MEMO

TO: City of Mission, Kansas City Council

FROM: Lotus Engineering & Sustainability, LLC

DATE: May 8th, 2023

SUBJECT: Community and LGO Greenhouse Gas Emissions Inventory Summary

---

Project Overview

The Lotus team, with data and support from Emily Randel and city staff, completed a 2022 greenhouse gas (GHG) emissions inventory for both the Mission, KS community (Community) and the local government operations (LGO). In addition, the Lotus team reviewed prior inventories conducted in 2008 with data from the years 2005, 2006, and 2007. The inventory was conducted to update and understand GHG emissions, track progress towards goals, and provide a baseline for modeling emission-reducing strategies.

Climate Change and Projected Impacts

Kansas is in a unique location; it sits in a transition zone between semi-arid western states and humid eastern states. This creates unpredictable weather that will become more variable as the climate changes. Temperatures in Kansas are expected to increase, with four times as many days over 100˚F probable by 2050. Rainstorms will happen less often, but when it does rain, it will fall in extreme amounts. This means that drought is probable, as is flooding due to severe storms intensifying. Tornadoes may increase in intensity as well; scientists are seeing more days with more than one tornado and a longer tornado season. Greenhouse gases, building up in the atmosphere due to global emissions from human activities, are causing this climate warming. Tracking emissions is vital so that communities like Mission can reduce their contribution to global emissions and mitigate the effects of climate change.

GHG Inventories: The Why & The How

GHG inventories are an essential exercise of a local government's process to reduce

climate-altering GHG emissions as well as provide a baseline for and monitoring of community emissions on a regular basis. Cities account for only 3 percent of the global land area yet are responsible for more than 70% of global emissions. Additionally, more than 50% of the global population resides in cities. Cities have control or influence over many of the highest emissions-generating activities like home and building energy use, transportation planning, and waste. Conducting regular GHG inventories allows cities to understand where they are, where they need to be in the context of global emissions targets, and how to measure the impacts of GHG reduction strategies.

While LGO emissions are typically only a fraction of the larger community emissions, it is also important for the Local Government to have its own inventory. In order to lead by example, LGO inventories allow for the same understanding of emissions but are specific to LGO actions.

Modern community-wide GHG inventories have been conducted for more than 20 years by cities across the globe. However, it was not until 2012 and 2014 that protocols, or "rulebooks" for how to complete community-wide GHG emission inventories were published for US and global communities, respectively. Data availability and accuracy have also improved in the last decade, with actual measurements of activity replacing assumptions, e.g., metered electricity data as opposed to average electricity use per unit. These protocols allow for the comparison of inventories across both spatial and temporal scales. Mission's community-wide inventory was calculated using the global protocol for community-scale greenhouse gas emissions inventories, or the GPC Protocol. The local government operations inventory followed the Local Government Operations Protocol.

Key Takeaways - 2022 Community-wide Inventory

In 2022, Mission's community-wide GHG emissions totaled 173,390 metric tons of carbon dioxide equivalent (mt CO_2e). The largest sectors of emissions in Mission are energy use in commercial and industrial buildings, transportation, and residential buildings (Figure 1). Since the 2007 inventory, emissions have decreased by 58%. In order for Mission to achieve the goal of net zero emissions by 2050, community-wide emissions will need to decrease by nearly 4% annually, or just shy of 6,200 mt CO_2e per year.

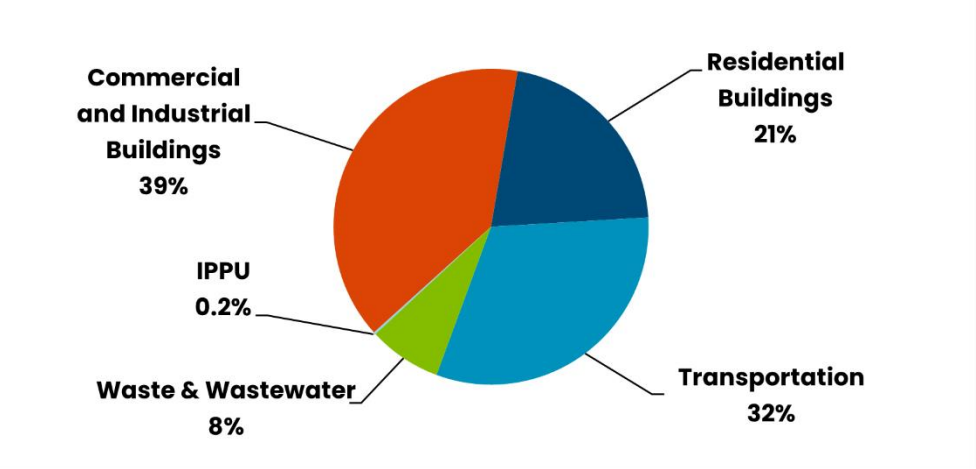


Figure 1. Mission community-wide GHG emissions by sector.

STATIONARY ENERGY

Stationary energy, or building energy use, comprises a total of 59% of emissions. Fifteen percent of total emissions are from the combustion of natural gas and 44% are from grid-supplied electricity use. The remaining stationary energy emissions are from propane and diesel used in backup generators; these make up less than 0.1% of all emissions (Figure 2). Energy sources like electricity and heating fuels require distribution throughout the community. These systems contribute to emissions in the form of fugitive emissions of methane from the natural gas distribution system and transmission & distribution losses from the electrical grid. In order for Mission to achieve the goal of net zero emissions from homes and buildings in the community by 2035, emissions will need to decrease about 8% annually, or 8,100 mt CO_2e emissions per year.

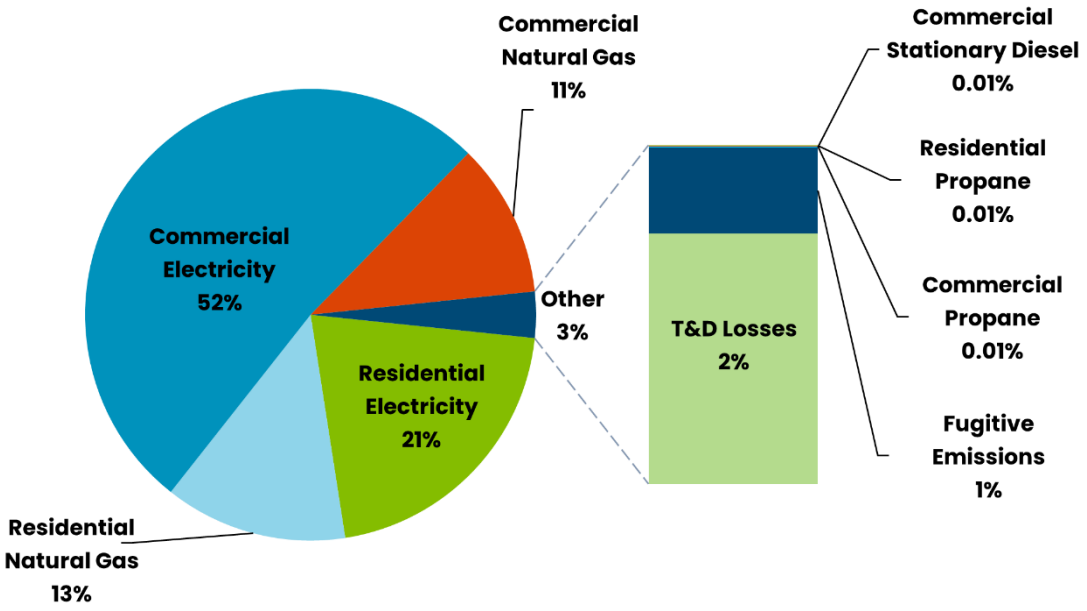


Figure 2. Stationary energy GHG emissions.

Opportunities to Reduce Emissions:

With recent federal legislation, the electrical power generating sector is projected to decrease grid carbon emissions 68%-78% below 2005 levels by 2030.[1] Evergy's electric emissions factor has also decreased by 43% since 2007 and Evergy has a goal of achieving net zero carbon emissions by 2045.[2] The decarbonization of the electrical grid presents multiple opportunities for low to no carbon electrification of heating homes and businesses. Heat pump technology allows for efficient heating and cooling, while receiving power from the electrical grid, getting cleaner each year of operation.

TRANSPORTATION ENERGY

On-road transportation energy is the second largest sector of emissions within the community. Accounting for 31% of total emissions, transportation emissions are largely from internal combustion engines, with a very small percentage from electric vehicles. Emissions from transit vehicles account for less than 0.1% of transportation emissions (Figure 3).

[1] https://www.energy.gov/eere/articles/nrel-study-identifies-opportunities-and-challenges-achieving-us-transformational-goal

[2] See: https://investors.evergy.com/TCFD.

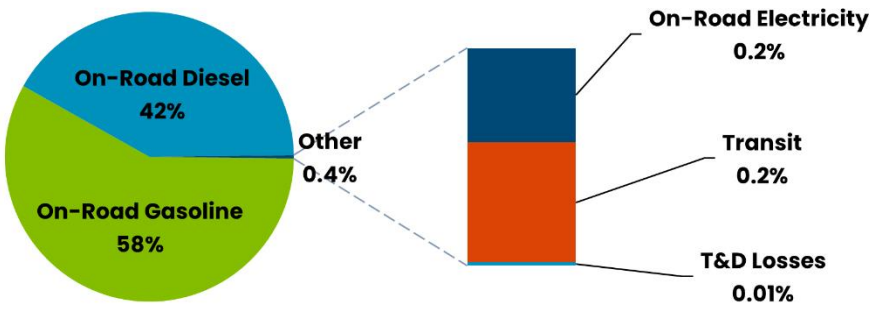


Figure 3. Transportation sector GHG emissions.

Opportunities to Reduce Emissions:

One option is to encourage alternative forms of transportation within the community; this can lessen the number of vehicle miles traveled. Additionally, expanding infrastructure and/or incentivize electric vehicles (EVs) and EV charging within the community can help to both reduce emissions and improve air quality locally.

WASTE & WASTEWATER

Emissions related to waste and wastewater account for 7% and 1% of total emissions, respectively. Waste that is generated from the community is disposed of outside of the community and through the decomposition of organic waste contributes to methane and CO_2 emissions.

Opportunities to Reduce Emissions:

Increase the diversion of recyclable waste and organic waste to reduce the quantity of waste sent to the landfill.

Key Takeaways - 2022 LGO Inventory

In 2022, Mission's local government operations created 18,819 mt CO_2e emissions. The majority of these emissions are created by consumption-based sources and building energy use. (Figure 4). Emissions from local government operations in Mission have decreased 42% since the 2007 inventory. In order for Mission to achieve its goal of net zero emissions from local government operations by 2025, emissions will need to decrease 33% annually. This is equivalent to 1,225 mt CO_2e per year without consumption-based sources and 6,273 mt CO_2e per year with consumption-based sources.

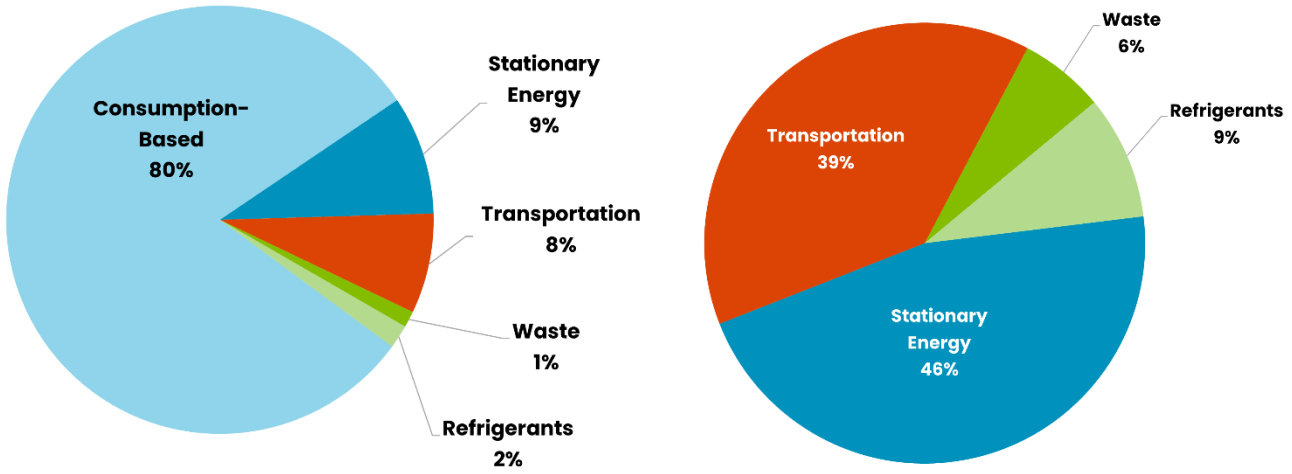


Figure 4. Local government operations GHG emissions by sector with (left) and without (right) consumption-based emissions sources.

CONSUMPTION-BASED EMISSIONS

Local governments have traditional direct emissions from buildings and vehicles, but also can cause indirect emissions. Emissions are also produced through the procurement and consumption of office goods such as paper and computers, and from building materials like cement and asphalt. Goods and services are often aggregated under "consumption-based emissions" (CBE) and can be useful in understanding the upstream and downstream emissions of the Local Government's activities. These emissions can be included in the total GHG inventory and/or considered separately. When including CBE in Mission's full inventory, CBE account for 80% of total emissions, with the largest contributor being the purchase of cement (78% of total emissions).

Opportunities to Reduce Emissions:

The production of cement causes GHG emissions both from the combustion of fuels as well as the decomposition of limestone. Blended cement and substitutes for limestone-based substances like fly ash can decrease the number of carbon emissions per ton of

cement purchased. Additionally, some applications of cement in horizontal projects can be replaced with aggregate or porous pavers that have additional stormwater benefits. Other new technologies for green cement continue to show promise in some applications but are still a way off from large-scale applications. Additionally, local governments can pursue green procurement practices to ensure sustainable products are prioritized.

STATIONARY ENERGY

Stationary energy use, or building energy use, accounts for 9% of total emissions when CBE are included, but 45% of emissions when CBE are not included. Electricity accounts for 33% of non-CBE emissions, natural gas accounts for 12%, and stationary diesel from backup generators accounts for less than 1%.

Opportunities to Reduce Emissions:

Like the community-wide opportunities above, the decarbonization of the electrical grid presents multiple opportunities for low to no carbon electrification of heating government buildings. Heat pump technology allows for efficient heating and cooling while receiving power from the electrical grid, which gets cleaner each year of operation. Energy efficiency opportunities can conserve energy as well as decrease expenses. Mission's retrofitting of streetlights and traffic signals is a perfect example of how efficiency can lower emissions and financial costs.

TRANSPORTATION ENERGY

Mission's transportation-related emissions are a combination of fleet vehicles owned or operated by Mission, employee commuting, and business travel. Collectively, these transportation-based activities account for 39% of emissions not including CBE. Employee commuting accounts for 32%, the vehicle fleet accounts for 7%, and business travel accounts for less than 1%.

Opportunities to Reduce Emissions:

Incentivizing alternative commuting options for employees, including telecommuting and public transit, helps limit the amount of vehicle miles traveled. Expanding infrastructure to support electric vehicles helps to limit the amount of carbon emitted per vehicle mile traveled; it also contributes to better air quality. In some cases, local governments have supported these opportunities with other options such as reimbursing emergency rides home or allowing goods and services to be delivered to employee workplaces.

WASTE

The solid waste generated from within Mission's buildings accounts for 6% of total emissions when not considering CBE. As public buildings, not all the waste is necessarily generated by Mission employees but is still considered part of the LGO inventory.

Opportunities to Reduce Emissions:

Increase the diversion of recyclable waste and organic waste. As noted above, public buildings also present an opportunity to educate the public about waste diversion options in public spaces and at home.

INDUSTRIAL PROCESSES & PRODUCT USE

Refrigerants used in commercial building cooling equipment can leak when serviced or through normal use of the equipment. Refrigerants from within Mission's government-owned/operated buildings account for 9% of emissions not considering CBE.

Opportunities to Reduce Emissions:

Mission can continue to look at phasing out refrigerants with high global warming potentials. More efficient technology, and in some cases technology shifts like heat pump systems, can also offer improved cooling with less energy.

Climate Action Task Force Charge:

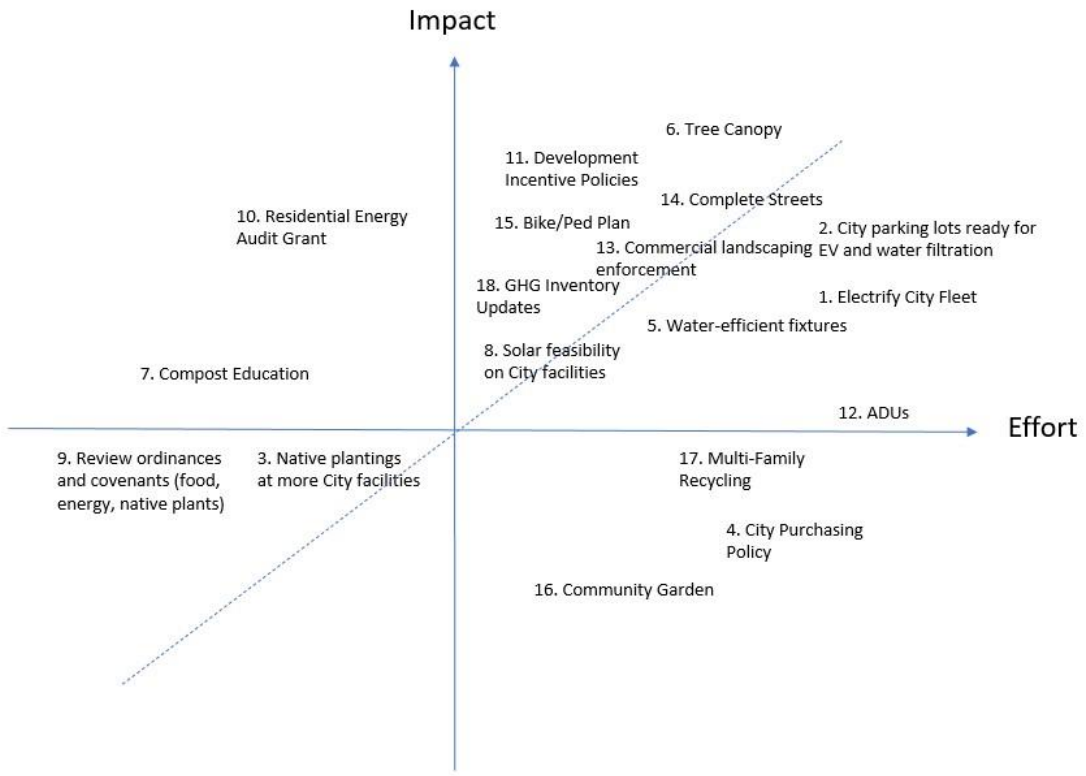
Evaluate and recommend 1-, 3- and 5-year strategies for Mission in support of the Regional Climate Action Plan's goal of Net-Zero emissions by 2050. The Task Force has identified a first set of shorter-term recommendations listed below. The recommendations are categorized by the overall Regional Climate Action Plan [C] goal for 2050 and by the interim net zero emissions targets of:

- Local Government Operations [G] in Mission by 2025 (Regional target: 2030)
- Energy Generation [E] in Mission by 2035 (Regional target: 2035)
- Homes and Buildings [B] in Mission by 2035 (Regional target: 2040)

Climate Action Task Force Initial Recommendations:

1. Transition City-owned vehicles and equipment to electric as appropriate. [G]
2. Include sustainable elements when refurbishing or constructing new City-owned parking lots including infrastructure for electric vehicle charging stations and enhanced water retention and filtration. [G]
3. Expand native planting to more City facilities. [G]
4. Implement purchasing changes in each City department that would significantly reduce related waste and greenhouse gas emissions. [G]
5. Encourage the installation of water-efficient fixtures in both commercial and residential applications and limit the amount of irrigation required for site landscaping. [G, B]
6. Invest in the preservation and enhancement of the tree canopy. [G, C]
7. Educate on the importance of composting and share resources about how to do it. Evaluate other cities' citywide composting programs. [G, C]
8. Evaluate City-owned facilities for feasibility of solar and other renewable energy options in 2022. [E]
9. Review City Code and HOA covenants for restrictions on onsite energy generation, food production and native plantings. [E, B]
10. Establish and promote a grant program to subsidize energy audits and weatherization for single family homes. Create an income-based reserve fund if anyone seeks financial assistance for participating. [B]
11. Establish a formal policy that ties development incentives to sustainable building practices. [B]
12. Amend the City Code to allow Accessory Dwelling Units. [B]
13. Enforce continued compliance with landscape agreements related to trees and vegetation especially in commercial areas and on multi-family housing properties. [B, C]
14. Formalize the intention to incorporate complete street elements in future infrastructure projects. [C]
15. Conduct a citywide bike and pedestrian plan in 2023 whose scope considers vulnerable populations. [C]
16. Establish a new location for the City's existing community garden. [C]
17. Review the availability of recycling services to multi-family residents in Mission and consider requiring it. [C]
18. Codify and fund a periodic greenhouse gas inventory every three years and the requirement for an annual report to the City Council on climate action. [G, E, B, C]

Climate Action Plan Task Force Recommendations Priority Grid
(Drafted by Staff and Modified by CAPTF in 2023)



Notes on 2022 Task Force Recommendations prepared for Mayor Flora in Fall 2023 and updated in January 2024

Tree Canopy – expanded budget for more tree maintenance than in past years, and continued, strategic planting. Focus needed on street and cul-de-sac tree inventories.

Development Incentive Policies – Tax Abatement Policy in use. Evaluation of remaining policies in 2024.

Complete Streets – Elements of complete streets will be included in street projects going forward. Discussed as part of each individual project. Complete Streets and other sustainable projects were an emphasis in Public Works Director interviews in 2023. Stephanie Boyce was hired as Director and started January 2, 2024.

Residential Energy Audit Grant – Grants are complete. Sharing session held on October 24 and two improvement grants for additional insulation have been paid to date. Hope for additional grant

payouts, testimonials and outreach as residents experience the improvements. Expansion possible in future years, including for commercial buildings.

Bike/Pedestrian Trails Plan – Underway, evaluation in early 2024. Carbon Reduction Program grant for bike share with Roeland Park anticipated bidding in winter 2024. Focus on dock placement, fee structure, advertising and implementation ahead of summer 2024 installation.

Commercial Landscaping Enforcement – Coordination in Community Development Department is needed to evaluate current shortcomings and to connect Code Enforcement to Planning activities.

Greenhouse Gas Inventory Updates – Materials from 2023 inventories are designed for easy updates in the future. Recommendation is to stay in close touch with consultant team at Lotus for their guidance on how to maintain and utilize the inventories.

Solar Feasibility on City Facilities – Initial contact has been made with SunSmart Technologies to evaluate feasibility on buildings, in park structures and City parking lots. Anticipate more forward progress in 2024.

Expansion of Native Plantings – Bids currently open for Johnson Drive project. Set for September 2024 planting. Highlights possible for City Hall gardens, native plant sellers continuing at Mission Market and GoGreen Environmental Fair.

Establish a New Location for a Community Garden – Survey is ready for former gardeners to evaluate desirable characteristics for a new garden location. Focus on more formal inquiry to St. Pius X.

Still to discuss:

- Encourage the installation of water-efficient fixtures in commercial and residential applications and limit the amount of irrigation required for site landscaping
- Electrify City Fleet (ongoing, in context of budget discussions)
- Prepare City parking lots for EV and water filtration (ongoing, in space needs analysis and parks construction projects)
- Adjustments to the code to allow for ADUs
- Review and modifications to code language for home energy generation, food production and hosting native plantings.
- Compost education – still hosting private composting companies at Mission Market and Environmental Fair if companies are interested. Possible business collaboration with KC Can Compost initiatives.
- Reiew the availability of recycling services to multi-family residents in Mission and consider requiring it.
- City purchasing policy