecting their work with broader macro-analytical assessments. Specifically, there's no experience in evaluating the economy-wide induced effects of climate change using a general-equilibrium approach or Computable General Equilibrium (CGE) models. The BRC suggested the center to engage with the Macro team in BRC located in Bogotá for a more comprehensive analysis.

Institute of Hydrology, Meteorology, and Environmental Studies (IDEAM)

42. The discussions with representatives from the Instituto de Institute of Hydrology, Meteorology and Environmental Studies (within the MADS), and form the National Disaster Risk Management Unit (UNGRD), highlighted important aspects of Colombia's approach to climate data collection, carbon inventory, and disaster risk management. IDEAM, in collaboration with MADS, is compiles a national carbon inventory, which includes measurements of CO2 emissions per capita. The methodology for compiling this data is aligned with the IPCC and is available. The latest publication in 2021 presents data up to the year 2018, covering eight different sectors and including carbon mapping in forests. IDEAM also contributes data related to the "Balance Energetico Colombiano" (Colombian Energy Balance), all of which is publicly available online and shared with DANE.

43. Participants noted that there needs to be broader awareness of climate-related initiatives and collaboration. In this sense, some discussants mentioned a lack of awareness on the System of Environmental-Economic Accounting (SEEA) and related efforts by DANE. Also, they highlighted the difficulty in gathering data from the original source, along with a desire for enhanced inter-agency dialogue. IDEAM and MADS recognize DANE's potential role in facilitating coordination among agencies.

44. Finally, The UNGRD underscored the importance of making local decisions based on locally sourced data. This emphasis points to the need for detailed, region-specific information to effectively manage and mitigate the risks associated with disasters at a local level.

D. ACTIVITIES AND OUTPUTS

45. DANE will participate in the training activities organized by STA.

46. A follow-up mission will take place after the training to start developing the statistical products identified as a priority during this mission.

TABLE 2. Data and Compilation Flows for Key Deliverables

Data items	Availability
Air (GHG) Emission Accounts	2021
National Inventories (UNFCCC)	2004
National Carbon Footprints	No
Energy Flow Accounts	2022
Energy Statistics	Yes
Environmental Activity Accounts/ Environmental Expenditures	Underway
Mineral and Energy Asset Accounts (quantity)	2022

E. CONCLUSIONS AND RECOMMENDATIONS

Introduction

47. There was agreement on key priorities to develop monetary assets accounts and the domestic carbon footprints, followed by enhancing the SEEA energy and emissions flow accounts. While DANE currently compiles both the energy and emissions flow accounts in physical terms, the agency noted the need to: i) express the assets accounts in monetary values, and ii) deriving the carbon footprints for Colombia. In addition and based on the available statistical infrastructure within the national accounts section, DANE has indicated its strong interest in expressing the energy flow accounts in monetary terms and enhancing the coverage of the flow emission accounts to include emissions coming from agriculture, land use, industrial processes, and waste. It is worth noting that DANE plans to start a feasibility assessment to develop the ecosystem accounts in the near future.

Mineral and Energy Asset Accounts

48. There was a broad agreement on the importance of Mineral and Energy Asset Accounts. The anticipated energy transition is expected to have significant repercussions for the use of natural resources and therefore, their changes in value over time which will impact public and private income which rely heavily on natural resources. While DANE already compiles these accounts in physical terms, the team indicated that developing these accounts in value terms is one of their priorities. Moreover, the longer-term plan includes developing ecosystem accounting.

49. A potential outcome of energy transition is a redistribution of natural resource wealth which may have implications for the revenue generating capacity of government. Mineral and Energy Asset Accounts present physical and monetary values of natural resource wealth and changes therein (extraction, holding gains and losses, depletion of natural resources). The methodology to account for these resources is well developed in both the *System of Environmental-Economic Accounting* and the *System of National Accounts 2008.* Mineral accounts can be developed using national accounts and data on stock, reserves.

Carbon Footprints

50. The compilation of Air Emissions Accounts and updated IOTs will facilitate the compilation of carbon footprints - a broad measure of emissions that includes direct and indirect

emissions by resident establishments as a result of economic (production, consumption, and accumulation) processes. Carbon footprints are broken down by output industry and contributing industries as well as by demand category –particularly final consumption, investment, and exports. The data are generally presented as annual estimates.

51. Carbon footprints have various policy uses including identification of high versus low emitting industries and the identification of the consumption of products that result in high levels of emissions. The main source data required to produce carbon footprints include:

- Input-output tables,
- Direct measures of emissions, and/or
- Air Emissions Accounts.

Other Priorities

Environmental Government Revenues by Type

52. There is potential for compiling environmental government revenues by type. Governments obtain revenues through the management and protection of natural resources and levying of environmental taxes. These revenues are likely to be impacted when economies transition away from fossil fuel-based energy supplies. On the other hand, substantial reserves of Lithium will positively impact GDP and therefore government revenues from growing economic activities. These data will help monitoring the change in government revenue streams as governments adopt climate mitigation and adaptation policies. Environmental revenues by type are outlined in the *Government Finance Statistics Manual 2014*, *the System of National Accounts 2008* and the *System of Economic and Environmental Accounting*.

Forward Looking indicators of Physical and Transition Risk Indicators

53. Participants in the plenary sessions also prioritized an assessment of the potential to develop forward looking physical and transition Risk indicators which quantify the potential impact that climate hazards can have on physical structures and populations as well as the impact climate mitigation strategies can have on business income and financial markets. While the methodological guidance on physical and transition risk indicators is still being developed significant progress has been made over the last number of years (e.g., models developed by the Network for the Greening of Financial System (NGFS)), to standardize the models and pathways that support the compilation of these indicators.

54. Indicators will focus on the potential for developing estimates of the loss (measured in terms of income, asset values, and populations) arising from climate hazards like rising storms, drought conditions or flooding caused by rising sea levels and those arising from climate mitigation policies such as carbon pricing. Work in this area could be envisaged as a data stewardship component using statistics readily available from international databases. Some examples are provided in the annex. The compilation of carbon footprint would also support the preparation of a carbon pricing model to assess the impact of a carbon tax on inflation for example.

Air Emissions Accounts

55. There was also agreement on the need to develop a more comprehensive set of air emissions accounts as a priority. Currently accounts are available in physical terms and including

a subset of pollutants. DANE intends to further develop air emissions, expanding the current pollutants, the industry detail, and to reduce the lag in the compilation.

56. Air emissions accounts have various policy uses, the most important being their use in tracking progress to low carbon economy. Other government institutions also share this principle; however, it is crucial to coordinate and data production, dissemination calendars, and working processes so that all the institutions involved in the development of these statistics can work in tandem.

Environmental Activity Accounts

57. Environmental activity accounts include expenditures whose primary purpose is to reduce or eliminate pressures on the environment or to make more efficient use of natural resources. The environmental goods and services accounts can inform on the contribution of environmental activities on the economy by identifying these activities related to the environment. Estimates of environmental activity expenditures (both public and private) can be used to understand the level of resources required to develop policies to mitigate the economic risk associated with climate change. Environmental expenditures can be broken down into two main categories: Environmental Protection Activities and Resource Management Activities. Most of these environmental transactions needs to be disaggregated from the total expenditures recorded within the core national accounts framework.

58. Technical assistance in this area would focus on working with countries to incorporate additional breakdowns into their existing national accounts statistics and re-aggregating the estimates of output, intermediate consumption and value added to produce accounts like environmental protection expenditure accounts, resource management expenditure accounts and environmental goods and services accounts.

F. COORDINATION

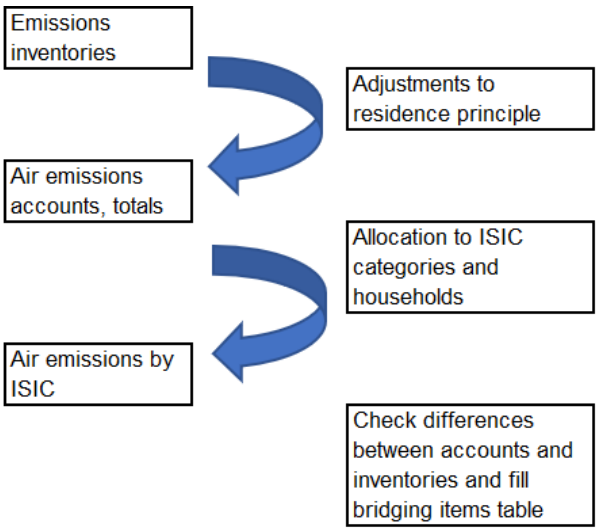
59. DANE should play a coordination role and promote the collaboration between agencies participating in this project. A technical coordinating group will include key stakeholders and be chaired by DANE. Meetings will be held as needed.

Appendix. Methodological Overview of Deliverables

Basic training was provided by the mission on the following deliverables.

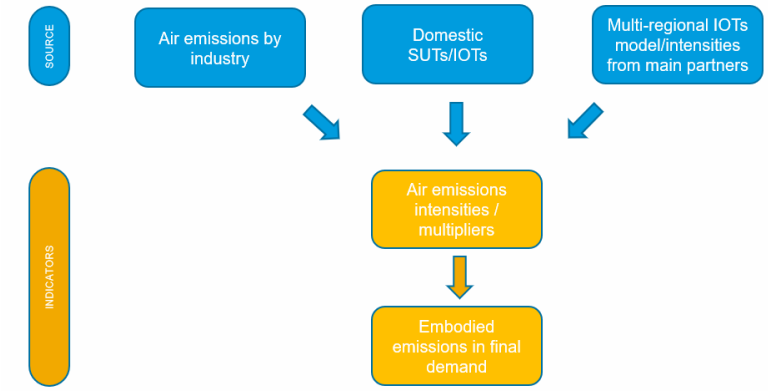
1. Air Emissions

Air emissions are derived from emission inventories and economic aggregates obtained from the SUTs.



2. Carbon footprints

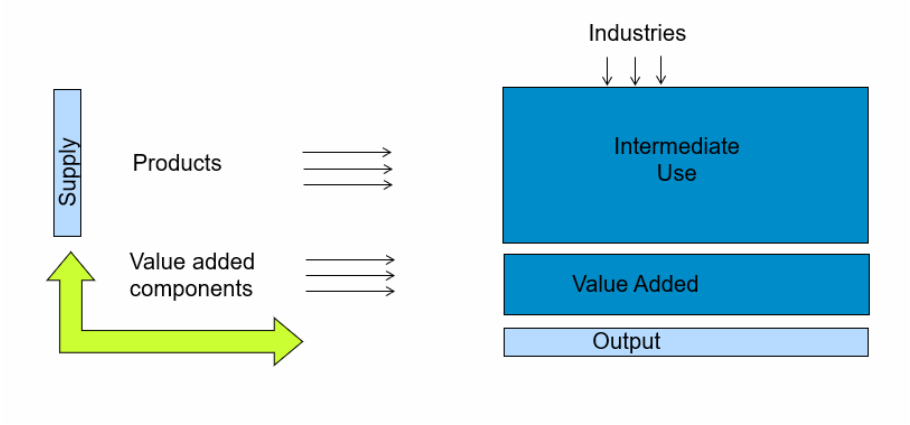
They are derived by combining emissions by industry with economic multipliers and final demand estimates from the IOTs



Specific emissions intensities should be used for imports depending on the country of origin. This require complex multi-regional input-output models which are available from international organizations. If multi-regional input-output models are not used all imports would have to be considered with the same emissions intensities which is incorrect. However, a simple approach based on similar intensities regardless of the country of origin might be acceptable as a first estimate.

3. Environmental Economic Accounts

Relevant estimates of activities contributing to environmental protection activities and resource management activities can be extracted from SUTs which provide production, value added and income components by industry. These activities should be estimated from SUTs, possibly using ratios because of the level of aggregation (SUTs have 98 industries).



4. Mineral and Energy Assets Accounts

Indicators for measuring macroeconomic impact of natural resources on production, income, labor, terms of trade, etc. can be derived from the SUTs.

5. Environment Government Revenues by Type

The following categories are presented:

a. taxes on energy (including fuel for transport)

b. taxes on transport (excluding fuel for transport)

c. taxes on pollution

d. taxes on resources.