

EXECUTIVE SUMMARY

Cities are only two percent of the world's landmass. Despite this, they "account for more than 70% of global CO₂ emissions" (C40 Cities, n.d.). Cities are also anticipated to grow—66 percent of the world's population is projected to live in urban areas by 2050 (UN DESA, 2014).

This Master's Project (MP) focuses on one American city, Philadelphia, but is meant to be applicable to American cities across the country. City governments are "more directly accountable to their constituents than national leaders on quality-of-life issues" and tend to have close relationships with local businesses, residents, non-profits and other stakeholders (Lane, 2012). Local governments also enable possible solutions to be implemented on an experimental basis, allowing for small-scale solutions to be developed before implementation at the state or federal level.

Several city, non-profit and state-led transportation greenhouse gas (GHG) reduction initiatives have emerged. This MP will focus on the work of one: the 2030 District in Philadelphia, which formed in October 2017 and is one of the 18 2030 Districts nationwide. 2030 Districts are "private/public partnerships in designated urban areas across North America committed to reducing energy use, water use and transportation emissions" (Districts 2030 Background, pg. 2, n.d.).

This MP primarily focuses on the challenges surrounding measurement of Philadelphia's 2030 District transportation emissions. While in the past, policy makers have primarily focused on electric power generation and industry to limit the growth of GHG emissions, transportation emissions today account for 27 percent of U.S. GHG emissions (EPA, 2015). Transportation is also now the fastest-growing source of GHG emissions, and there are 1/3 more vehicles on the road than there were in 1990 (Sorrel, 2016). Transportation infrastructure lasts decades, and the decisions surrounding urban development comes not just from national, but local and city governments. This is where cities, in partnership with businesses and other stakeholders, can play a substantial role in limiting the growth of these emissions, both now and in the future.

In Chapter 1, I provide a frame of reference regarding cities, climate change and how 2030 Districts can develop a solution. I begin by explaining the general challenge and problem that all cities and researchers face is a lack of standardization regarding how to measure transportation GHG emissions on a city and regional planning level. In addition, out of the 18 Districts, only San Francisco, Denver, Cleveland, Seattle and Pittsburgh have started to track their transportation emissions. An additional challenge with this is that each 2030 District is using its own methods, and the approaches have varied considerably.

The Project and Its Importance

The MP has three parts. The first part was the development of a transportation GHG emissions baseline for the Philadelphia 2030 District. The baseline will enable the District to track its progress towards the 2030 Challenge Architecture 2030 set for all Districts.

The second part of the project was to create a proposed survey for the District to better track transportation GHG emissions moving forward. As a note of clarification, I will not administer the survey, but have designed it for the District.

The third part of the project was to create case studies comparing the 2030 Districts already measuring their transportation emissions. There is currently no document that summarizes how each District has approached tracking transportation emissions. This project considered some of the best-practice methodologies of the five other 2030 Districts and suggested which of their methods (both survey and baseline) can be incorporated and used moving forward.

By helping the Philadelphia 2030 District create a transportation GHG emissions baseline and a survey to measure its GHG emissions, not only will it enable the Philadelphia 2030 District to accurately measure progress on reducing its transportation emissions 50 percent by 2030, but it will also serve as an example for other 2030 Districts and add to the literature for standardizing a method all Districts can use, regardless of their size or location in the U.S. This will enable Districts to better measure progress against one another, contribute to the best-practice literature and determine which policies have an impact.

In the first part of Chapter 2, I focus on the current practices and key takeaways and lessons learned from how the other 2030 Districts have created a transportation GHG emissions baseline, as well as tracked their progress moving forward. Table 2 lists the transportation carbon dioxide emission baselines of each District, along with how they have measured their carbon dioxide emissions since the completion of their baselines.

I divided their approaches into three buckets: 1. National Household Travel Survey (NHTS): Cleveland; 2. Public-Private Partnerships: Denver and Seattle; 3. Metropolitan Planning Organization (MPO) Partnership: Pittsburgh and San Francisco.

Methodology for Philadelphia 2030

The second part of this section reviews how I decided which data to use for the Philadelphia 2030 baseline, as well as its key assumptions.

There were five different methodologies considered throughout the process of determining the best way to develop a baseline: 1. The Delaware Valley Regional Planning Commission (DVRPC) 2012-2013 Household Travel Survey (HTS), 2. Develop and Distribute a Survey, 3. Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES) data with the American Community Survey (ACS), 4. On the Map (OTM) with ACS, 5. Census Transportation Planning Products (CTPP) with the DVRPC Distance Matrix Data.

Based on discussions with my advisor and client, I decided to use methodology five, CTPP with the DVRPC Distance Matrix Data. Table 4 compares the potential baseline methods, as according to data availability, age of data, replicability/fit the project timeline, and risk of error.

Philadelphia 2030 Baseline Result

I used methodology five in an Excel Workbook Baseline Calculator and found that the Philadelphia 2030 District had a transportation GHG emissions baseline of 9.4 kg

CO2/commuter/day. Table 6 is the Excel Workbook methodology justification, Table 7 contains the MPO and CTPP data assumptions and Table 8 the data sources for the Excel Workbook.

Survey Design

As previously stated, I recommend that the Philadelphia 2030 District pursue a survey methodology to measure transportation GHG emission moving forward. The proposed survey is in this section.

In Chapter 3, I cover what other initiatives have done to track city transportation GHG emissions, along with the role of transit agencies in data collection, challenges agencies have faced with measuring transportation GHG emissions at the metropolitan level, along with how MPOs and the Clean Air Act (CAA) offer opportunities to address the data standardization challenge.

Chapter 4 is a discussion on where Philadelphia's GHG emissions fall relative to the other Districts and how geography, along with city and state policies, influence the baseline. I also discuss the lack of standardization when it comes tracking transportation GHG emissions.

Next, I explain that the methodology I use to establish the 2030 Philadelphia baseline is a methodology that should and can be replicated by Districts moving forward. First, the Excel Workbook Calculator is easy and inexpensive to use. Most importantly, its inputs are easy to change and are customizable to the location. As MPOs are already required to collect emission factors because of the CAA, this data is already available.

Finally, I conclude that the baseline calculator is an important first step, but is only a first step. A survey methodology will enable Districts to see the current travel habits of their 2030 District commuters, as well as the nuances of multi-modality travel that is not available through the CTPP data. In addition, survey questions will allow the District to understand some of the rationale behind transit choices, as well as options commuters have.

In Chapter 5, I divide my recommendations into two buckets: one set specifically for Philadelphia and one set for 2030 Districts in general. I recommend 2030 Districts focus on using their local MPO, develop strong relationships and partnerships, standardize their communication and survey methodology, and in the long term, develop a centralized office for obtaining information on the various 2030 Districts, as well as decide if the 2030 District focus is on adding new buildings or decreasing emissions.

For Philadelphia specifically, I recommend that it continue its partner and stakeholder outreach, develop specific ambassadorial roles for committee members, and fold its survey into the MPO data tracking efforts.

My appendix includes an index of terms, the Excel Workbook Baseline Calculator and related documents, as well as other important primary documents used in this research.

