

Accounting beyond boundaries: Exploring consumption-based carbon approaches in Paris and Gothenburg

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Abstract

This article examines how Paris and Gothenburg have integrated Consumption-Based Carbon Accounting (CBCA) into local climate governance. As cities increasingly confront emissions beyond their borders, CBCA offers a framework to address the carbon impacts of urban consumption. Through a comparative qualitative case study, the research identifies 16 enabling conditions for CBCA implementation, organized into four themes: (1) data transparency and accessibility, (2) institutional and technical capacity, (3) political legitimacy and stakeholder engagement, and (4) multi-level and cross-sectoral support. The findings reveal how different governance models - Paris's institutionalized approach and Gothenburg's pioneering model - can both foster CBCA adoption. This study contributes to understanding the political, institutional, and participatory dynamics that enable cities to engage meaningfully with consumption-based emissions.

Keywords: Consumption-based carbon accounting; Carbon neutrality; Climate governance

1. Introduction

As cities around the world increasingly commit to achieving carbon neutrality, they rely on greenhouse gas (GHG) inventories to assess their emissions and guide climate action. These inventories are typically structured around internationally recognized frameworks, such as the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC), that primarily rely on a production-based carbon accounting (PBCA) methodology (Harris et al., 2020). However, a growing body of academic literature and policy discourse has highlighted the limitations of PBCA, arguing that it captures only a partial representation of urban emissions (Balouktsi, 2020; Millward-Hopkins et al., 2017; Pellán et al., 2024). In particular, PBCA overlooks the substantial carbon footprint embedded in goods and services consumed by urban populations but produced outside city boundaries. On the contrary, consumption-based carbon accounting (CBCA) estimates the life-cycle emissions of goods and services consumed within a city's boundaries, regardless of where those emissions occur geographically offering a more comprehensive and equitable framework for addressing urban GHG emissions, incentivizing the adoption of policies that promote less carbon-intensive consumption (Grasso, 2016; Lombardi et al., 2017). The claim for the switch towards a more CBCA-focus framework is especially relevant in high-income cities in Europe and North America, where local production-based emissions have declined due to deindustrialization, while consumption-based emissions continue (Millward-Hopkins et al., 2017).

Despite its appeal, the implementation of CBCA remains limited and uneven. Most existing research focuses on methodological and technical challenges (i.e., data availability, input-output modeling), while the political and governance dimensions are mostly studied at the national level. Therefore, the governance dimensions of CBCA at the city level remain largely underexplored, particularly with regard to the political, institutional, and organizational conditions that enable its operationalization within local governments.

This article seeks to address this gap by asking the following research question: What are the governance conditions that enable cities to implement consumption-based carbon accounting and associated policies to reduce emissions?

To answer this question, the article conducts a comparative case study of two European frontrunner cities - Paris and Gothenburg - which have formally adopted CBCA approaches and integrated consumption-based targets into their climate strategies. By analyzing these two cases, the study identifies key enabling governance conditions, ranging from data systems and institutional capacity to political leadership and stakeholder engagement.

The article is structured as follows. Section 2 reviews the terminology and key concepts. Section 3 outlines the methodological approach, including the case selection and analytical framework. Section 4 presents the empirical findings, identifying five thematic clusters of governance enablers. Finally, Section 5 discusses the broader implications of the findings for climate governance and outlines directions for future research.

2. Definition and key concepts

It is essential to define the key terms used throughout this study, as terminology in the field of urban carbon accounting is often used interchangeably or inconsistently.

Most GHG reporting frameworks currently focus on territorial or production-based emissions (Harris et al., 2020). PCBA is a method for quantifying GHG emissions that attributes all emissions to the country, region, or organization where the emissions physically occur during the production of goods and services (Franzen & Mader, 2018). At city level, these emissions largely correspond to Scope 1 of the GPC – meaning emissions from industrial activity, transportation, energy use in buildings, and waste management (Balouktsi, 2020; Fan & Guan, 2025). However, PBCA overlooks the embodied emissions in imported goods and services, which can be considerable, particularly in high-consumption urban contexts with limited local production.

In contrast, CBCA allocates emissions to the final consumers of goods and services, regardless of where in the world those emissions occur along the supply chain. This approach accounts for all emissions generated throughout the supply chain, including production, transportation, and distribution (Volden, 2018). It closely aligns with what is considered Scope 2 and Scope 3 emissions under the GPC framework.

The GPC categorizes emissions as follows:

- Scope 1: Direct emissions from sources located within the city boundary (e.g., local transport, buildings, industry).
- Scope 2: Indirect emissions from the consumption of grid-supplied electricity, heat, steam, and cooling within the city.
- Scope 3: Other indirect emissions that occur outside the city boundary as a result of activities within the city

While Scope 3 provides the most comprehensive perspective on urban emissions, it remains largely optional and is often excluded from official city-level inventories or only partially addressed. As a result, most cities continue to focus on reducing production-based emissions, leaving a significant portion of their carbon footprint unaccounted for (Millward-Hopkins et al., 2017). This gap has crucial implications for the effectiveness of urban climate strategies, particularly in “consumer cities” such as those in Europe, where a significant share of emissions stems from imported goods and service (Harris et al., 2020). Furthermore, it is argued that integrating consumption-based accounting, and particularly Scope 3 emissions, into local governance is critical for developing more effective and equitable climate mitigation strategies. A full accounting of urban emissions - beyond territorial boundaries - enables better-targeted policies that reflect the real carbon emissions drivers in service-oriented urban economies.

To explore this shift, the article focuses on the governance conditions necessary to support the integration of CBCA into city-level climate policy. Governance here is understood in a broad sense, encompassing formal and informal norms, procedures, institutions, and instruments that structure decision-making and implementation processes (Grasso, 2016). As Grasso underlined in his study on the political feasibility of CBCA, governance mechanisms for consumption-based accounting may not yet be fully established or even conceptualized. In this study, governance will be analyzed as a multidimensional framework - including policies, institutional structures, political will, and administrative practices - that can either enable or hinder the implementation of CBCA.

3. Study framework

This study draws upon data originally collected in a broader comparative research project that analyzed the barriers to implementing consumption-based carbon accounting (CBCA) in 17 European cities. These cities were purposefully selected to ensure diversity in terms of geographical location, size, and climate policy maturity. Within this wider research effort, certain cities stood out as exemplary cases in integrating CBCA into their local climate governance frameworks. Among them, Paris and Gothenburg were identified as particularly progressive to advance CBCA and have been chosen for a more in-depth comparative study case study on the governance conditions. Drawing from the main study, the authors formulated a set of hypotheses regarding the political, institutional, and technical enablers necessary for successful CBCA integration. These hypotheses guided the subsequent research design and data analysis strategy.

3.1 Main hypotheses

Two principal hypotheses shaped the analytical framework of this study. The primary hypothesis argues that the successful implementation of CBCA at the city level is contingent upon a combination of enabling governance conditions. These include high institutional capacity, strong data transparency, stakeholder legitimacy, and effective multi-level coordination. The second hypothesis states that the successful implementation of CBCA at the city level is contingent upon a combination of enabling governance conditions. These include high institutional capacity, strong data transparency, stakeholder legitimacy, and effective multi-level coordination.

Each of these hypotheses is underpinned by theoretical and empirical insights from climate governance literature and were broken down into more specific analytical categories, as described below.

High institutional capacity

It is anticipated that cities advancing CBCA possess robust institutional capacity. This includes not only administrative competence and specialized staff, but also financial resources sufficient to develop and sustain complex policy instruments such as CBCA.

Data availability and transparency

An expected key enabling factor is the presence of mechanisms to gather, estimate, and communicate consumption-based emissions data. This may involve standardized methodologies, collaboration with national statistical agencies or academic institutions, and innovative approaches to address data gaps. Moreover, transparency in how data are collected and what they represent is considered essential for credibility and stakeholder engagement.

Political legitimacy

Successful implementation is also linked to the legitimacy of CBCA within the local governance ecosystem. Two factors are anticipated to support legitimacy, measurable targets and the active engagement of both internal and external stakeholders in shaping and delivering on the policy objectives.

Multi-level coordination and stakeholder engagement

Effective coordination across governance levels; horizontal (within municipal departments), vertical (with regional or national authorities), and cross-sectoral (with businesses and civil society), is assumed to be a central enabler. The engagement of diverse stakeholders is also crucial to reinforcing legitimacy and ensuring long-term policy durability.

3.2 Research design

From the broader dataset of 17 European city case studies, Paris and Gothenburg were selected for deeper qualitative analysis. The selection was guided by their advanced engagement with CBCA defined here as going beyond compliance with national or EU mandates. Another selection criterion was for the city to have a consumption-based emissions reduction goal that does not only encompass organizational emissions (i.e., from the municipality) but also include city-wide emissions in their climate targets.

Semi-structured interviews were conducted with key stakeholders involved in the climate governance of each city. Interviewees were initially identified through the NetZeroCities (NZC) platform and selected based on their role and knowledge of CBCA implementation. Complementary to the interviews, documentary analysis was conducted on municipal climate action plans, technical reports, and official data-sharing agreements. During the initial research, a codebook was developed. As this research was exploratory, an inductive coding approach was preferred to discover unexpected themes and patterns and limit researcher bias. These codes were then refined through an iterative validation process involving a second researcher, ensuring inter-coder reliability and interpretative coherence.

From the results of the coding of the main research data, an initial focus was placed on the codes that reflected governance enablers. This preliminary review made it possible to identify recurring patterns and key governance conditions necessary for the implementation of consumption-based carbon accounting (CBCA). These conditions form the analytical framework presented in the results section. Subsequently, a comparative analysis was conducted by reviewing all codes linked specifically to the interviews from Paris and Gothenburg. This step aims

to identify the concrete governance mechanisms present in these two cities, which are considered frontrunners in CBCA. Additional patterns that complemented the initial findings were identified through this city-specific review. Finally, a close re-examination of the interview transcripts for both cities was carried out to validate and deepen the analysis of the governance conditions that have facilitated progress on CBCA at the local level.

Table 1: Summary of Interviews Conducted in Paris and Gothenburg

City	Date	Duration
Paris	19-07-2024	45:58
Gothenburg	07-08-2024	53:28

The transcription of the interviews conducted in Paris and Gothenburg serve as the primary empirical basis for this study and directly inform the analysis of governance conditions for implementing consumption-based carbon accounting (CBCA). In addition to the interviews, several key documents provided by the municipalities were analyzed, including, the Paris Climate City Contract (CCC), the Paris Climate Action Plan, the Gothenburg CCC. Further desk research was also conducted to clarify specific aspects of local governance and policy context not directly covered in the interviews or official documents.

It is worth noting that, throughout the research process, the terms *consumption-based carbon accounting (CBCA)* and *Scope 3 emissions* were frequently used interchangeably by stakeholders. While technically distinct, in this context they were often treated as synonymous in practice and discourse.

3.3 Paris and Gothenburg case studies

Paris and Gothenburg were selected as case studies due to their advanced commitments to climate action, particularly regarding the integration of consumption-based carbon accounting (CBCA) into their urban climate strategies.

Table 2: Key Climate Commitments of Paris and Gothenburg

City	Covenant of Mayors adhesion	Date of CCC publication	Consumption based objectives
Paris	2008	2024	Achieve carbon neutrality, including consumption-based emissions, by 2050
Gothenburg	2009	2024	Reduce per capita consumption-based emissions to 1.9 tCO ₂ e by 2050

Paris emerged early in the research as a leading example, having set an ambitious carbon neutrality target that explicitly includes Scope 3 emissions. Its 2018 Climate Action Plan and subsequent strategies reflect a comprehensive approach, integrating both territorial and consumption-based emissions into its monitoring and objectives. As stated in the Plan:

“Through the Climate Plan, the City of Paris has set an ambitious objective to reduce its carbon footprint by 80%. In this way, it is going beyond the legal requirements by integrating indirect emissions that come mainly from aviation, the production of goods, and the food consumed in Paris. To attain this target, the City of Paris plans to encourage the aviation and food industries in particular to make their practices more sustainable” (p.92)

Gothenburg also represents a strong case, albeit with a slightly less integrated approach than Paris. Nevertheless, it has set clear and measurable targets for reducing consumption-based emissions. The city aims to lower per capita consumption-based emissions to 3.3 tonnes by 2030, 3.5 tonnes by 2035, and 1.9 tonnes by 2050. These goals encompass all goods and services consumed by residents, regardless of where the emissions occur, and imply an annual reduction of approximately 7.6%.

4. Results

4.1 Initial Coding Results

The initial coding process based on the original codebook revealed several recurring governance conditions that enable the implementation of Consumption-Based Carbon Accounting (CBCA). This led to the identification of 16 enabling conditions, organized across four overarching themes: (1) Data transparency and accessibility, (2) Institutional and technical capacity, (3) Political legitimacy and stakeholder engagement, and (4) multi-level and cross-sectoral support. These enabling conditions are presented in the framework below:

Table 3: Enabling Governance Conditions for CBCA Implementation

Themes	Enabling Conditions	Explanation
Data transparency and accessibility	Standardized process	The city has established procedures for collecting and/or analyzing consumption-based emissions data
	Innovation	The city uses alternative data collection approaches where direct data is missing
	Data agreements	The municipality has institutional arrangements with external actors (e.g., private companies, agencies) for data sharing
	Open access	When working with an external stakeholder to collect the data, the city has access to the datasets and methodologies used
Institutional and technical capacity	Dedicated expertise	The municipality has in-house staff or department with expertise in CBCA
	Human and financial resources	The department in charge of the carbon accounting has sufficient technical, administrative, and financial resources
	Strategic cross-departmental collaboration	All relevant departments are being included in CBCA implementation
Political legitimacy and stakeholders' engagement	Strong political mandate	The political commitment goes beyond minimal compliance, supporting ambitious CBCA targets
	Clear communication	There are active efforts to explain CBCA logic and relevance to stakeholders
	Historic commitment	The city has a long-standing engagement in climate action
	City wide and multi-sectoral targets	The consumption-based emissions targets address a broad range of emission sources within the scope of the entire city
	Stakeholders' inclusion	The municipal strategy plans for the engagement of external actors (e.g., citizens, business)
	Clear framing of the objective	A numerical objective with a timeframe is set out from the reduction of consumption-based emissions. This objective is written in the Climate Plan.
Multi-level and cross-sectoral support	National level support	The national ecosystem is favourable of the implementation of CBCA
	Horizontal coordination	Formal agreements are being signed with other public or private organisations allows to enlarge the scope of committed actors

The following sections detail how each theme is manifested in the case studies of Paris and Gothenburg, with insights triangulated through case analysis and complementary data sources.

4.2 Data transparency and accessibility

Four factors have been identified as enabling conditions for CBCA implementation: (1) Standardized data collection and analysis, (2) Use of innovative methods to fill data gaps, (3) Existence of formal data-sharing agreements, (4) Open access and transparency in data communication.

Standardized data collection and analysis processes

A standardized data collection and analysis process appeared essential to strengthen the legitimacy of the accounting process. On the one hand, Paris utilizes the nationally standardized *Bilan Carbone* methodology developed by ADEME¹, ensuring consistency across French cities and reinforcing data legitimacy. The city also relies on INSEE² for robust demographic and economic statistics critical to emissions estimation, especially for sectors like food. Paris estimates average daily meal consumption based on residential and commuting populations to approximate food-related emissions. As expressed in the interviews, the existence of national level process allows to strengthen the legitimacy: *"It's good to have in France this "Bilan Carbone" methodology, because then every city would use the same rate for emissions. So, it gives more legitimacy as well for these figures."*

Gothenburg, while lacking standardized local systems, leverages data provided by the Stockholm Environment Institute (SEI), which, for all cities in Sweden, broke down national data to postal code areas, using market segmentation and local adjustments. However, Gothenburg notes this approach is externalized and lacks sufficient clarity. They also work with a state-sponsored research institute to calculate the impact of food consumption. Therefore, Gothenburg relies on externalized processes, carried on by research institutions, and unified at a national level.

Innovative Approaches

Paris uses innovative methods for categories with data gaps. For example, freight emissions are estimated through regional surveys and applying proportional calculations to allocate emissions to the city. The city also calculates material usage based on construction waste data: *"We do the math from the waste to upstream, because we don't know the amount of materials purchased. So we estimate it from construction waste."*

Gothenburg began with a bottom-up approach in 2008, assessing household consumption categories using available data, despite its fragmented nature. As exposed in the interview: *"We used like more of a bottom up approach that we looked at on various consumption categories and which day-to-day had available and tried to see how difficult the households in Gothenburg consumed and what the emissions were from the different groups"*. Nowadays, this work still complements SEI's data.

Formal data-sharing agreements

These data sharing agreements appear to be particularly done with the air travel industry. Paris has a formal agreement with Aéroports de Paris (ADP), providing free annual data on air travel by Parisians, including departure and arrival information. On the other hand, Gothenburg previously received local air travel data from the airport, but this was discontinued due to political sensitivities, highlighting the fragility of this type of voluntary agreement.

Open access and transparency

In the case of Paris, getting the data from national institutions guarantees the transparency of the processes and access to the data sets. However, Gothenburg, while benefiting from SEI's mapping tools, notes that the opacity of the underlying model makes it hard to explain variations between areas, illustrating a trade-off between using relying on an external stakeholder and transparency; *"It's a little bit of a black box. It's a bit difficult to explain why some areas are higher in emissions and some are not"*,

¹ ADEME (Agence de l'environnement et de la maîtrise de l'énergie) : French Environment and Energy Management Agency
² INSEE: French National Institute of Statistics and Economic Studies

4.3 Institutional and technical capacity

The institutional and technical capacity depends on 3 enabling factors: (1) Dedicated expertise within the municipality, (2) Human and financial resources, (3) Cross-departmental collaboration.

Dedicated expertise within the municipality

Paris also works with the Association Bilan Carbone (ABC) association, a national organization that trains professionals on carbon inventories and methodologies, ensuring the upskill process in French municipalities. Furthermore, the city also created a Department for Ecological Transition and Climate in 2022 to oversee its Climate Action Plan. This department monitors actions across administrative departments, conducts greenhouse gas emissions assessments. Gothenburg has a small, dedicated team, with one or two people focusing specifically on carbon accounting, led by a climate strategist responsible for monitoring emissions. *"We have people working with the carbon accounting, but it's not a big team. It's one or two people that are really working with this in detail."*

Cross-departmental collaboration

Both cities are involving a large number of departments into the strategy to reduce consumption-based emissions. **Paris** promotes shared responsibility by involving various departments and external partners. Carbon accounting data is shared internally to build awareness and ownership: *"We try to involve all the stakeholders of the municipality. So we have different ways to raise awareness and to discuss with them"*. **Gothenburg** collaborates with departments like transport and procurement, though it acknowledges that challenges remain: *"There is some collaboration with the transport department and with the procurement department, because their decisions have a big impact on emissions."* The CBCA strategy is embedded in the normal environmental governance in Gothenburg: *"The City's climate goals are deeply embedded in its ordinary governance structures, notably outlined in the Environmental and Climate Program, backed by a broad political consensus. Central to this program is the aim for near-zero emissions, driving action across all municipal administrations"*.

4.4 Political legitimacy and stakeholders' engagement

Seven enabling conditions emerged: (1) Strong political mandate, (2) Clear communication, (3) Historic climate commitment, (4) City-wide, cross-sectoral scope, (5) Inclusion of external stakeholders, (6) Legitimacy through leadership and continuity.

Strong political mandate

Both cities have a strong political support that goes beyond the mandatory obligations in terms of climate engagements, as highlighted in the interview: *"We have a very ambitious climate plan, and the mayor is very committed to including all emissions, not just the ones happening inside the city."* Indeed, Paris's commitment to carbon neutrality by 2050 includes scope 3 emissions. The interviewees also highlighted the role of the COP21 Conference in Paris, and the mayor's leadership as a formal president of the C40 network, as key factors explaining Paris high-level commitment.

Gothenburg has robust, cross-party political support for its 2030 goal of near-zero carbon footprint, targeting both territorial and consumption-based emissions. *"The City's climate goal for 2030, 'a carbon footprint close to zero,' has robust support from a broad political majority, and is particularly highlighted by The Environment and Climate Programme for the City of Gothenburg 2021-2030."* However, as underlined by the interviewee, it might be more complicated to get a political consensus about the methods to adopt to reach the emissions reduction objectives: *"It was quite universal support for these kind of goals, and there have been some discussions when it comes to like individual choices when it comes to like food or what politicians should not do when it comes to emissions related to citizens. But the goals in themselves and not so much discussion"*.

In both cases, the cities are pushed by what could be called a moral obligation, as expressed by Gothenburg in the following quote: *"We thought we also have an obligation to see how we affect the other parts of the world through our consumption"*.

Clear communication

Paris actively communicates the importance and methodology of CBCA to stakeholders, both inside and outside the municipality, to foster understanding and engagement:

"We explain to them that it's not just about the emissions from buildings or transport in Paris, but also about what we consume, like food, clothing, and electronics."

"We have meetings and workshops to explain the logic of including consumption-based emissions and why it's important for the city's climate goals." Gothenburg supports public participation, but less detail is available regarding structured communication campaigns.

Historic commitment:

The fact that both cities have been leading on climate action and consider as "champion" is perceived as a clear enabler, pushing cities to further extend their actions towards Scope 3 emissions. Paris has demonstrated a long-standing commitment to greenhouse gas accounting and climate action, reflected in the establishment of specialized departments and the use of standardized methodologies. The city began assessing the impact of its activities in terms of greenhouse gases as early as 2004 and published its first comprehensive greenhouse gas assessment in 2006, identifying key emitting sectors and establishing a knowledge base for further action. They were also calculating the carbon footprint of the city since 2004: *"We were already known as a leader on climate for a long time, and that's what we want to still carry on"*.

Gothenburg began measuring consumption-based emissions in 2008, integrating scope 3 in climate policy despite limited data at the time: *"We had our first time goal for the city, we chose to include the consumption emissions also, even though we had very little data or anything on it"*. Initially, the city was separating between territorial and consumption-based emissions before adopting the scope 1, 2, 3 framework as part of their involvement with the Covenant of Mayors and other reporting schemes.

City-wide and cross-sectoral focus

Both Paris and Gothenburg have adopted climate strategies that extend well beyond municipal operations, encompassing a wide range of emissions sources, including those linked to citizen behavior, urban infrastructure, and procurement practices.

In Paris, the city's climate policy is explicitly designed to address emissions across all sectors - not just those occurring within city boundaries. This includes emissions from energy, transport, food, construction, and the consumption of goods and services by Parisians. As one official explains, *"The city's climate plan covers all emissions, including those from energy, transport, food, construction, and even the consumption of goods by Parisians."* Another emphasizes the city's broader scope: *"We don't just look at what happens inside the city boundaries. We want to reduce the footprint of everything Parisians consume, even if it happens outside Paris."* The ambition is clear and comprehensive: *"Our goal is to reduce all emissions by 100%, not just the ones we control directly."*

Similarly, Gothenburg has adopted a wide-ranging climate objective that integrates both territorial and consumption-based emissions. As described by a city representative: *"The climate goal of the City of Gothenburg has a broader scope than required in the Mission. The goal targets emissions from both a territorial and a consumption-based perspective."* At the organizational level, Gothenburg closely monitors emissions associated with municipal procurement. The city has conducted a detailed analysis of all its programmatic requirements, comparing them against a national emissions database that calculates greenhouse gas intensity per monetary unit. This allows the city to assess the carbon impact of everything it purchases: *"We did this analysis on all our programme requirements, checking them against the database that has data on emissions per krona or monetary unit in Sweden."* As one official notes, this gives the municipality considerable influence: *"We have much more say in what we as a city consume and procure, and we can do much more with that."*

At the citizen level, Gothenburg also aims to capture emissions associated with individual consumption. While recognizing limitations in influencing certain areas - such as the embedded emissions in imported goods - the city still exerts significant control through local systems: *"When it comes to what our citizens consume, we still have a lot of say in how our transport system is set up and our energy system within the city, but not so much when it comes to the cost of goods and services."* To operationalize this broad approach, Gothenburg has developed a climate program structured around seven strategic focus areas - or "strategies" - that require radical transformation.

Stakeholders inclusion:

Both Paris and Gothenburg prioritize inclusive governance by actively engaging a wide range of stakeholders in their climate initiatives - from large corporations and public institutions to local associations and citizens.

In Paris, the city has developed a collaborative framework to bring together stakeholders from across sectors. One key initiative is the Pacte Action-Climat-Biodiversité (Climate Action-Biodiversity Pact), a publicly available charter that outlines stakeholder commitments and reinforces transparency. *"It's like a kind of charter that some actors and stakeholders agree to sign to say that they will work alongside the city to implement measures that have an impact on the carbon footprint of the city."* The pact not only encourages joint action but also provides open access to information about partners and their objectives. Among the participating actors are major energy providers such as **GRDF** and **EDF**. As one official described, *"We have big energy companies like GRDF, EDF... the idea is to embark all of them and to share experience and good practices between all of them."* This approach reflects a deliberate effort to keep institutionalizing cooperation and knowledge exchange across organizational boundaries.

In Gothenburg, a similarly inclusive approach is taken, particularly with local associations and community-based actors. The city provides targeted support mechanisms that encourage grassroots involvement in climate work. For instance, associations, including sports organizations, can apply for municipal grants to fund environmental initiatives. *"You can, as a sports association, ask the city for grants for doing that kind of work, and you can get access to the city's buildings"*, explained one representative. Notably, these programs have been expanded to include organizations working on issues such as circular economy, allowing for greater diversity in the types of projects supported: *"We extended those programmes to associations that want to work with circular economy issues and things like that."*

Clear objectives

The presence of clearly defined goals - particularly those that are quantitative and time-bound - plays a fundamental role in enabling consumption-based climate action (CBCA). These objectives serve not only as guiding principles but also as concrete benchmarks that drive prioritization, mobilize resources, and ensure accountability. In both Paris and Gothenburg, long-term climate ambitions are formally documented in strategic plans, providing an essential foundation for implementing CBCA measures.

In Paris, the city's objectives are explicitly articulated in the Climate Action Plan and the Climate, Air, and Energy Plan (PCAET). These plans commit Paris to reducing all local emissions - including both territorial and consumption-based - by 100% in the long term. More specifically, the city aims to cut total emissions (including consumption-based ones) by 40% by 2030 and by 80% by 2050, relative to 2004 levels: *"Paris established targets in its Climate Action Plan to decrease territorial and consumption-based emissions (the Paris carbon footprint) to 40% below 2004 levels by 2030 and 80% below 2004 levels by 2050."*³

Similarly, Gothenburg has committed to a clear and ambitious consumption-based emissions reduction pathway. Its goals are both quantified and tied to a defined timeline, providing a strong political mandate for CBCA implementation. By 2030, the goal is to reduce consumption-based greenhouse gas emissions to 3.3 tonnes CO₂e per person per year, down from a baseline of 9.25 tonnes in 2017. This requires an annual reduction rate of at least 7.6%. The final goal is to reach 1.9 tonnes CO₂e per person per year by 2050.

4.5. Multi-level and cross-sectoral coordination

The successful implementation of CBCA depends significantly on coordination across multiple levels of government and sectors. This is enabled by two key factors: a supportive national governance system and a horizontal coordination across sectors and stakeholders.

National governance ecosystem

Paris benefits from a strong national framework that provides substantial institutional support for implementing CBCA. National-level entities - including government agencies, research institutions, and statistical offices - supply cities with the methodologies, data, and standards necessary for consumption-based carbon accounting. These tools not only strengthen the technical foundation of Paris's climate policy but also lend political legitimacy and

coherence to local actions. In contrast, Gothenburg operates within a more fragmented national governance context. While it receives technical support from organizations such as the Stockholm Environment Institute (SEI) - which plays a crucial role in developing methodologies for CBCA - there is no formal governmental mandate or support at the national level for consumption-based accounting.

Horizontal coordination

Both cities also rely heavily on horizontal coordination, meaning collaboration across sectors and with various public and private stakeholders.

In Paris, this is exemplified by initiatives such as the Pacte Action-Climat-Biodiversité, an open, online charter where stakeholders voluntarily commit to actions aligned with the city's climate goals, as explained above. Similarly, in Gothenburg, CBCA is not the responsibility of a single department but is instead embedded across the city's governance structures. The Environment and Climate Program for 2021-2030 was adopted by a wide political majority and applies to all city departments and city-owned companies. This ensures that the goal of reducing consumption-based emissions is shared across the entire municipal apparatus.

5. Discussion

This study identifies two contrasting yet complementary models of consumption-based carbon accounting (CBCA) governance: Paris's institutionalized model and Gothenburg's pioneering approach. These cases illustrate that there is no singular pathway to implementing CBCA. Instead, diverse strategies - shaped by political cultures, institutional configurations, and external support systems - can all serve as viable routes to operationalizing this ambitious climate accounting framework.

5.1. Two different models: Institutionalized vs. Bottom-up CBCA Approaches

Paris advances CBCA within a highly institutionalized and nationally supported governance environment. It benefits from a structured ecosystem comprising national research institutions (e.g., INSEE, ADEME, ABC), legal mandates, and standardized methodologies, which provide a robust backbone for methodological consistency and policy legitimacy. CBCA is embedded within the city's broader climate strategy, supported by cross-sectoral coordination and formal target-setting. This reflects what Bulkeley and Kern (2006) describe as "governing through enabling," where higher-level institutions provide cities with tools and frameworks for climate action. In contrast, Gothenburg exemplifies a more bottom-up, pioneering approach. Despite the absence of strong national mandates or standardized frameworks, the city has pushed CBCA forward through close partnerships with expert institutions like the Stockholm Environment Institute (SEI), bottom-up data collection, and partnerships with local institutions. The reliance on external actors has enabled methodological innovation and credibility, though it also introduces potential vulnerabilities in terms of continuity, autonomy, and long-term data governance. Studies shows that, while introducing expertise and standardized methods, the reliance on external stakeholders also include challenges in maintaining consistent methodologies over time, risks of data discontinuity if external partnerships dissolve, and potential limitations on local autonomy and data ownership (Fünfgeld & McEvoy, 2012; Turnhout et al., 2016).

5.2 The Role of National Ecosystems

These two cases highlight the enabling role, but not deterministic function, of the national ecosystem. While Paris's success is deeply tied to a supportive national framework, Gothenburg demonstrates that local innovation can substitute for national direction. Paris thrives in an ecosystem with clear national institutions and policies that underpin CBCA, from macroeconomic data (INSEE) to methodological standards (ADEME). The relationship between national frameworks and local climate action is well documented in the literature. National institutions can provide essential data, methodological standards, and legitimacy, enabling cities to develop robust climate policies (Bulkeley & Kern, 2006; Kern & Bulkeley, 2009).

Conversely, research shows that cities can also innovate in the absence of strong national direction by leveraging local academic and technical expertise. For example, Gothenburg does not benefit from national institution data but draws on the academic expertise of the SEI. However, such innovation may be less stable or scalable without institutionalized national support (van der Heijden, 2019; Castán Broto & Bulkeley, 2013).

5.3 Political framing and target settings as a key enabler towards CBCA

A shared enabler in both contexts is the framing of CBCA through clear, time-bound targets embedded in official climate strategies. Paris aims to reduce territorial and consumption-based emissions by 80% from 2004 levels by 2050. Gothenburg targets a per capita reduction to 3.3 tonnes CO₂e by 2030. The literature demonstrates that setting ambitious and specific targets not only structures implementation but also acts as a powerful tool for political mobilization, stakeholder engagement, and accountability (Rogge & Reichardt, 2016; Hsu et al., 2020).

Closely tied to target-setting is the integration of CBCA across departments and sectors. Paris exhibits more formalized coordination through interdepartmental mechanisms and city-wide climate charters. Gothenburg relies on horizontal integration, embedding CBCA objectives across all departments and city-owned companies through its Environmental and Climate Program (2021-2030). This integration ensures that scope 3 data informs procurement, planning, and budgeting processes which are key for mainstreaming beyond symbolic commitments. The mainstreaming of CBCA objectives across municipal departments and city-owned companies, as seen in both Paris and Gothenburg, is also recognized as a best practice for effective climate governance (Bulkeley & Kern, 2006; Reckien et al., 2018).

5.4 The crucial role of stakeholder engagement

Stakeholder engagement is central to the legitimacy, operationalization, and sustainability of CBCA governance. In Paris, structured participation is institutionalized through the Pacte Action-Climat-Biodiversité, a publicly accessible charter that mobilizes actors across sectors, from energy companies to grassroots organizations. This charter formalizes commitments, ensures transparency, and reinforces co-responsibility. It embeds climate action within a network of shared governance, illustrating that a broad societal buy-in is needed in order to carry out actions to counter consumption-based emissions. Gothenburg mainly focus on society organizations, sports associations, and NGOs are encouraged to align with the city's environmental objectives through financial support and access to public infrastructure. This fosters bottom-up engagement and reflects a high-trust model of participatory governance. The city has expanded its collaborative programs to include circular economy initiatives, highlighting the dynamic evolution of stakeholder roles in CBCA. Such bottom-up approaches are shown to be effective in mobilizing local actors, fostering innovation, and ensuring that climate actions are contextually relevant and widely supported (Aylett, 2015; Arnouts et al., 2012).

5.5 Normative Framing and Cities as Global Climate Actors

The deliberate inclusion of consumption-based emissions in local climate plans reflects a normative redefinition of urban responsibility. Rather than limiting themselves to territorial emissions under their direct control, both Paris and Gothenburg embrace a broader ethical mandate that connects local governance to global sustainability. This shift positions cities not as passive implementers but as active shapers of post-territorial climate governance. This framing aligns with emerging literature on cities as global actors (van der Heijden, 2019).

Therefore, it can be argued CBCA equips cities with tools to address climate change systemically but also imposes new demands. Cities must negotiate responsibilities beyond their formal jurisdictions, build internal expertise, and ensure accountability for emissions they do not directly control. To succeed in this role, they require enhanced support - access to funding, methodological guidance, and platforms for international collaboration. The cases of Paris and Gothenburg reinforce the view that cities can lead in addressing global challenges when empowered with the right frameworks and coalitions. Their experiences suggest that CBCA is not just a technical exercise but a transformative approach to rethinking urban sustainability and governance in the age of climate crisis.

Conclusion

This article has examined the governance conditions of consumption-based carbon accounting (CBCA) through an in-depth comparison of Paris and Gothenburg, two cities that, despite distinct institutional contexts and levels of national support, each have advanced ambitious and pragmatic CBCA strategies. The findings reveal that while Paris operates within a highly institutionalized, nationally backed model and Gothenburg advances a more bottom-up, normatively driven approach, both demonstrate that local governments can lead on scope 3 emissions governance, even in the absence of a harmonized international framework.

The Paris case illustrates the strengths of a mature governance ecosystem where national institutions provide the methodological and legal infrastructure necessary to support robust CBCA integration. In contrast, Gothenburg shows that municipal innovation, when coupled with collaboration with expert institutions, can pioneer new methodologies and mainstream CBCA into city operations, even with limited national guidance. Across both cases, the success of CBCA governance is tied not only to technical capacity or institutional design, but also to the political and ethical reframing of urban climate responsibility. By choosing to include emissions beyond their direct territorial control, both cities expand the boundaries of local climate governance toward a more globally accountable model. Clear targets, cross-sectoral integration, and meaningful stakeholder engagement emerge as critical levers for embedding CBCA within policy and society. At the same time, the analysis underscores the fragility of such efforts when they rely too heavily on individual champions, external expertise, or voluntary mechanisms. To sustain and scale CBCA, cities need institutional safeguards such as binding mandates, integrated planning processes, and sustained national support.

Moreover, the broader governance landscape must evolve to recognize and support cities as global climate actors, providing the financial and technical resources needed to monitor, manage, and reduce consumption-based emissions.

Ultimately, the Paris and Gothenburg experiences show that CBCA is not only a technical tool but a political and ethical project. It calls for reimagining the role of cities in a globally interconnected carbon economy and for crafting governance arrangements that enable urban actors to lead climate action far beyond their borders. CBCA thus offers a vital lens through which to rethink both the responsibilities and the capabilities of cities in the age of planetary crisis.

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