Community Greenhouse Gas Emissions Inventory: Recommendations for Future Inventories

CITY OF ASPEN, CANARY INITIATIVE

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Recommendations for Future Inventories

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ACRONYMS

AE	Aspen Electric
CH_4	Methane
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide equivalent
DMV	Department of Motor Vehicles
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
HCE	Holy Cross Energy
ICLEI	International Council for Local Environmental Initiatives
EIB	Emission Inventory Boundary
mt	Metric tons
N_2O	Nitrous Oxide
RFTA	Roaring Fork Transportation Authority
VMT	Vehicle Miles Travelled

1 INTRODUCTION

The City of Aspen municipal government is a leader in greenhouse gas emissions tracking, climate planning, and environmental sustainability initiatives among cities of its size and larger. In 2006, The Canary Initiative was created to oversee all goals, programs, and tracking associated with climate and energy related work. In 2005, the City adopted a policy to reduce emissions 30% by 2020 and 80% by 2050 in their Climate Action Plan. To track progress, the City conducts an "internal" greenhouse gas (GHG) inventory which accounts for the emissions associated with city operations. The City also conducts a "community" inventory every three years that quantifies emissions among all sectors within the Emissions Inventory Boundary (EIB definition is provided in Report 2: Data Management Plan Methodology document, Section 2). This project provides the City of Aspen recommendations relating to past and future community-scale inventories, a methodology report and design for a community "Quick Tracker," and two mini greenhouse gas inventories using the Quick Tracker to quantify 2012 and 2013 emissions from key sectors within the City of Aspen's urban growth boundary. The community "Quick Tracker" mechanism will help planners better assess how various programs and project are moving the needle on emissions reduction and make decisions accordingly. Rather than waiting three years to determine if a given activity is having a positive, negative, or neutral effect on emissions, using a Quick Tracker will provide the City of Aspen with better insight to help refine decisions. Therefore, the project team used data from 2012 and 2013, the years between the past 2011 community inventory and the future 2014 inventory, to illustrate how the "Quick Tracker" functions as a comprehensive, efficient, and feasible process for the City of Aspen.

2 FRAMEWORK

One project deliverable includes identifying areas where the City of Aspen can become compliant with ICLEI (International Council for Local Environmental Initiatives) protocols. After investigating all inventory frameworks, we have concluded that it would be in the City of Aspen's best interest to conduct their inventories according to the Significant Influence framework. This framework divides emissions by source and activities that help officials develop a deeper understanding of their community emissions. In other words, the City government can conceptualize, organize, and report emissions and identify areas where efficiency measures have been successful, could be improved, and inform policy. It is important to note that because Aspen is a tourism-based economy, dividing emissions according to sources and activities allow additional reporting frameworks such as Individual Industry Sectors that would reveal the contribution of tourism on community emissions.

The distinction between source and activities could help city officials avoid double counting on a regional scale. For instance, if each city in the Roaring Fork Valley reported emissions according to Significant Influence they could create a regional inventory by reporting each city's source emissions. An activity refers to a community activity that results in the creation of GHG emissions either directly (e.g., use of household furnaces and vehicles with internal combustions engines) or indirectly (e.g., use of electricity created through combustion of fossil fuels at a power plant outside of the EIB). Conversely, a source is a physical process or activity that releases GHG emissions into the atmosphere. For example, Holy Cross Energy and Aspen Municipal Electric are an activity because they indirectly contribute to community emissions but are not generated or combusted within the EIB; however, SourceGas natural gas would be considered a source because it is combusted within

the EIB. As Table 1 illustrates how ICLEI defines emissions by source or activity. Where as, Table 2 demonstrates how emissions are recorded for the City of Aspen.

It is important that sources and activities are never summed; rather, officials would report these emissions separately. A source-based emission inventory would estimate total emissions released within the EIB; whereas, purely activity-based emissions inventory would reveal the efficiency of the community despite occurring outside EIB. Additionally, the distinctions between these types of emissions avoid double counting on a regional scale as other cities create inventories.

Table 1. ICLEI's Built Environment Sources and Activities Emissions Chart

In-Boundary GHG emissions Sources	Activities Resulting in GHG emissions
Built Environment	
Use of fuel in residential and commercial stationary combustion equipment	Use of fuel in residential and commercial stationary combustion equipment
Industrial stationary combustion sources	
Power Generating Facilities	Use of Electricity by the community
District heating or cooling facilities	Use of it by the community
Industrial Process	
Refrigerant leakage	

Table 2. Aspen's Built Environment Sources and Activities Emissions Chart for "Quick Tracker"

In-Boundary GHG emissions Sources	Activities Resulting in GHG emissions
Built Environment	
Consumption of Natural Gas, propane, or other fuels for stationary combustion	Consumption of Natural Gas, propane, or other fuels for stationary combustion
	SourceGas Holy Cross
	Aspen Electric

Table 3. ICLEI'S Transportation Sources and Activities.

In-Boundary GHG emissions Sources	Activities Resulting in GHG emissions
Transportation	
On-road passenger vehicles operating within the community boundary	On-road passenger vehicle associated with community land uses
On-road freight and service vehicles operating within the community	On-road freight and service vehicle travel associated with community land uses
On-road transit vehicles operating within the community boundary	On-road freight and service vehicle travel
Transit rail vehicles operating within the community boundary	
Inter-city passenger rail vehicles	Use of transit rail travel

Table 4. Aspen's Transportation Sources and Activities Emissions Chart for the Quick Tracker

In-Boundary GHG emissions Sources	Activities Resulting in GHG emissions
Transportation	
Driving Around Town	Commuter traffic
RFTA City of Aspen Buses	RFTA data

3 ICLEI'S FIVE BASIC EMISSION GENERATING ACTIVITIES

According to ICLEI, there are five basic emission-generating activities that each inventory should identify: the use of electricity by the community, use of fuel in residential and commercial stationary combustion equipment, on-road passenger and freight motor vehicle travel, use of energy in potable water and wastewater treatment and distributions, and generation of solid waste by the community. This "Quick Tracker" identifies electricity and stationary combustion in the building sector and on-road passenger data in the transportation sector; but it would be in Aspen's best interest to account for all five of these activities. The rationale behind reporting these activities under the Significant Influence framework is that the city government can often influence electricity use in local buildings through building codes and financial incentives, and influence transportation emission through land use and urban design regulations and transportation infrastructure investments.

4 RECOMMENDATIONS

4.1 BUILDING SECTOR/BUILT ENVIRONMENT

4.1.1 Electricity

Aspen Electric and Holy Cross Energy provided utility specific carbon dioxide emission factors; however, regional emissions factors were used for both CH4 and N2O emissions from EPA eGRID 2010. It would be in the City of Aspen's best interest to entice the Utility companies to provide their specific CH4 and N2O emissions factors that are third-party verified. A way to show the need for these emissions factors is to perform a *Sensitivity Analysis (BE.2; 20).* This analysis measures the difference between the reported third-party verified utility-specific emissions factors and the corresponding eGRID emissions factors. This is demonstrated in the 2012 and 2013 quick tracker inventories emissions factors for Holy Cross Electric's Aspen Electric's. Despite the dramatic difference between HCE and AE carbon emission factors, they use the same eGRID CH_4 and N_2O emissions factors. By providing third-party verified utility-specific emissions factors, the City of Aspen could measure areas where the overestimated or under estimated emissions.

4.1.2 Natural Gas

SourceGas is under both sources and activities; however, double counting was avoided by separating the lifecycle (extraction of natural gas to the combustion) of natural gas by SourceGas activities versus community activities. The activity of natural gas consumption is determined by finding the emissions from extracting the natural gas and multiplied by the volume demanded by consumers in the EIB. On the other hand, the source would be the volume of gas demanded and combusted within the EIB multiplied by the emissions factor that is associated with the technology used in combustion. The relationship between technology and fuel type is further discussed in ICLEI's Appendix C: Built Environment Activities and Sources "Table B.3 Default Methane and Nitrous Oxide Emissions Factors

by Fuel Type and Technology Sector." This methodology has been incorporated into the Quick Tracker.

4.1.3 Refrigerant Leakage:

Unfortunately, obtaining this data is very difficult to gather. However, accounting for these emissions create a more accurate inventory of true community emissions. This would be considered a source due to emissions occurring within city boundaries.

4.1.4 District Heating and Cooling:

This is relevant to the City of Aspen if they decide to go through with the district heating and cooling system powered with geothermal energy from Aspen Mountain. Generally, district energy sources can provide heating and cooling more efficiently to the buildings they serve than is achieved with multiple heating and cooling systems for individual buildings. Additionally, many areas have decreased their community emissions by providing district energy services.

4.1.5 Electric Power Transmission and Distribution Losses:

This section would account for the Transmission and Distribution losses from the energy producers to the building sector. This is recommended by ICLEI and the data required is annual community-wide electricity use by sector. Therefore, this would be a great additional framework for the quick tracker (US Community Protocol Accounting and Reporting of Greenhouse Gas Emissions, Building Sector Appendix C), Additionally, reporting these losses and the corresponding emissions could encourage the community to depend more on distributed energy, and the application of Solar-PV on residential and commercial buildings.

4.1.6 Government Consumption

This could easily be incorporated into the Quick Tracker as an additional framework. It is important to note, government consumption refers to all levels of government located within the community-from federal and state facilities to school districts- and is not limited to just municipal or county operations. Additional information is provided in Appendix I: Consumption-Based Emissions of US Community Protocol Accounting and Reporting of Greenhouse Gas Emissions.

4.1.7 Lifecycle Emissions of Community Businesses:

The City of Aspen's economy is centered on tourism. Therefore, lifecycle emissions of businesses within the Urban Growth Boundary would capture emissions associated with community business. However, methods for estimating these emissions is currently under development; see Appendix I: Consumption-Based Emissions for more information.

Through utilizing ICLEI's framework of "Significant Influence" the City of Aspen could identify GHG reduction opportunities and measure progress toward emission goals. In the Roaring Fork Valley, the Community Office for Resource Efficiency (CORE) is a nonprofit organization focused on reducing greenhouse gas emissions by implementing efficiency incentives in the building sector and diversifying Holy Cross Energy and Aspen Municipal Electric's fuel mix with more renewable energy. Aspen should incorporate all retrofits completed by CORE to measure progress through sustainability and efficiency efforts. By doing so, the City of Aspen would be able to attribute greenhouse gas reductions to sustainability and efficiency efforts and not dips in tourism.

4.2 TRANSPORTATION SECTOR

4.2.1 Driving Around Town Data

Despite the challenges associated with finding this data, Driving Around Town data that is up to date would be incredibly beneficial when capturing the City of Aspen's true emissions. By conducting a survey that is more up to date, the City of Aspen would be able to have higher confidence in their data.

4.2.2 Commuter Passenger Vehicles

Many cities have seen the importance of traffic counting data and have implemented Traffic Counter technologies such as, video systems, tube systems, and radar systems to track the vehicle types passing through the designated area. As a result, greenhouse gas consultants are provided a vast array of data that can more accurately convey the emissions associated with commuter traffic.

4.2.3 RFTA Valley-Wide and City

RFTA data is imperative to provide high confidence inventories. Currently, RFTA has no way of tracking vehicle miles traveled. However, they are looking for methods to track ridership and the fleet's vehicle miles traveled. In addition to providing this data, RFTA could implement ridership information with "Zone Passes" that record the rider's usual boarding area and destination. According to Aspen's ridership, this data could provide the average VMT per Aspen rider, which would in turn create a high confidence RFTA commuter VMT.

For the City of Aspen buses, total vehicles miles traveled on bus routes such as, Maroon Bells, Cemetery Lane, Hunter Creek, etc., as well as vehicle type, would result in higher confidence source emissions of RFTA.

4.2.4 Hotel Shuttles

Due to tourism being the dominant industry, it would be beneficial for the City of Aspen to create a relationship with the main hotels in Aspen to provide shuttle data. Each large hotel such as, The Little Nell, Hotel Jerome, The Limelight, and Sky Hotel, have personal shuttle services to transport guests within Aspen. The emissions associated with hotel transportation would be considered a source as it is combusted within the urban growth boundary. If the City of Aspen received this data, it would more accurately capture sources of transportation and would be a key feature of the Industry Specific Tourism Additional Framework of the Quick Tracker.

4.2.5 OHV

Transportation should include all the vehicles that are used to maintain the slopes of Aspen Mountain, Highlands, and Buttermilk. This could be incorporated into the Industry Specific Tourism Additional Framework to convey the contributions of the Tourism sector and the City of Aspen's limited jurisdiction over these emissions.

5 RECOMMENDED FIRST STEPS

In regards to the recommendations provided above, the most important first steps would be transmission and distribution losses, RFTA data, and conducting more up to date passenger vehicle surveys (source and activities). By tracking and disclosing Transmission and Distribution losses, the City of Aspen could incentivize distributed (local) generation of energy within the urban growth boundary. Unfortunately, the authors were unable to utilize RFTA data for the quick tracker. Yet, this

information is imperative to fully account for transit emissions. In order to do so, the City of Aspen and RFTA need to come to an agreement on how to gather necessary data such as, vehicle miles traveled and valley-wide ridership. Lastly, conducting new surveys to capture passenger vehicle surveys would provide instrumental data to capture both sources (Driving Around Town) and activities (Commuter Traffic) associated with the City of Aspen.