



MEMORANDUM

DATE: July 8, 2026
TO: Sustainability Framework Advisory Committee
FROM: Katherine Barnett, Division Manager
SUBJECT: May 27, 2026 Meeting Follow-Up

Sustainability Framework Fund Incentives Embodied Carbon & Emissions Equivalency

Question(s):

- Can we assess total embodied carbon and the total avoided emissions facilitated by the EV, E-bike, and electric lawn equipment rebates? Infrastructure needs? Dollar value?
- Another way to assess equivalency between the 3 rebate programs?

Greenhouse gas emissions are classified into three different scopes. Scope 1 emissions are direct emissions from sources within the city boundary and are controlled or owned by a source within the boundary. Scope 2 emissions are indirect emissions that physically occur at the facility where they are generated, typically outside of city boundaries. For example, energy consumed by the Denton community is Scope 2 because it is consumed within city boundaries, but the energy is generated outside of city boundaries. Scope 3 emissions are indirect emissions not controlled by the community but related to activities such as transmission and distribution losses from electricity generation. Embodied carbon is the sum of all emissions resulting from the manufacturing, transportation, installation, maintenance, and disposal of materials or infrastructure and is typically Scope 3.

On March 20, 2026, staff sent out surveys to recipients of the electric vehicle (EV), e-bike, and electric lawn equipment rebates awarded in Fiscal Year 2024/2025 and Fiscal Year 2025/2026 (Q1 - Q2) to assess the effectiveness of the Sustainability Framework Fund (SFF) incentives and the avoided Scope 1 greenhouse gas emissions facilitated by the rebates. Respondents provided information like vehicle trips and miles traveled, use of e-bikes in place of gasoline-powered vehicles, and use of electric lawn equipment in place of gasoline-powered lawn equipment. To adequately quantify the embodied carbon of gasoline-powered vehicles and lawn equipment, and compared to that of EVs, e-bikes, and electric lawn equipment, would require additional

OUR CORE VALUES

Inclusion • Collaboration • Quality Service • Strategic Focus • Fiscal Responsibility

staff time and additional data to be built into the rebate surveys and applications. Furthermore, adequate data on the emissions associated with the sourcing of materials, manufacturing, transport, and use of the equipment by residents over an established period or mileage would be needed. Estimated embodied carbon emissions for traditional gasoline-powered cars, EVs, and e-bikes can be assessed, at least in part, in future analyses, but available data on direct emissions from gasoline-powered and electric lawn equipment is currently limited.

Direct Emissions from Gasoline-Powered Lawn Equipment

Question: For the electric lawn equipment slide, is point 2 referring to CO2?

Greenhouse gas emissions from gas-powered lawn equipment have not been extensively studied, but they contribute to a large proportion of off-road greenhouse gas emissions. A 2020 EPA National Emissions Inventory reported that gasoline-powered lawn equipment, including trimmers, releases 68,000 tons of nitrous oxides, 21,800 tons of fine particulate matter (PM2.5), and 30 million tons of CO2 annually. Additionally, EPA reports that one hour of operating a new gasoline-powered lawn mower emits the same amount of volatile organic compounds and nitrogen oxides as driving a new car 45 miles. Furthermore, the emissions from powering a two-stroke gas string trimmer for one hour are equivalent to driving a car for approximately 300 miles. In the previous May 27, 2026, SFAC meeting, staff estimated from the survey results that the greenhouse gas emissions avoided by the electric lawn mowers and string trimmer rebates are approximately 11,616.77 tons of CO2. However, this is likely an underestimation of greenhouse gas emissions as it includes other gases, not just CO2, all of which have different global warming potential. Global warming Potential (GWP) is the measure of how much energy, or warming, the emission of one ton of a greenhouse gas will absorb over time. The larger the GWP, the more that a given gas warms the Earth compared to CO2.

Greenhouse Gas	GWP
Carbon Dioxide (CO ₂)	1
Nitrous N ₂ O	273
Methane (CH ₄)	29.8

Sustainability Framework Fund Incentives Program Surveys

At the May 27, 2026, SFAC meeting, the Committee requested to see the survey questions that were sent to rebate recipients. The survey questions for the three surveys are below.

Electric Bike Survey Questions

1. Please select your zip code
 - a. 76201
 - b. 76205
 - c. 76207
 - d. 76208
 - e. 76209
 - f. 76210
2. What factors influenced your decision to purchase an e-bike? Check all that apply
 - a. Cost
 - b. Environmental Impact
 - c. Convenience
 - d. Health benefits
 - e. Other (please specify)
3. Is your e-bike your primary mode of transportation?
 - a. Yes
 - b. No
4. How do you primarily use your e-bike?
 - a. Commute to work/school
 - b. Recreational Rides
 - c. Running Errands
 - d. Exercise/fitness
 - e. Other
5. How often do you typically use your e-bike?
 - a. Daily
 - b. A few times a week
 - c. About once per week
 - d. A few times per month
 - e. Rarely
 - f. Never
6. How far do you typically ride your e-bike in one trip?
 - a. Less than 1 mile
 - b. 1-5 miles
 - c. 6 -10 miles
 - d. 11-15 miles
 - e. More than 15 miles
7. What type of terrain do you typically ride your e-bike on?
 - a. City Streets
 - b. Paved Trails
 - c. Off-road Trails
 - d. Other (Please specify)_____
8. Did this e-bike replace your use of a gasoline/diesel vehicle or a non-motorized bicycle?
 - a. Yes
 - b. No

9. Where do you typically charge your e-bike?
 - a. At a single-family home
 - b. At an apartment or townhome building
 - c. At Work
 - d. At a Public Charging Station
 - e. Other (please specify) _____
10. Where do you store your e-bike? Check all that apply
 - a. Inside home (Garage, hallway, etc.)
 - b. Outside home (Patio, Bike rack, etc.)
 - c. Apartment complex/townhome bike storage or bike rack
 - d. Inside your apartment complex/townhome
11. How much did having a rebate offered through the City of Denton influence your purchase of an e-bike?
 - a. Not at all influential
 - b. Slightly influential
 - c. Moderately influential
 - d. Very influential
 - e. Extremely influential
12. Would you or have you recommended this rebate opportunity to a friend/family member?
 - a. Yes
 - b. No

Electric Vehicle Survey Questions

1. Please select your zip code
 - a. 76201
 - b. 76205
 - c. 76207
 - d. 76208
 - e. 76209
 - f. 76210
2. Where do you charge your electric/hybrid vehicle? Check all that apply.
 - a. At a single-family home
 - b. At an apartment/townhome building
 - c. Work (Within City of Denton)
 - d. Work (Outside of City of Denton)
 - e. Public Charging Stations (s) (Within City of Denton)
 - f. Public Charging Stations (s) (Outside of City of Denton)
 - g. Other (please specify) _____
3. Explain the reason you chose to purchase or lease an electric/hybrid vehicle instead of an exclusively gasoline/diesel vehicle?
 - a. Financial
 - b. Environmental impact
 - c. Less maintenance costs
 - d. Convenience
 - e. Other (please specify) _____
4. How many vehicles does your household have?
 - a. 1
 - b. 2
 - c. 3
 - d. 4+
5. How many electric/hybrid vehicles are in your household?
 - a. 1
 - b. 2
 - c. 3
 - d. 4+
6. What percentage of your trips are made using an electric/hybrid vehicle?
 - a. 0-10%
 - b. 11-25%
 - c. 26-50%
 - d. 51-75%
 - e. 76-90%
 - f. 91-100%
7. How many miles per day are you driving your electric/hybrid vehicle?
 - a. 0-5 miles per day
 - b. 6-10 miles per day
 - c. 11-20 miles per day

- d. 21-30 miles per day
 - e. 31-50 miles per day
 - f. 51+ miles per day
8. What are some advantages of having an electric/hybrid?
- a. Open ended
9. What are some disadvantages of having an electric/hybrid?
- a. Open ended
10. How much did having a rebate offered through the City of Denton influence your purchase of an electric/hybrid?
- a. Not at all influential
 - b. Slightly influential
 - c. Moderately influential
 - d. Very Influential
 - e. Extremely influential
11. Would you or have you recommended this rebate opportunity to a friend/family member?
- a. Yes
 - b. No

Electric Lawn Equipment Survey Questions

1. Please select your zip code
 - a. 76201
 - b. 76205
 - c. 76207
 - d. 76208
 - e. 76209
 - f. 76210
2. Which type (s) of electric lawn equipment do you currently own or use?
 - a. Lawn Mower
 - b. String Trimmer/Weed Eater
 - c. Leaf Blower
 - d. Hedge Trimmer
 - e. Saw
 - f. Other (please specify) _____
3. Was this your first time purchasing electric lawn equipment?
 - a. Yes
 - b. No
4. Did your new lawn equipment replace existing gasoline equipment?
 - a. Yes
 - b. No
5. How often do you use your electric lawn equipment during peak season?
 - a. Daily
 - b. A few times per week
 - c. About once per week
 - d. A few times per month
 - e. Rarely
6. What was your main reason for choosing electric over gas-powered equipment?
 - a. Quieter operation
 - b. Lower maintenance
 - c. Environmental benefits
 - d. Cost savings
 - e. Lightweight/easier to handle
 - f. Other (Please specify) _____
7. What are some advantages of owning Electric Lawn Equipment?
 - a. Open ended
8. What have been some disadvantages of owning an Electric Lawn Equipment?
 - a. Open ended
9. How much did having a rebate offered through the City of Denton influence your purchase of electric lawn equipment?
 - a. Not at all influential
 - b. Slightly influential
 - c. Moderately influential
 - d. Very Influential

- e. Extremely influential
10. Would you or have you recommended this rebate opportunity to a friend/family member?
- a. Yes
 - b. No