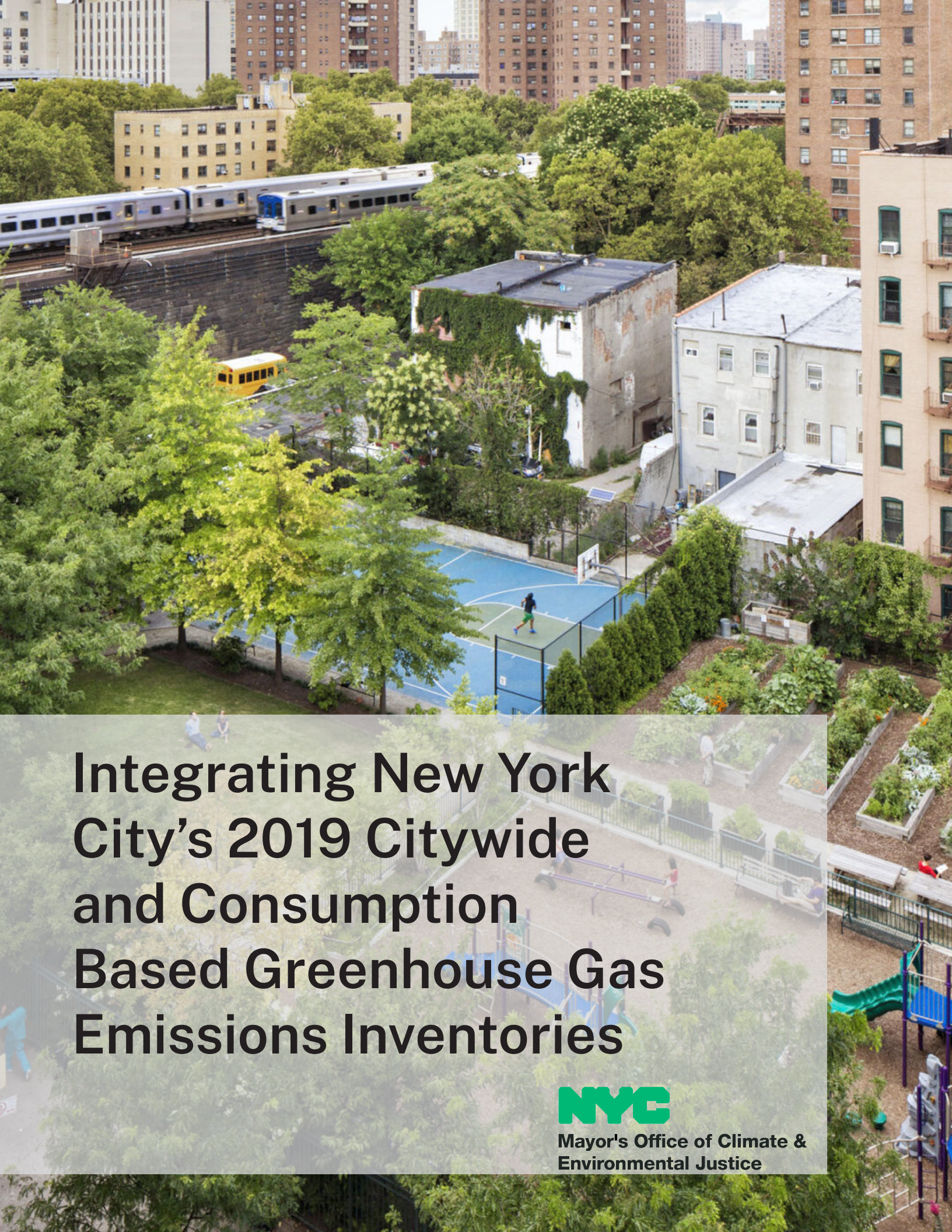

Integrating New York City's 2019 Citywide and Consumption Based Greenhouse Gas Emissions Inventories

NYC

Mayor's Office of Climate & Environmental Justice

Executive Summary

The City of New York has partnered with C40, American Express, and EcoDataLab to develop a Consumption-Based Emissions Inventory (CBEI) that estimates the greenhouse gas (GHG) emissions generated by the consumption of average New York City households. This work provides useful new insight on the climate impacts of New Yorkers' consumption of food, goods, housing, services, and transportation. In order to communicate these impacts effectively, the City has developed a method for combining the estimates from the CBEI with those of our traditional citywide GHG inventory. This document describes more about these two inventories and the method the City has developed to combine them into the Integrated Inventory.

Method

The 2019 CBEI estimates GHG emissions induced anywhere in the world by residential lifestyles in New York City (scope 1,2,3) and accounts for both emissions from use and creation of products (life cycle emissions).

The City has an existing 2019 Citywide GHG Emissions Inventory, which was developed according to the global protocol for community-scale inventories (GPC). This citywide inventory estimates "production-based emissions" occurring from activity within NYC's five boroughs. This includes emission sources existing in the city (scope 1) and emissions from the generation of electricity that is used within the city (scope 2). However, the vast majority of goods and services consumed in New York City are produced elsewhere. This means that most emissions in the CBEI are scope 3, which is defined by the GPC for cities as "all other GHG emissions that occur outside the city boundary as a result of activities taking place within the city boundary."

These inventories (the Citywide Inventory and the CBEI) are developed using very different methods that are not directly compatible. The Citywide Inventory is created by gathering data on emissions-inducing activity that takes place within the city boundary and calculating that with emissions factors. The CBEI is modelled using national consumer spending data, household characteristics data from the census, energy use data and emissions factors.

To minimize the potential for double-counting emissions across the two inventories and develop an inventory that integrates the citywide emissions calculations and the consumption emissions estimates, the City has estimated the overlap of emissions in the CBEI that occur in the city boundary and thereby may be accounted for in part in the citywide inventory. To estimate a range of potential overlap, two methods were used:

- The US Census Bureau's 2019 County Business Patterns and Nonemployer Statistics Combined Report was used to estimate the percentage of total businesses for each category and allocated that estimate to the total commercial energy use in the citywide inventory.

- The average lifecycle-stage allocations for different consumption categories (production, transportation, sale) were used to estimate the share of emissions in each category and UC Berkeley's Cool Climate Business Calculator was used to estimate the energy share of carbon emissions of a typical business of the category type in New York State, and with these estimated a local emissions share of sale and/or production depending on the category.

These calculations are estimates that produce a guiding range. Transportation was not estimated in this overlap analysis. Instead the citywide inventory's freight transportation total was used for the overlap estimate because transportation is embedded in the lifecycle analysis in the CBEI and it is not possible to estimate where that transportation occurs.

Overlap Estimation Process

1. Estimated the national average pre-consumer lifecycle share of each category (production, transportation, sale) using data provided from the EcoDataLab Model. This data was assembled using the PCE Bridge Table 2019, which shows the Input-Output (I-O) commodity composition of the products in the PCE products 2012 (https://www.bea.gov/help/faq/84).
2. Estimated the percentage of total businesses for each category using the 2019 County Business Patterns & Nonemployer Statistics Combined Report (https://www.census.gov/programs-surveys/economic-census.html).
3. Developed energy share emissions estimates of typical businesses by type with the Cool Climate Business Calculator (https://coolclimate.org/business-calculator).
4. Estimated overlap in two ways to determine a range:

   a. Calculated the business share of commercial energy emissions:
      - Commercial energy x % of businesses in category

   b. Applied the business type energy percentage to the sale percentage of total emissions:
      - Consumption category emissions x % share by sale x % energy share by business type

Notes

- The Citywide Inventory has a freight estimate (heavy and medium duty trucks. As this is developed according to GPC protocol it only looks at trips beginning or ending in-boundary and therefore “last mile” delivery. This is taken to be the local transportation overlap and transportation is not estimated for each consumption category.

- Where sale is not part of lifecycle emissions and local energy use is a large part of production (eating out, entertainment services), the estimate of energy use is applied directly to the production share.

- The CBEI uses the roughly 17 million MTC02e of emissions from residential energy use observed in the citywide inventory.