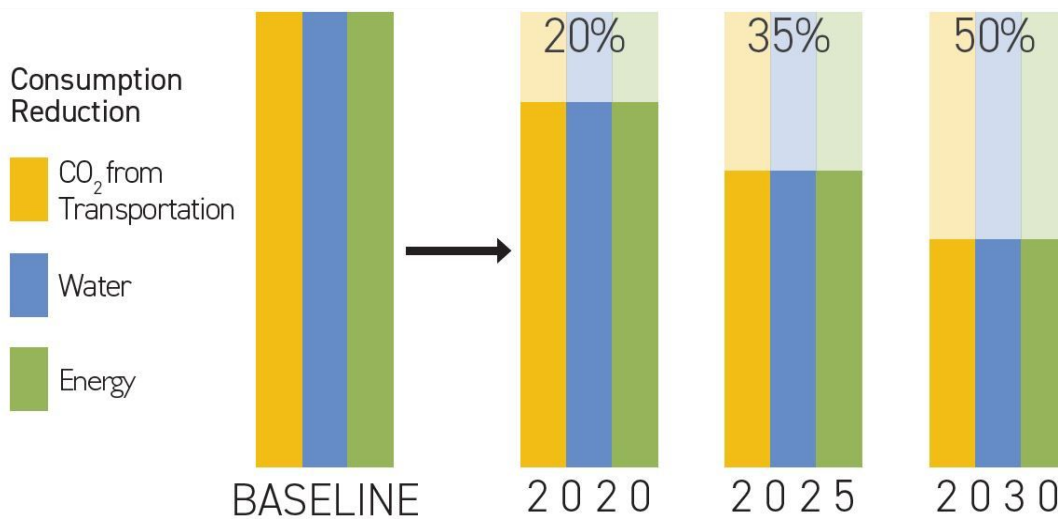


# Ithaca 2030 District Targets: Methods, Assumptions, and Final Data

June 13, 2017 - Updated December 18, 2018

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This document describes the methods used to generate targets for the Ithaca 2030 District Individual Member Buildings and the District-Wide Buildings. Targets are calculated based on the 2030 Challenge for Planning<sup>1</sup> guidelines, in which buildings are required to reduce fossil-fuel operating energy consumption, water consumption, and CO<sub>2</sub> emissions from transportation compared to the median. To accurately compare buildings, the Ithaca 2030 District reports targets as intensities (e.g. Energy Use Intensity (EUI) in kbtu/ft<sup>2</sup>, Water Use Intensity (WUI) in gal/ft<sup>2</sup> and Emissions Due to Transportation in kgCO<sub>2</sub>/ft<sup>2</sup>). Data regarding the performance of individual member buildings in Tables 1, 2, and 5 is confidential and has been redacted in the public version of this document.



## The 2030 Challenge for Planning: Existing Buildings

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**Figure 1:** This is the graphic used by Architecture 2030 to demonstrate the targets for the three categories - energy consumption, water consumption, and CO<sub>2</sub> emissions from transportation.

<sup>1</sup> 2030 Challenge for Planning [http://architecture2030.org/2030\\_challenges/2030\\_challenge\\_planning/](http://architecture2030.org/2030_challenges/2030_challenge_planning/)

# Individual Member Buildings: Water Targets

Quarterly water consumption data for each individual member building was provided to the project team by the Ithaca Water and Sewer Division (IWSD), with whom the District signed a Memorandum of Agreement. This data was recorded and managed using ENERGY STAR’s Portfolio Manager. For each member building, yearly reduction targets were calculated based on the *2030 Challenge for Planning* methodology. Existing buildings are required to reduce water consumption by 20% from the regional average/median by the year 2020, 35% by 2025, and 50% by 2030. New buildings and major renovations are required to immediately reduce water consumption by 50% from the regional average/median. The baseline year used for calculations is 2017. As no median data exists to compare to for this water consumption category, reduction targets were instead calculated using the Ithaca 2030 District Water Baseline.

**Table 1:** Water use intensity (WUI) for the year 2017, and reduction targets for each member building. Gateway Commons - Commercial represents the two businesses on the first floor (Domino’s Pizza and Ithaca Coffee Company).

Property Name	2017 WUI (gal/ft <sup>2</sup> )	Estimated Baseline WUI (gal/ft <sup>2</sup> )	2020 Target (20% reduction)	2025 Target (35% reduction)	2030 Target (50% reduction)
Alternatives Federal Credit Union	████	████	████	████	████
Argos Inn	████	████	████	████	████
City Hall	████	████	████	████	████
Cornell Cooperative Extension TC	████	████	████	████	████
Gateway Commons - Commercial	████	████	████	████	████
HOLT Architects <sup>2</sup>	████	████	████	████	████
Human Services Annex Building	████	████	████	████	████
Ithaca Bakery	████	████	████	████	████
Ithaca Connected	████	████	████	████	████
Press Bay Alley	████	████	████	████	████
Printing Press	████	████	████	████	████
Purity Ice Cream	████	████	████	████	████
Taitem Engineering	████	████	████	████	████
The Space @ Greenstar	████	████	████	████	████
Tompkins County Chamber of Commerce	████	████	████	████	████

<sup>2</sup> HOLT Architects is a major renovation, so its goal is an immediate 50% reduction from the baseline.

## Individual Member Buildings: Energy Targets

Each individual member building signed a Letter of Authorization, allowing the project team to access their electric and gas consumption data using their Point of Delivery ID (PoD ID). This PoD ID acts as a unique identifier for each energy meter. Monthly energy consumption data was obtained directly from NYSEG in accordance with the agreement. This data was recorded and managed using ENERGY STAR's Portfolio Manager. For each member building, yearly reduction targets were calculated based on the *2030 Challenge for Planning*. Existing buildings are required to reduce energy consumption by 20% from the regional average or median by 2020, 35% by 2025, and 50% by 2030. New buildings and major renovations are required to make an immediate 70% reduction below the national average, with incremental targets reaching carbon neutral by 2030.

**Table 2:** Energy use intensity (EUI) for the year 2017, and reduction targets for each member building. Solar generation data is missing for Purity Ice Cream, but once collected, this report will be updated.

Property Name	2017 Site EUI (kBtu/ft <sup>2</sup> )	National Median Site EUI (kBtu/ft <sup>2</sup> )	2020 Target (20% reduction)	2025 Target (35% reduction)	2030 Target (50% reduction)
Alternatives Federal Credit Union	████	████	████	████	████
Argos Inn	████	████	████	████	████
City Hall	████	████	████	████	████
Cornell Cooperative Extension TC	████	████	████	████	████
Gateway Commons - Commercial	████	████	████	████	████
HOLT Architects <sup>3</sup>	████	████	████	████	████
Human Services Annex Building	████	████	████	████	████
Ithaca Bakery	████	████	████	████	████
Ithaca Connected	████	████	████	████	████
Press Bay Alley	████	████	████	████	████
Printing Press	████	████	████	████	████
Purity Ice Cream	████	████	████	████	████
Taitem Engineering	████	████	████	████	████
The Space @ Greenstar	████	████	████	████	████
Tompkins County Chamber of Commerce	████	████	████	████	████

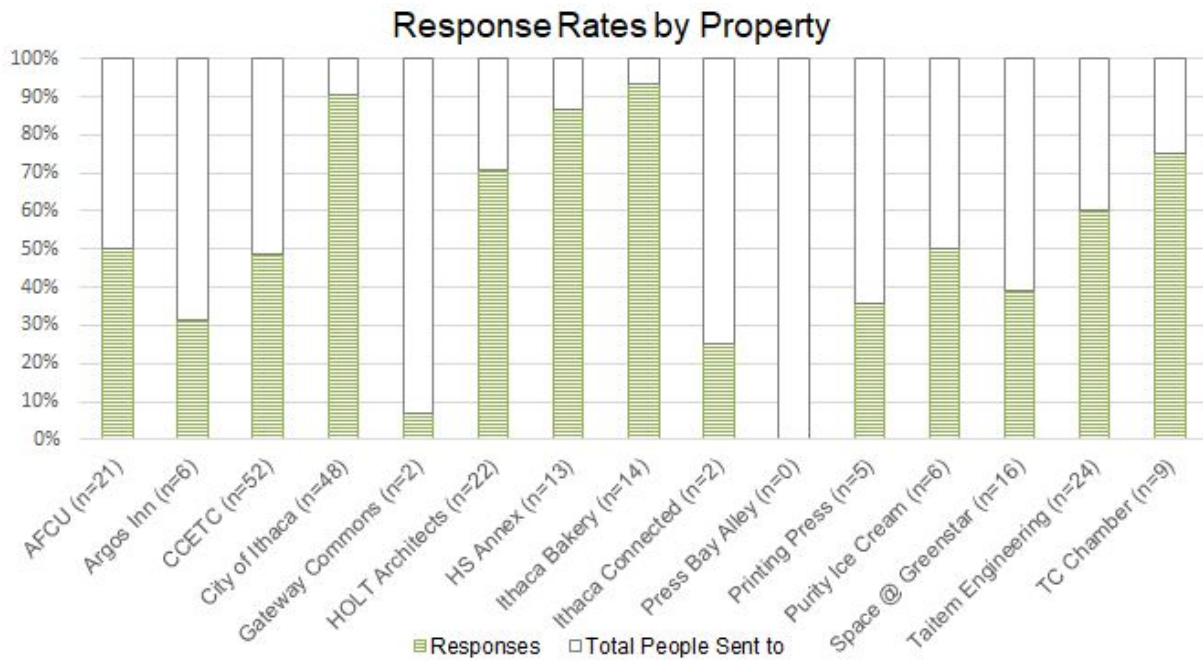
<sup>3</sup> HOLT Architects is a major renovation, so its goal is an immediate 70% reduction below the national average, with incremental targets reaching carbon neutral by 2030.

# Individual Member Buildings: Transportation Targets

To collect transportation data for the District, the project team sent a four question survey to each member building. The four questions were:

1. Where do you work?
2. On a typical day, how do you get to work?
3. If traveling by car, about how many miles per gallon does the vehicle get?
4. How many miles, on average, do you travel to get to work?

The survey has received 254 responses as of June 13<sup>th</sup>, 2018. Fourteen of the responses gave unusable answers for “Where do you work”, and were therefore omitted from the individual building targets. Based on the *Ithaca 2030 District Performance Metric Baselines Report*<sup>4</sup>, there is an estimated 9,003 commuters and 464 buildings within the District. Using this data, we estimate about 20 occupants per building. Therefore, there are estimated to be about 300 occupants within member buildings, translating to a 85% response rate.



**Figure 2:** Response rates for each individual member building. The number next to property names represents the amount of responses from that property.

<sup>4</sup> *Ithaca 2030 District Performance Metric Baselines Report*  
<http://www.2030districts.org/sites/default/files/atoms/files/Ithaca%202030%20District%20Baseline%20Report%20-%20Final.pdf>

The percentage showing how many commuters used one mode over another (the mode split) was calculated using a weighted average based on the number of days each mode was used. Annual miles traveled was calculated by multiplying (miles per trip) x (2 trips per day) x (days worked per week) x (50 weeks per year). Fifty weeks per year was used to account for typical sick days and vacation days. For survey responses that had more than seven days per week, a weighted average was used to get commuters/mode. For the single-occupancy vehicle (SOV), carpools, and electric vehicle modes, gallons per year was calculated by multiplying (percentage the mode was used) x (miles traveled annually) ÷ (miles per gallon). The EPA coefficient 8.89 kgCO<sub>2</sub>/gal of gasoline<sup>5</sup> was used to calculate annual emissions. For the bus mode, annual emissions were calculated using the same methodology as for the baseline: (annual miles traveled) x (EPA emissions coefficient<sup>6</sup>). Dividing total emissions by the number of commuters results in the total emissions per commuter. Using the weighted average results in **1,418 kg CO<sub>2</sub> per commuter per year**.

**Table 3:** Metrics generated from the transportation survey results. Miles traveled only takes into account the commute to and from work, not any work-related traveling. Note that for electric vehicles, emissions were calculated using the given mpge (miles per gallon equivalent) value.

Mode	Mode Split	Annual Miles Traveled	Annual Emissions (kgCO <sub>2</sub> /yr)	Annual Emissions per Commuter (kgCO <sub>2</sub> /psgr/yr)
Single-Occupancy Vehicle	67.7%	995,978	348,628	1,900
Carpool	8.6%	90,615	31,992	1,369
Electric Vehicle	1.8%	28,200	2,819	587
Bus	2.8%	14,250	855	113
Non-Motorized Transit	14.8%	28,159	0	0
Telework	4.2%	-	0	0

Transportation Survey results were compared with the results from the *Ithaca 2030 District Performance Metric Baselines Report* to validate past calculations. To facilitate the comparison, Telework was combined with Non-Motorized Transit, and Single-Occupancy Vehicle was combined with Electric Vehicle. Most of the values are within a small margin of error when compared across reports, which validates the old methodology. The biggest difference between the two results was emissions for the transportation mode Carpool, which could be due to the uncertainty of how many people are in a carpool in this region. For the purpose of calculating targets, carpool vehicles were assumed to each contain two people, which could artificially inflate emissions for this mode if there were actually more than two people per carpool. This assumption results in using the upper bound of carpool emissions as the Carpool mode split input for the overall transportation emissions calculation. The overall baseline<sup>2</sup> of 1,501 kgCO<sub>2</sub>/commuter is very close to the measured value of 1,418 kgCO<sub>2</sub>/commuter.

<sup>5</sup> Environmental Protection Agency Conversion Coefficients  
<https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references>

<sup>6</sup> Emission Factors for Greenhouse Gas Inventories: Table 7  
[https://www.epa.gov/sites/production/files/2015-07/documents/emission-factors\\_2014.pdf](https://www.epa.gov/sites/production/files/2015-07/documents/emission-factors_2014.pdf)

**Table 4:** Comparison of metrics calculated in the baseline to metrics calculated from the transportation survey. Non-motorized transit included teleworkers, bikers and walkers.

BASELINE			SURVEY RESULTS	
Mode	Mode Split	Annual Emissions per Commuter (kgCO <sub>2</sub> /psgr/yr)	Mode Split	Annual Emissions per Commuter (kgCO <sub>2</sub> /psgr/yr)
Single-Occupancy Vehicle	76.9%	1,875	69.5%	2,488
Carpool	5.1%	494	8.6%	1,369
Bus	7.7%	437	2.8%	113
Non-Motorized Transit	10.3%	0	19.0%	0

For each member building, yearly reduction targets were calculated based on the *2030 Challenge for Planning*. Existing buildings are required to reduce CO<sub>2</sub> emissions from transportation by 20% from the regional average/median by the year 2020, and a cumulative 35% by 2025, and 50% by 2030. As no median data exists to compare to for the transportation category, reduction targets were instead calculated using the Ithaca 2030 District Transportation Baseline. Unlike for the Water and Energy Baselines, the Transportation Baseline was calculated based on mode rather than property type. Because of this, each member of the Ithaca 2030 District has the same baseline for emissions per commuter.

**Table 5:** CO<sub>2</sub> emissions due to transportation for the year 2017, and reduction targets for each member building. Gateway Commons is omitted from the results as not enough survey responses were received.

Property Name	Annual Emissions per Commuter (kgCO <sub>2</sub> /psgr/yr)	Baseline Emissions per Commuter (kgCO <sub>2</sub> /psgr/yr)	2020 Target (20% reduction)	2025 Target (35% reduction)	2030 Target (50% reduction)
Alternatives Federal Credit Union	██████	██████	██████	██████	██████
Argos Inn	██████	██████	██████	██████	██████
City Hall	██████	██████	██████	██████	██████
Cornell Cooperative Extension TC	██████	██████	██████	██████	██████
HOLT Architects <sup>7</sup>	██████	██████	██████	██████	██████
Human Services Annex Building	██████	██████	██████	██████	██████
Ithaca Bakery	██████	██████	██████	██████	██████
Ithaca Connected	██████	██████	██████	██████	██████
Press Bay Alley	██████	██████	██████	██████	██████
Printing Press	██████	██████	██████	██████	██████
Purity Ice Cream	██████	██████	██████	██████	██████
Space@Greenstar	██████	██████	██████	██████	██████
Taitem Engineering	██████	██████	██████	██████	██████
Tompkins County Chamber of Commerce	██████	██████	██████	██████	██████

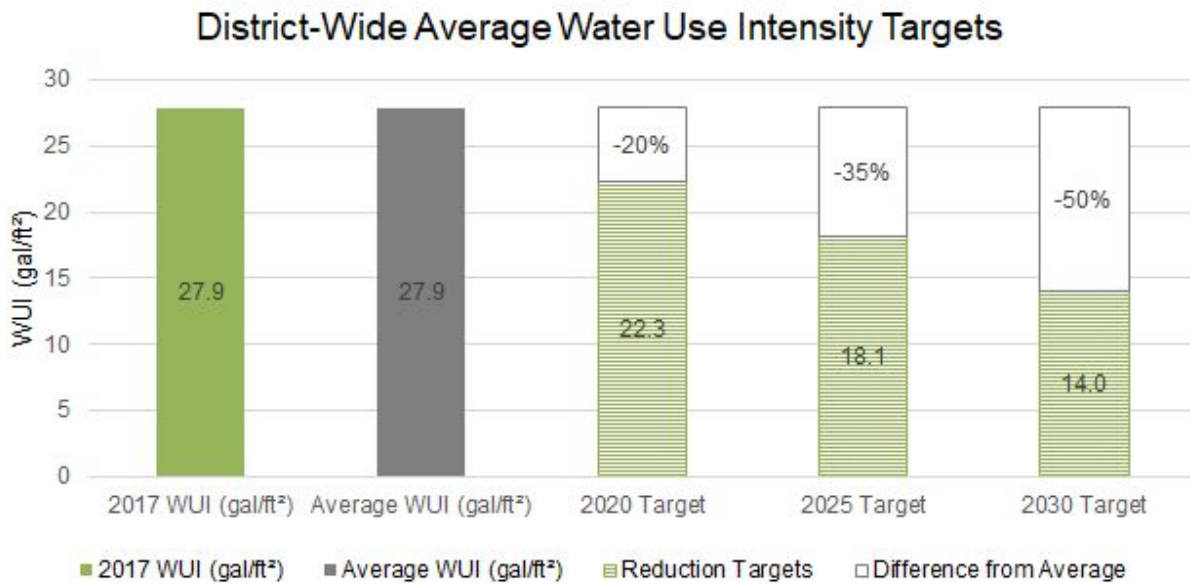
<sup>7</sup> HOLT Architects is a major renovation, so its goal is an immediate 50% reduction from the baseline.

# District-Wide Buildings Targets

Using the individual targets, aggregate targets were created for the District members.

**Table 6:** Water use intensity as a weighted average for the year 2017 based on the number of buildings in each property type (as determined in the Ithaca 2030 Baseline), and reduction targets for each property type.

Property Type	Weighted Average WUI (gal/ft <sup>2</sup> )	Baseline WUI (gal/ft <sup>2</sup> )	2020 Target (20% reduction)	2025 Target (35% reduction)	2030 Target (50% reduction)
Financial Office	10.3	11.4	9.1	7.4	5.7
Hotel	43.8	23.9	19.1	15.5	12.0
Office	7.0	11.4	9.1	7.4	5.7
Restaurant	47.1	84.2	67.4	54.7	42.1
Retail Store	31.2	8.6	6.9	5.6	4.3

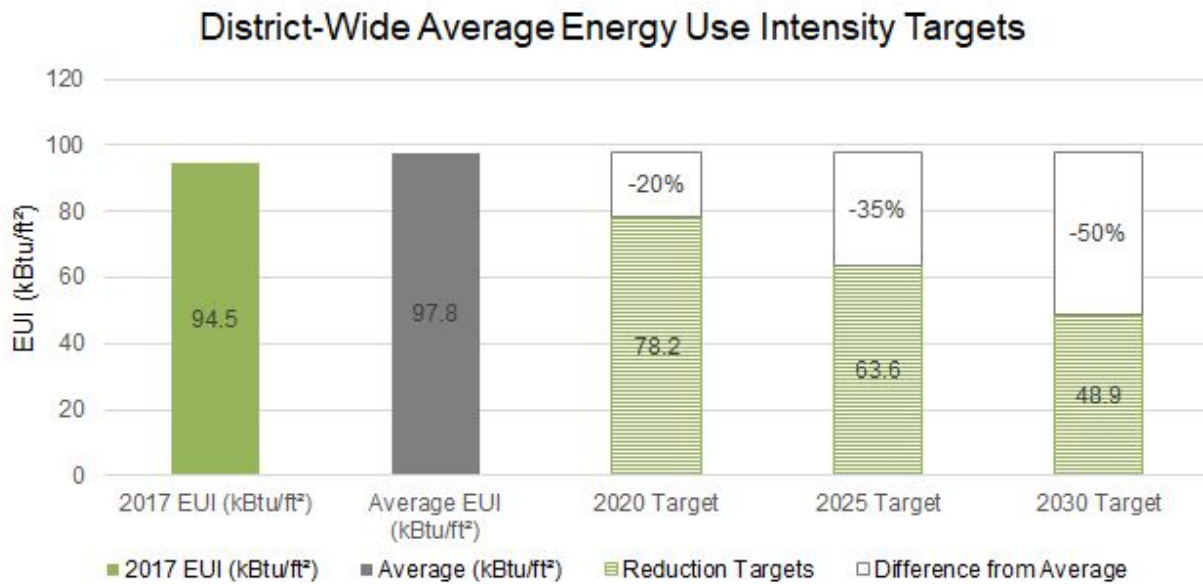


**Figure 3:** Water use intensity targets as an average for the entire Ithaca 2030 District.



**Table 7:** Energy use intensity as a weighted average for the year 2017 based on the number of buildings in each property type (as determined in estimated for the Ithaca 2030 Baseline) and reduction targets for each property type.

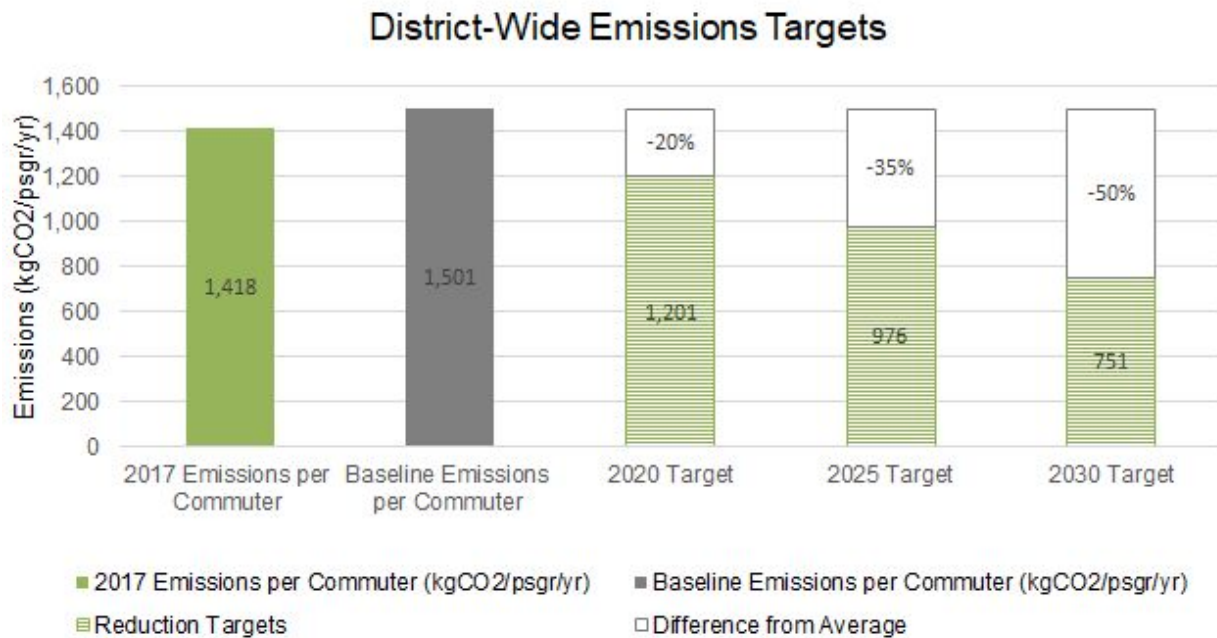
Property Type	Average Site EUI (kBtu/ft <sup>2</sup> )	Average National Median Site EUI (kBtu/ft <sup>2</sup> )	2020 Target (20% reduction)	2025 Target (35% reduction)	2030 Target (50% reduction)
Financial Office	74.7	74.7	59.8	48.6	37.4
Hotel	52.1	59.8	47.8	38.9	29.9
Office	56.5	92.1	73.7	59.8	46.0
Restaurant	252.7	226.0	180.8	146.9	113.0
Retail Store	36.7	36.4	29.1	23.7	18.2



**Figure 4:** Average energy use intensity targets as an average for the entire Ithaca 2030 District.

**Table 7:** Per commuter CO<sub>2</sub> emissions due to transportation (kgCO<sub>2</sub>/ft<sup>2</sup>) calculated from the transportation survey results, estimated for the baseline, and reduction targets for each property type.

Mode	Annual Emissions per Commuter (kgCO <sub>2</sub> /psgr/yr)	Baseline Emissions per Commuter (kgCO <sub>2</sub> /psgr/yr)	2020 Target (20% reduction)	2025 Target (35% reduction)	2030 Target (50% reduction)
Single-Occupancy Vehicle	2,488	1,875	1,500	1,219	938
Carpool	1,369	494	395	321	247
Bus	113	437	350	284	219
Non-Motorized Transit	0	0	0	0	0



**Figure 5:** Transportation emissions targets as an average for the entire Ithaca 2030 District.

# Acknowledgements

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