STATISTICS

# IMF efforts to measuring climate-relevant expenditures

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*The views expressed in this presentation are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF Management.*

G20
# DATA GAPS INITIATIVE 3


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Rec #7:
Climate Change Mitigation and Adaptation
Current and Capital Expenditures

# The context

- World needs to **invest between $3 and $6 trillion annually over the next three decades** to mitigate climate change and adapt to its changes.

- Estimates of expenditure are the foundation for long-term planning and budgeting, helping governments **anticipate future funding needs** and adapt financial strategies to evolving climate challenges.

# DGI-3 Recommendation 7

- ***Target***
  - G20 and participating countries to develop and disseminate climate change **mitigation and adaptation** current and capital expenditures
- ***Second-best Target***
  - G20 and participating countries to develop and disseminate climate change **mitigation (or adaptation)** current and capital expenditures

Related

# DGI-3 Recommendation 6

***Target***

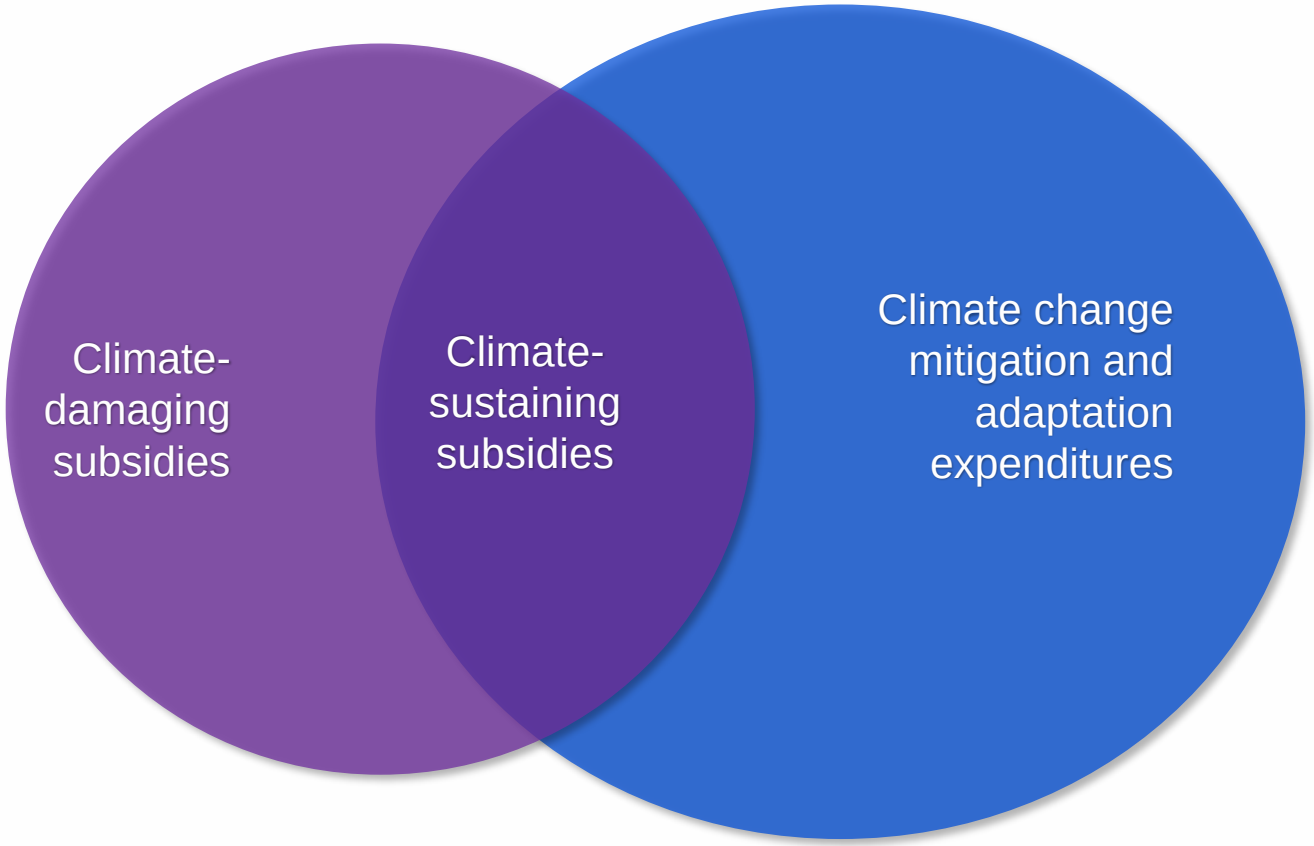
- Develop and disseminate annual estimates of **general government and central government** climate-impacting subsidies **for 2015 onwards** in percent of GDP and in percent of government expenditure within **12 months** of the reference period.

***Second-best Target***

- Develop and disseminate annual estimates of **central government** climate-impacting subsidies for 2020 onwards in percent of GDP and in percent of government expenditure **within 18 months** of the reference period.

# Similarities and differences - Recommendations 6 & 7

- Rec 7 has a broader focus on expenditures across the whole economy, Rec 6 focuses on government
- Climate-damaging subsidies not part of Rec 7
- Potential differences in classifications used to disaggregate data



# Proposal for DGI 3 Recommendation 7

# Proposed definition

"Working" definition for climate change mitigation expenditure:

- ***Climate change mitigation expenditures are expenditures for preventing, removing or reducing the emission of greenhouse gases (GHG) into the atmosphere and enhancing sinks of greenhouse gases.***

"Working" definition for climate change adaptation expenditure:

- ***Climate change adaptation expenditures are expenditures on adapting and building resilience of human and ecological systems to the changing climate conditions and minimizing the negative climate change impacts.***

*The working definitions proposed by the IMF focus on the technical nature of the expenditures and intend to cover primary and secondary purpose.*

# Proposal for Recommendation 7

**A given country's national accounts record all climate mitigation and adaptation transactions occurring during an accounting period and the resulting stock of assets.**

- Since most G20 countries have readily available Supply Use Tables (SUTs) adopting a 'satellite' approach (thematic account) using the supply use framework can help countries meet the target by the deadline.
- Start with CEP, mapped to product codes.
- Adopt the broad set mentioned in the CEP

# Categories proposed

## CLIMATE CHANGE MITIGATION

- Renewable energy (and low-carbon energy?)
- Energy efficiency
- Non-GHG emitting transport
- Carbon capture, storage and destruction
- GHG removals by sinks

(AND – not mentioned in the CEP)

- Sustainable agriculture

## CLIMATE CHANGE ADAPTATION

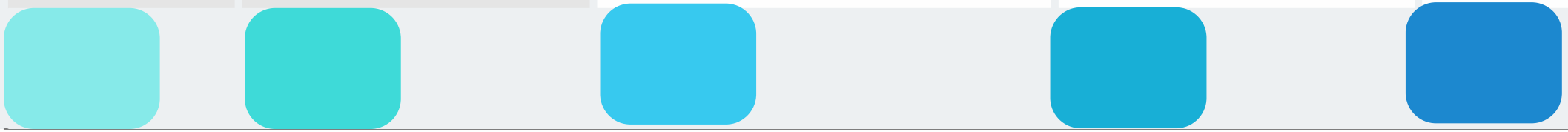
- Specifically designed products moderating harm from different types of natural hazards
- Construction, installation, repair and other related products
- Architectural, engineering and other professional products

# Format for the output for DGI Rec-7

| | Aggregates to be reported for these classes | | | | |
|---|---|---|---|---|---|
| Classes for mitigation/ adaptation/ both | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

# Timelines

| 2022 | 2023 | 2024 | 2025-26 | 2027 |
|---|---|---|---|---|
| Workplan prepared for DGI-3 | May: First Workshop for DGI3 Recs 6 and 7<br><br>June – Dec 2023: Developed concept notes | Feb 2024: Second Workshop for DGI Recs 6 and 7<br><br>April 2024: TWG constituted<br><br>Oct-Dec 2024: Agree on concept notes, approach and methodology | Economies pilot draft estimation framework | Finalize framework & economies work to close data gap |



# Estimation for G7 economies

**Climate Change Mitigation and Adaptation Expenditure Tables**

Authors: P. Bhanumati, Jennifer Ribarsky, Erich H. Strassner, and Jim Tebrake

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# Highlights of the paper

- **Purpose:** To illustrate how, once definitions have been agreed upon, the national accounts framework can be used to develop fit-for-policy use indicators of climate change mitigation and adaptation expenditures.
- **Flexible framework** that can be adapted to whatever list of products/activities countries choose to include.
- **Aggregates prepared** for the Climate Change mitigation and adaptation expenditure tables (CCMAT) are:

1. **Output** of Climate change mitigation and adaptation products
2. **Final Consumption Expenditure** of Climate change mitigation and adaptation products
3. **Gross Fixed Capital Formation** of Climate change mitigation and adaptation products

# Climate Change Mitigation Products

| Term | Examples |
|---|---|
| **Non-GHG Emitting Energy Products** | Solar panels, wind turbines, hydroelectric power plants, nuclear reactors. |
| **Energy Efficiency Products** | LED light bulbs, high-efficiency heating and cooling systems, energy-saving appliances. |
| **Non-GHG Emitting Transportation Products** | Electric vehicles (EVs), electric bicycles, hydrogen fuel cell buses. |
| **Carbon Capture and Storage Products** | Carbon capture facilities, carbon sequestration technologies, industrial carbon utilization equipment. |
| **Afforestation and Reforestation Products** | Tree saplings for planting, drone seed dispersal systems, forest management and monitoring software. |
| **Non-GHG Emitting Agriculture Products** | Organic fertilizers, no-till farming equipment, biochar, methane digesters for livestock waste. |
| **Non-GHG Emitting Public Transportation Products** | Electric buses and trains, solar-powered tram systems, cable-propelled transit systems. |

# Climate Adaptation Products

| Term | Examples |
|---|---|
| **Flood Protection and Adaptation Products** | Flood barriers, elevated structures, wetlands restoration, flood warning systems. |
| **Drought Protection and Adaptation Products** | Drought-resistant crops, rainwater harvesting systems, water recycling and reuse technologies. |
| **Wildfires Protection and Adaptation Products** | Fire-resistant building materials, controlled burn equipment, wildfire detection and monitoring systems. |
| **Sea Level Rise Protection and Adaptation Products** | Sea walls, mangrove restoration, raised walkways and buildings. |
| **Extreme Temperatures Protection and Adaptation Products** | Heating and Cooling systems, Reflective roofing materials, green roofs, efficient HVAC systems. |
| **Landslides Protection and Adaptation Products** | Retaining walls, drainage systems, landslide sensors and monitoring equipment. |

# Climate Adaptation Products

| Term | Examples |
|---|---|
| **Melting Glaciers and Ice Caps Protection and Adaptation Products** | Glacier monitoring systems, protective barriers for glacier-fed lakes, and adaptive water management systems for river flows. |
| **Ecosystem Shifts Protection and Adaptation Products** | Restoration of native vegetation, wildlife corridors, invasive species management tools. |
| **Ocean Acidification Protection and Adaptation Products** | Water quality monitoring equipment, alkalinity enhancement techniques, shellfish farming adaptation methods. |
| **Disease Outbreak Products** | Vector control products (e.g., mosquito nets), disease monitoring systems, vaccines and healthcare facilities enhancement. |

# Preparing the dataset

- ✓ The first step is to identify products with no obvious link to climate mitigation or adaptation based on the lists prepared above – this was achieved by using Natural Language Processing (NLP) to match climate-related descriptions with those from the detailed CPA for FIGARO products. The following product codes were selected for further processing.

| Code | Label |
|---|---|
| A01 | Products of agriculture, hunting and related services |
| A02 | Products of forestry, logging and related services |
| C26 | Computer, electronic and optical products |
| C27 | Electrical equipment |
| C28 | Machinery and equipment n.e.c. |
| C29 | Motor vehicles, trailers and semi-trailers |
| C30 | Other transport equipment |
| D35 | Electricity, gas, steam and air conditioning |
| F | Constructions and construction works |
| H49 | Land transport services and transport services via pipelines |
| M72 | Scientific research and development services |
| Q86 | Human health services |

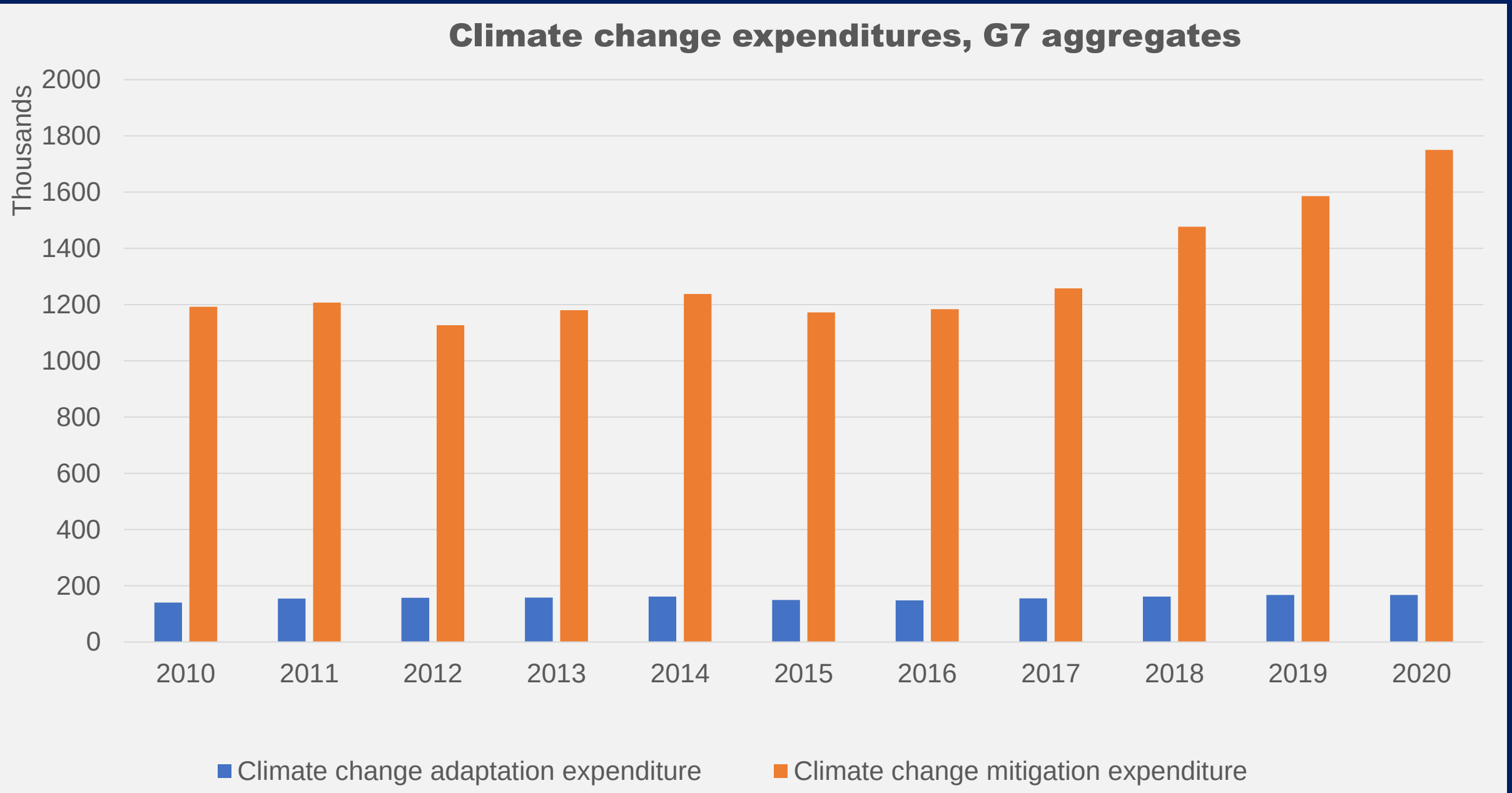
# Data sources for allocation factors

- ✓ For the selected product codes, the following data sources were used to develop (allocators or attribution factors):
  - Estimates of capital stock
  - Data on capacity, generation and investment in the renewable energy sector from IRENA
  - IEA datasets on electric vehicles; carbon capture, utilization, and storage; energy-end uses and efficiency indicators.
  - Trade in Low carbon technology
  - Public transit ratios from International Association of Public Transport
  - General Government Environmental Protection Expenditures
  - Expenditures on human health services
  - Reports on climate-resilient construction by the Global Alliance for Buildings and Construction
  - Other country-specific information.

LINKS GIVEN IN PAPER

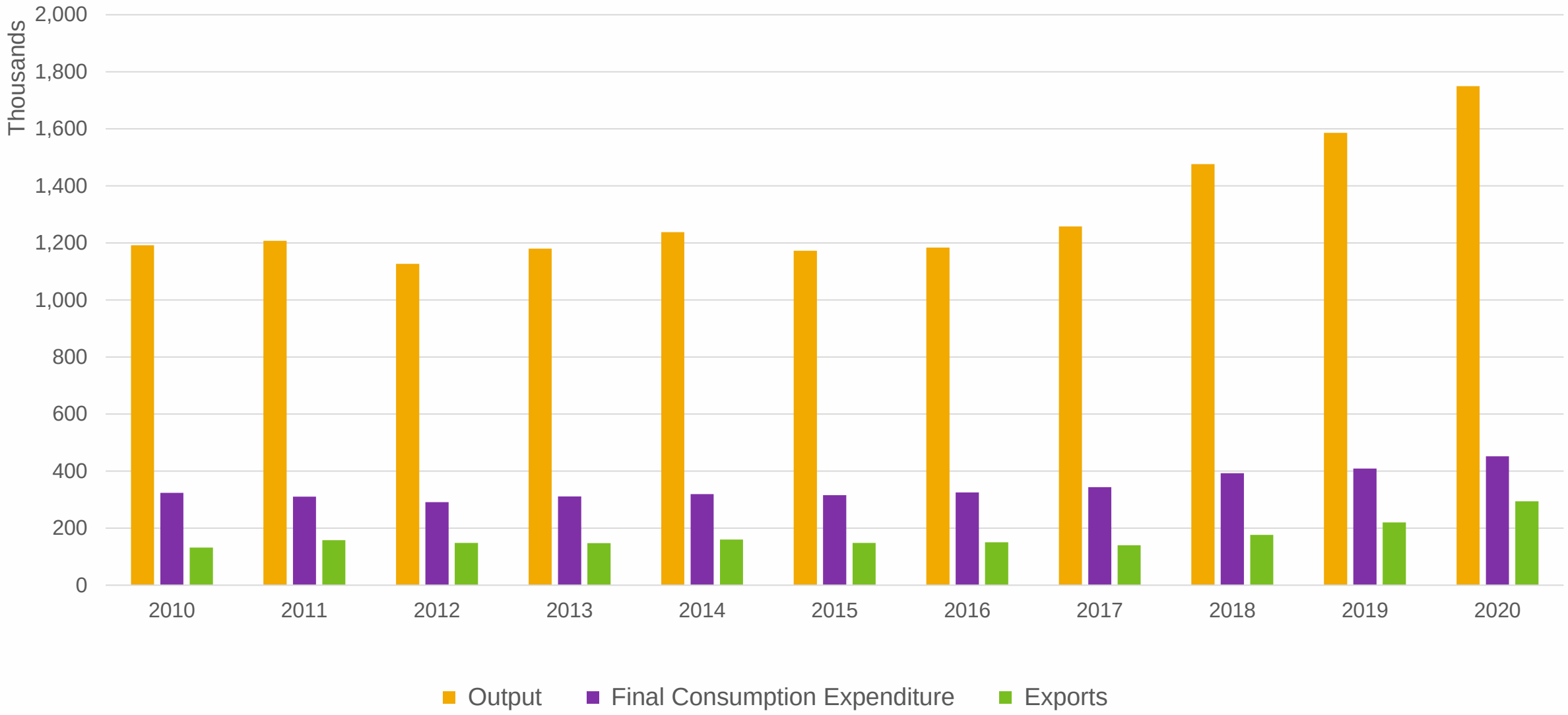
# Outputs

- ✓ The attribution factors were applied to the national supply and use tables from the EU FIGARO
- ✓ FIGARO captures the supply and use relationships for the 27 EU countries and 18 main EU trading partners (Argentina, Australia, Brazil, Canada, China, India, Indonesia, Japan, Mexico, Norway, Russia, Saudi Arabia, South Africa, South Korea, Switzerland, Türkiye, the United Kingdom and the United States), and a 'Rest of the World' region.
- ✓ Estimates of output, gross fixed capital formation and final consumption expenditure related to climate change mitigation and adaptation products were derived for the G7.



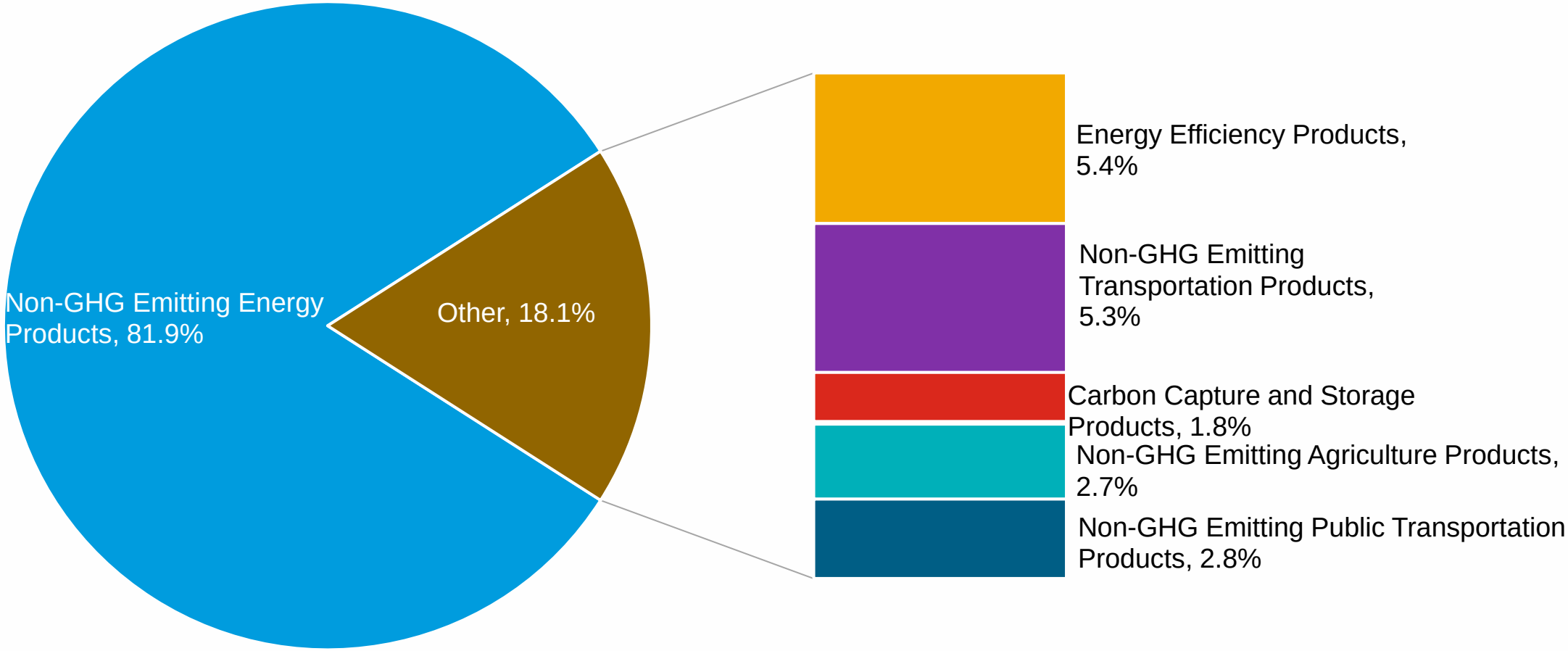

*SOURCE: AUTHORS' ESTIMATES*

## Components of climate-relevant expenditure, G7 aggregates




*SOURCE: AUTHORS' ESTIMATES*

# Classification of mitigation expenditures – G7 country, 2018




*SOURCE: AUTHORS' ESTIMATES*

# Conclusion from the paper

- By **leveraging existing national account data** and developing product-level attribution factors, it is possible to develop **fit-for-policy-use** climate change mitigation and climate adaptation expenditures.
- Using the national accounts as the basis helps bring **international comparability** and **coherence with aggregate economic activity**.
- The choice to present detailed classes allows users to both **assess the quality** of the estimates and **develop custom aggregations** that meet their specific analytical purposes.
- Once a first set of estimates are generated, compilers can subsequently work with data sources or even **establish surveys to get better estimates** of the attribution factors.