

# Baseline Community GHG Inventory

## + Electricity and Natural Gas Specifics

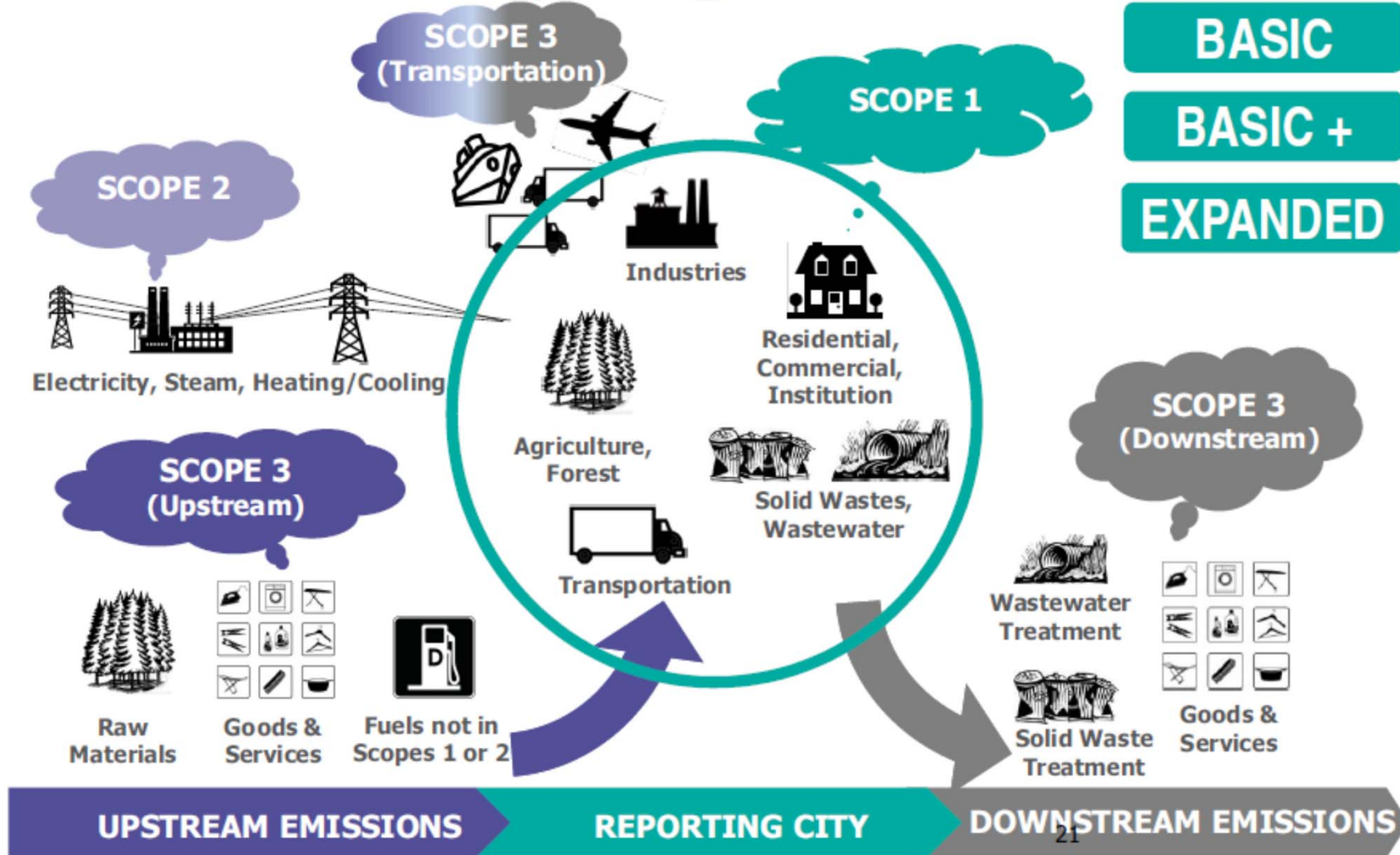
Electricity and Natural Gas TAG  
August 14, 2014

# Protocol

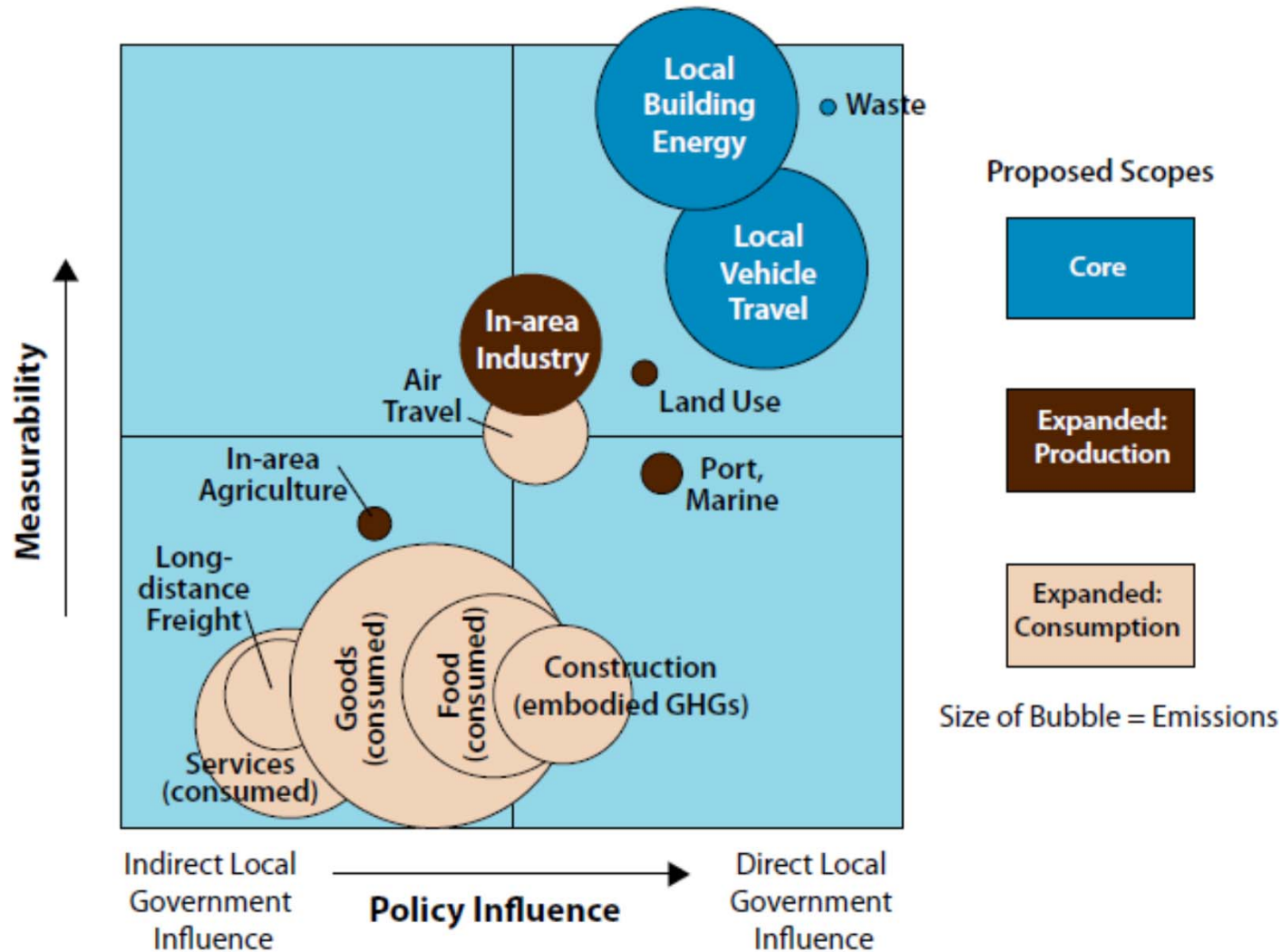
- Developed by ICLEI (Local Governments for Sustainability)
- ICLEI is the world's leading association of cities and local governments dedicated to sustainable development
- Protocol Released October 2012
- Designed to guide *U.S. local governments* to account for and report on community wide greenhouse gas emissions
- One other option – World Resources Institute international accounting tool



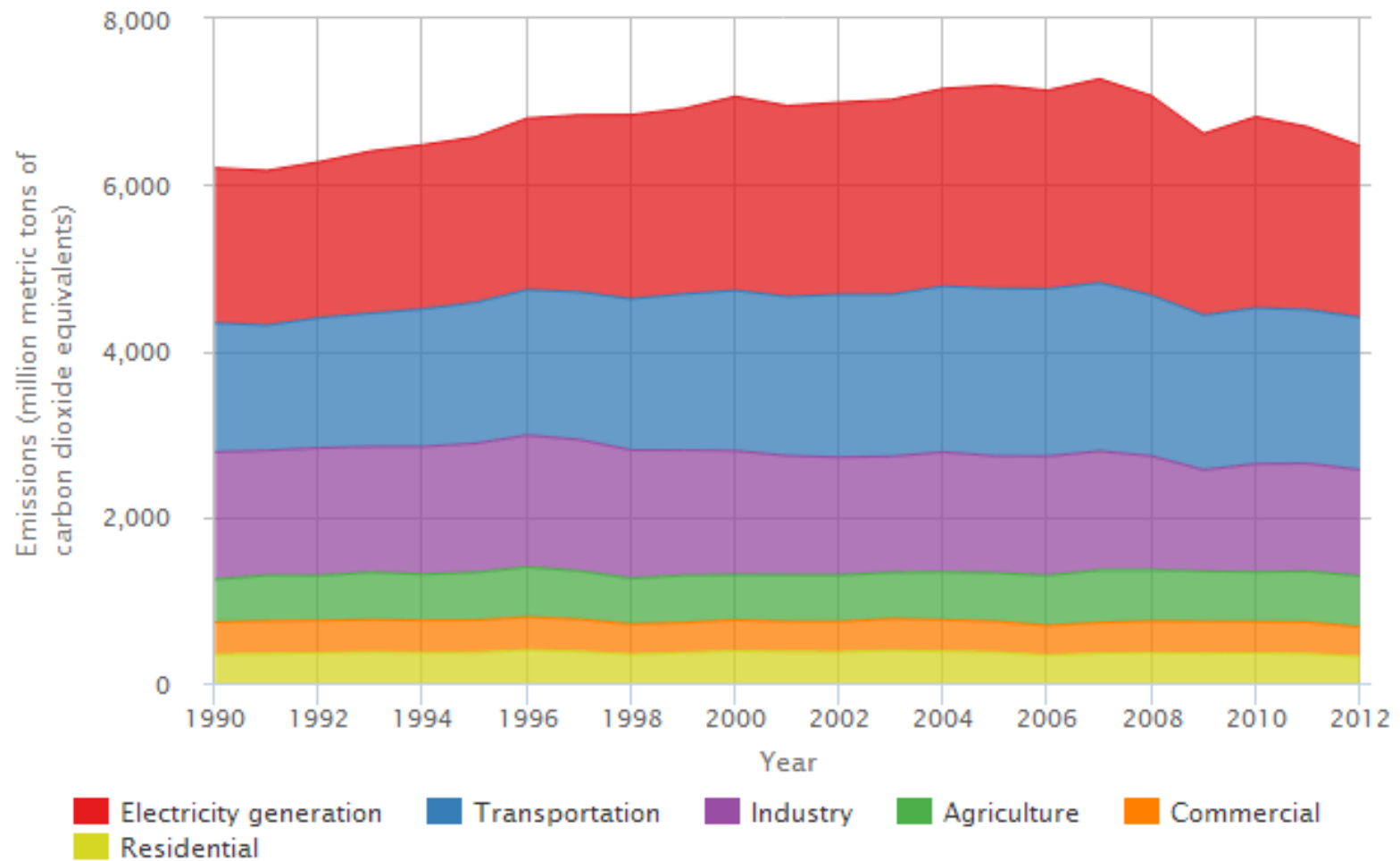
# Illustration of Reporting Framework



# GHG measurability vs influence

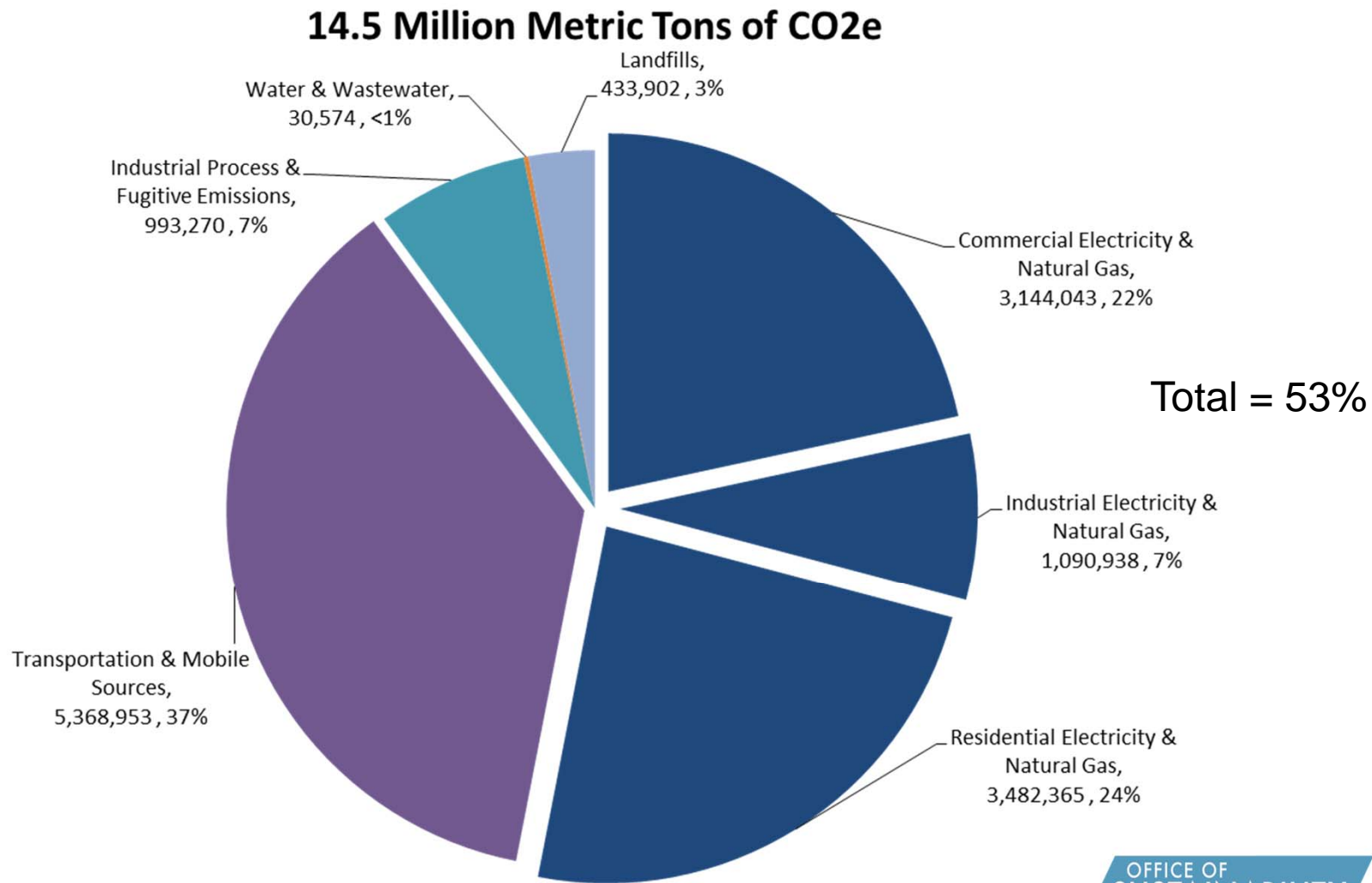


## U.S. Greenhouse Gas Emissions by Economic Sector, 1990-2012



Source: U.S. EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2012.  
<http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html>

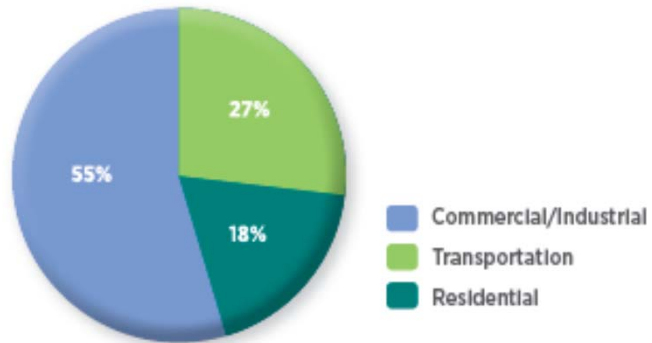
# 2010 Estimated Travis County GHG Inventory



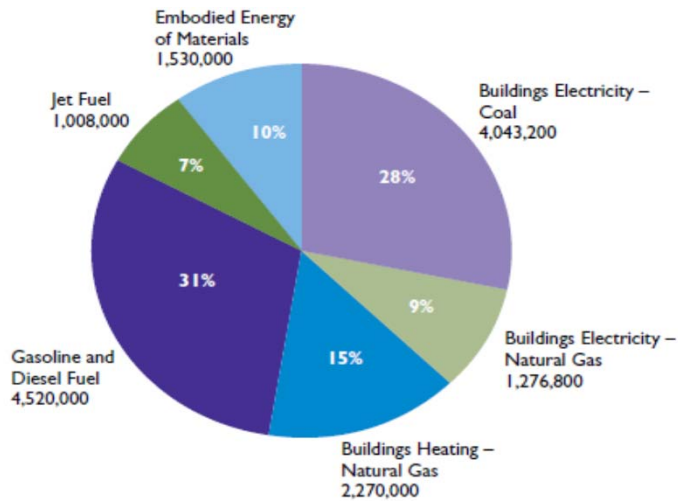


# Other Cities

Boston 2008 GHG Emissions by Sector



Denver 2005



Chicago 2000

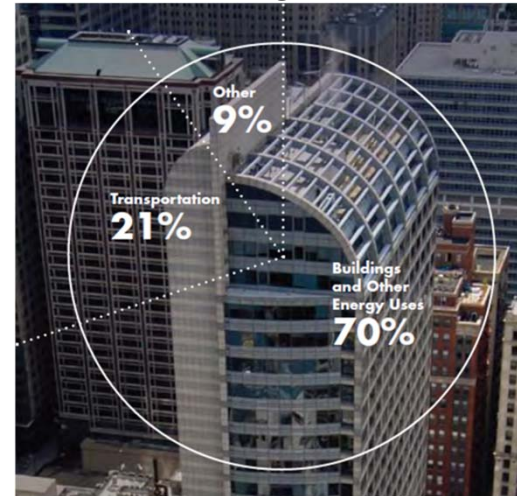
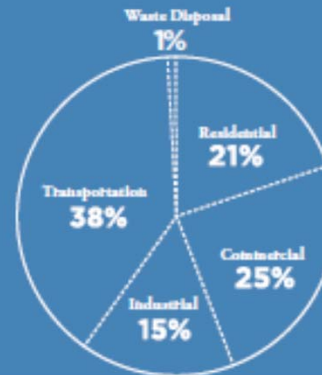
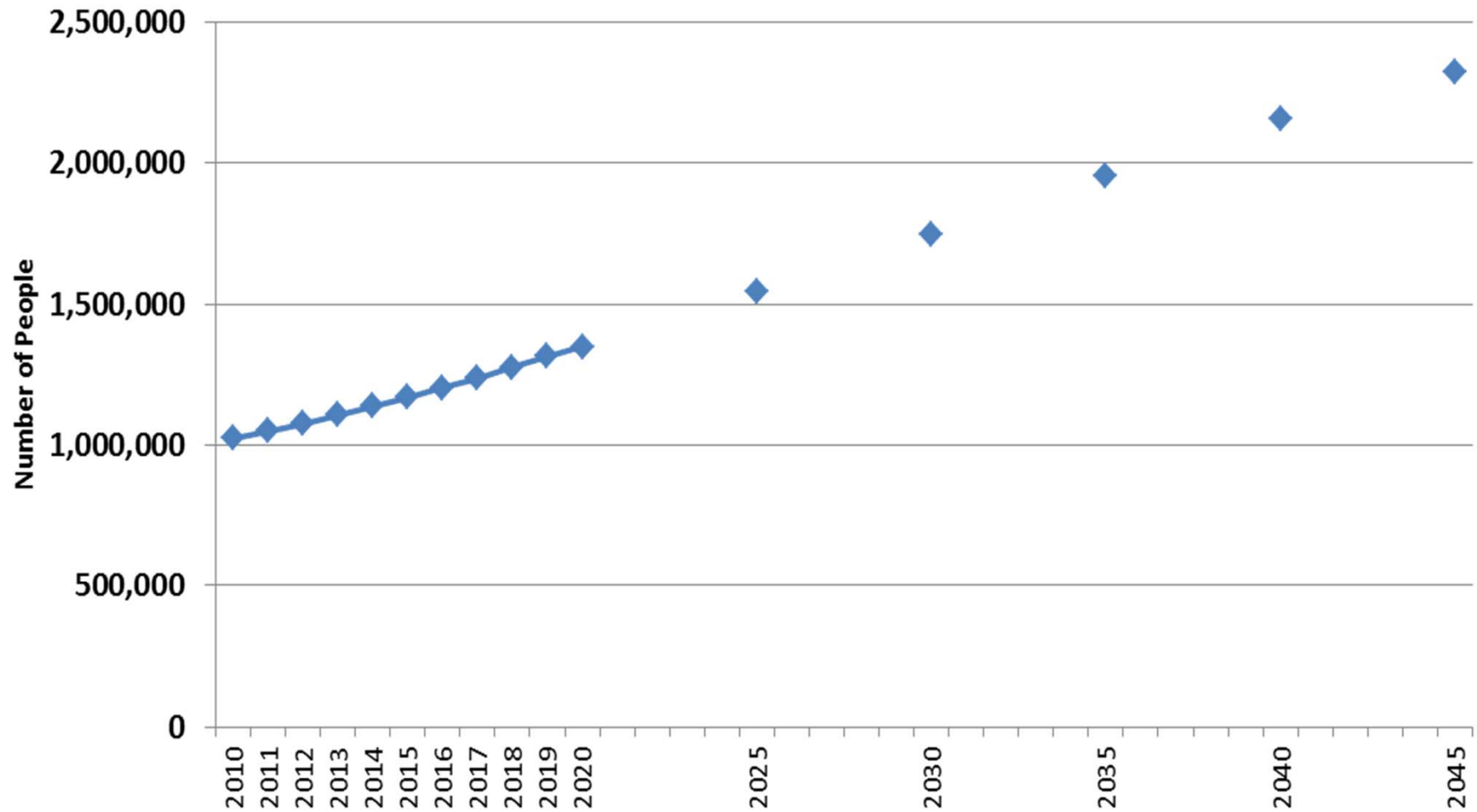


FIGURE 2

2008 MULTNOMAH COUNTY GREENHOUSE GAS EMISSIONS BY SECTOR

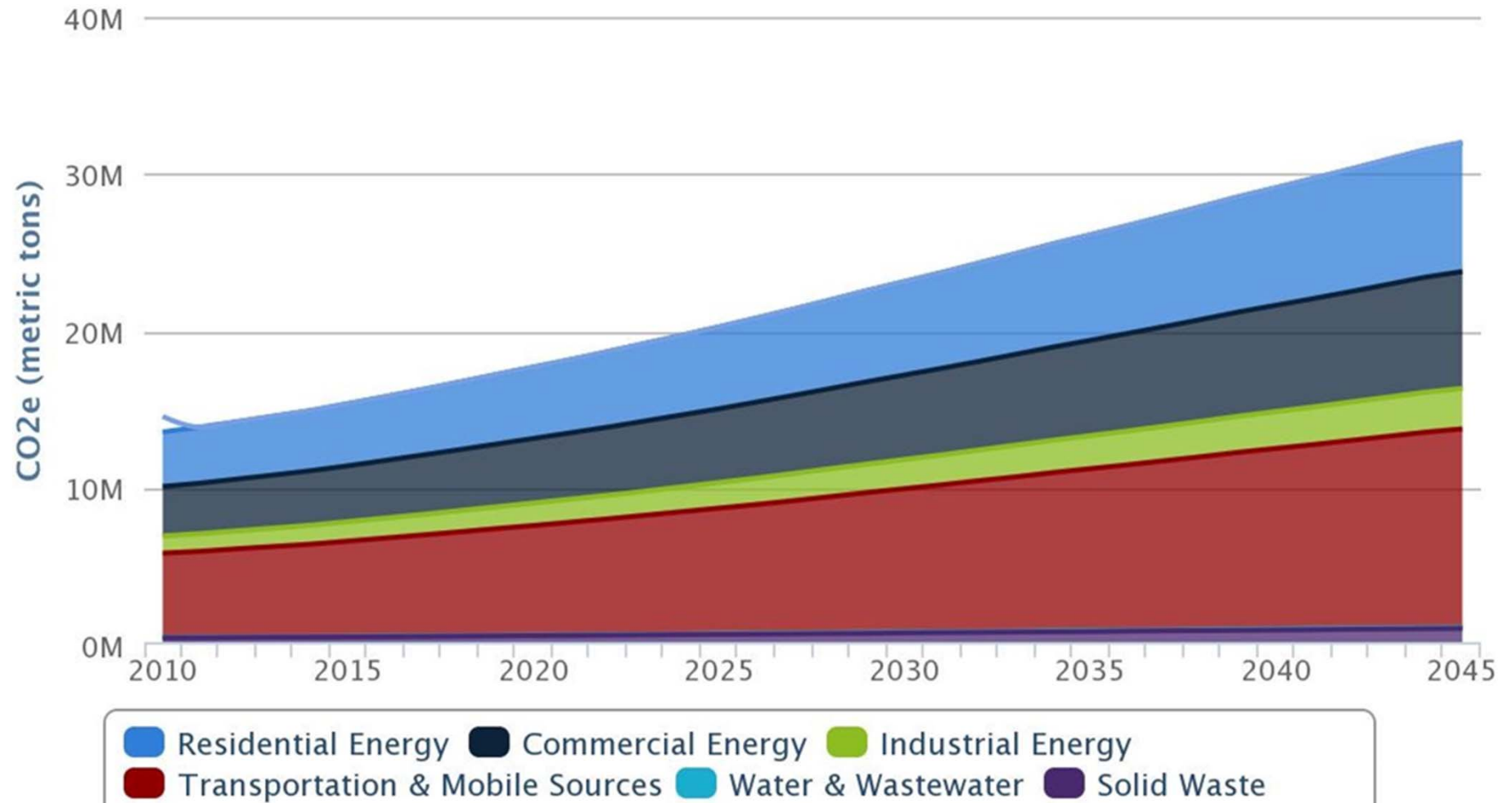


## Population Projections for Travis County

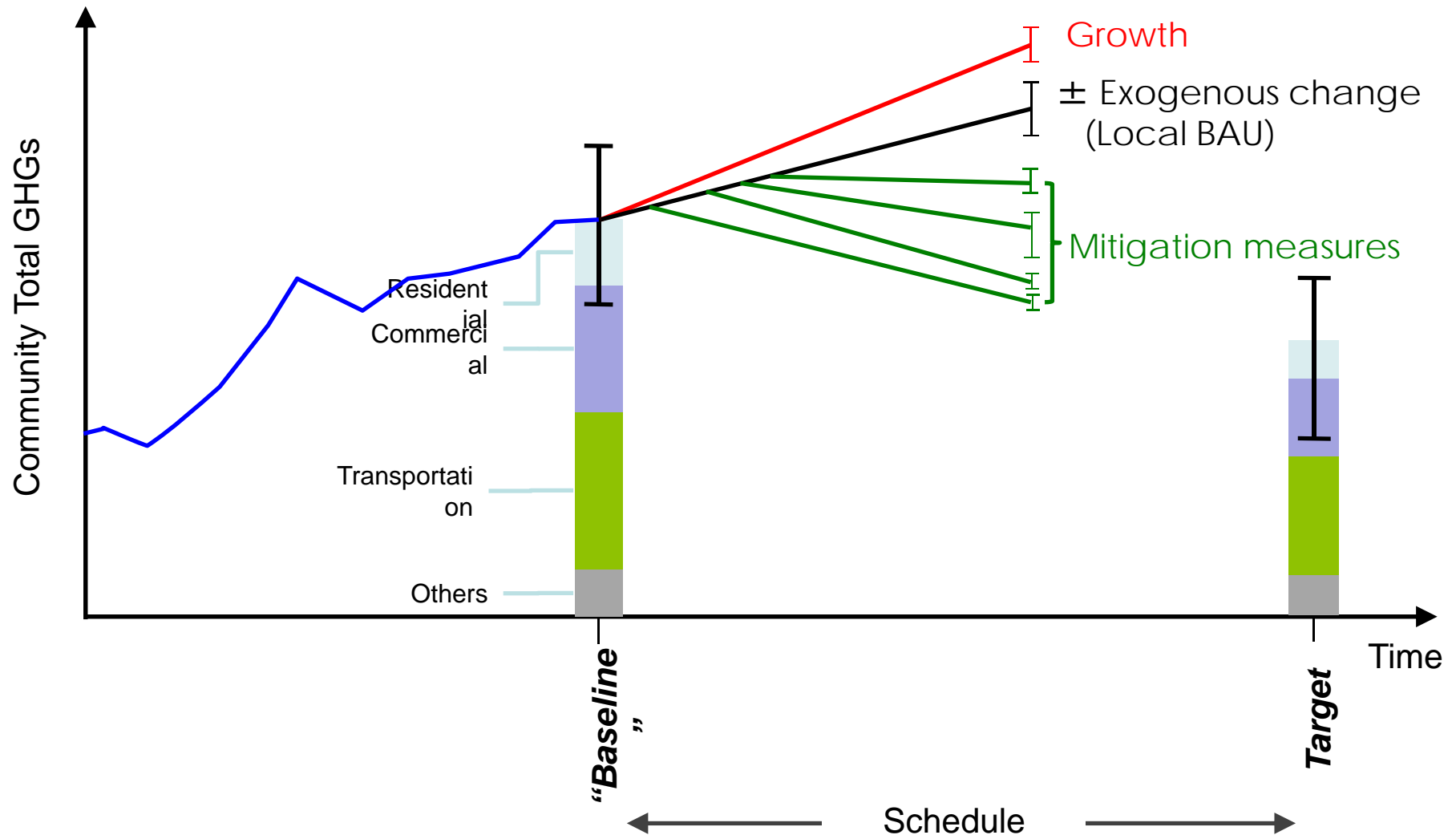




# Emissions and Business as Usual Growth



# The planning paradigm



# Defining Net Zero

- Reduce to the greatest extent possible
  - How do we measure success and know we're there?
  - When is enough, enough?
  - How do state and federal policy influence our progress?
  - There is no magic.
- Offset any remaining emissions
  - Standards?
  - What impact can local biological sinks have?
  - Who would pay?
  - We're a LONG way from 2050

# Reforestation Offset Estimates

- Travis county area =  $990 \text{ mi}^2$  ( $640 \text{ acres} / \text{mi}^2$ ) = 633,600 acres
- Reforestation estimates: 1-7 metric tons of CO<sub>2</sub> per year
  - <http://fas.org/sgp/crs/misc/R40562.pdf>
- 50% reforestation – 1 ton per year on 316,800 acres
  - 316,800 metric tons per year
  - 2% of 15 million tons per year emitted
- 50% reforestation – 7 tons per year on 316,800 acres
  - 2.2 million metric tons per year
  - 14% of 15 million tons per year emitted

# Transportation

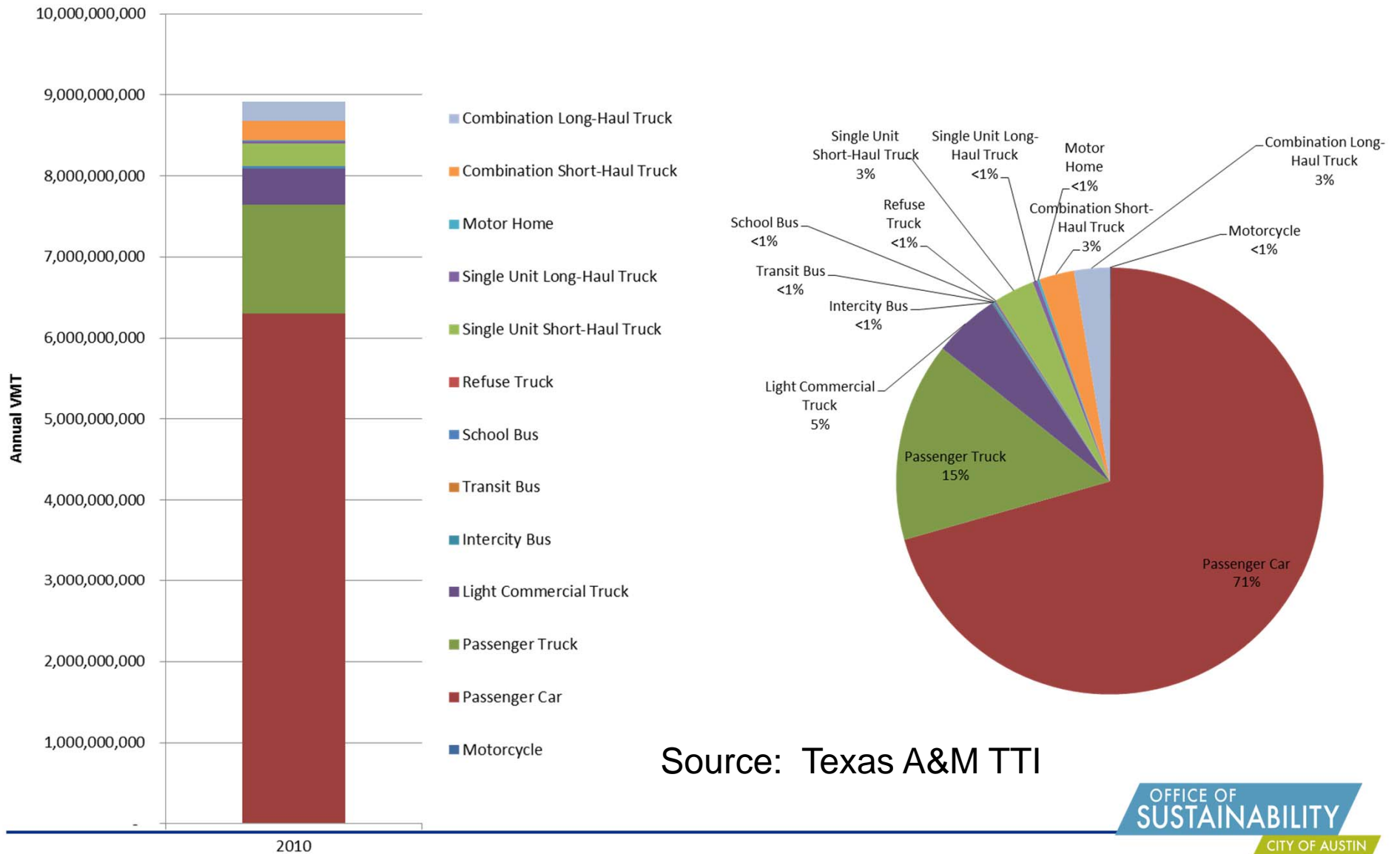
# Estimating Emissions from on-road Vehicles

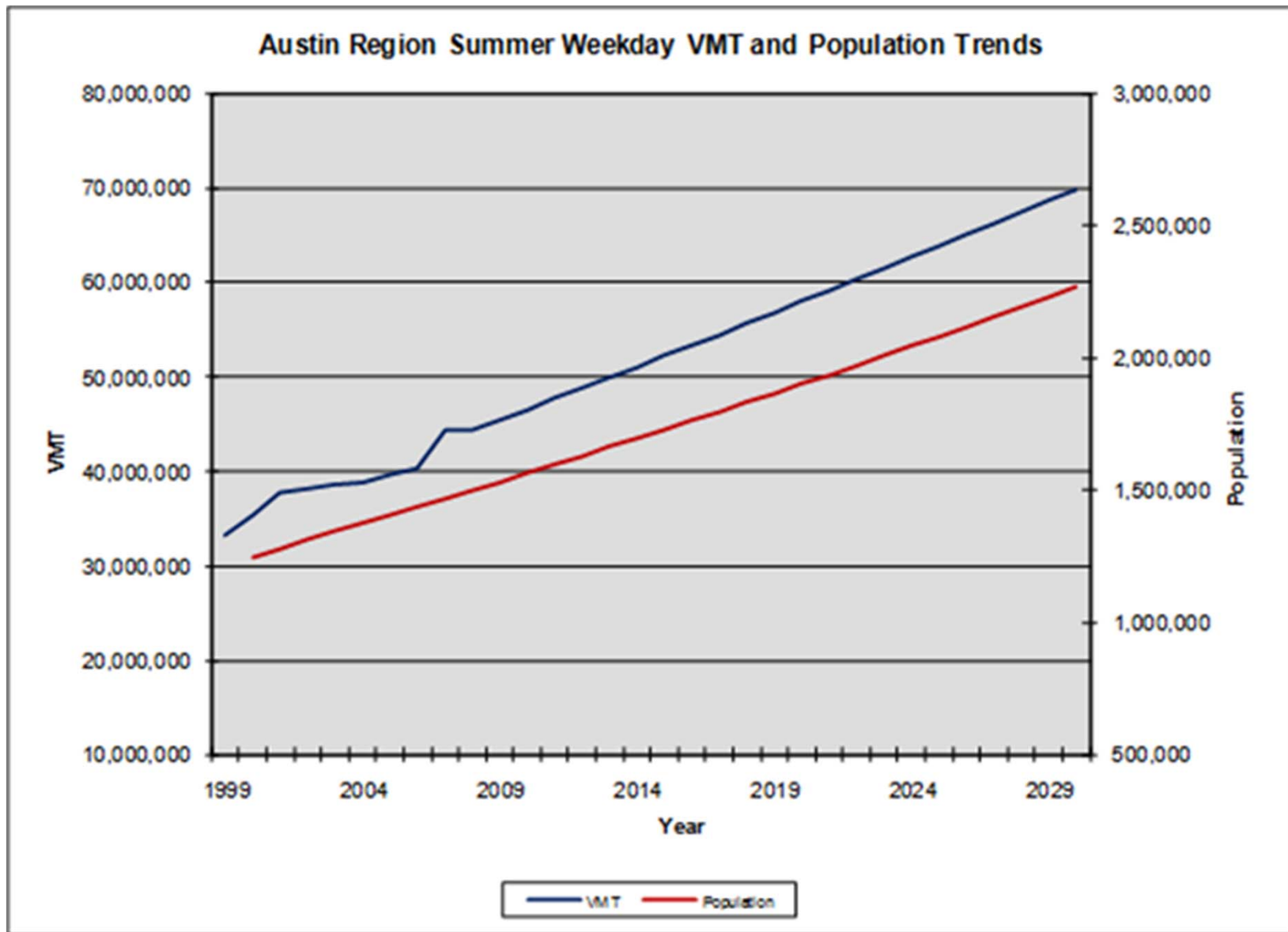
$$\text{Annual Vehicle Miles Traveled (mi)} \times (\text{energy/mile}) \times (\text{CO}_2\text{e/energy}) = \text{Annual CO}_2\text{e}$$

- Annual VMT = Daily VMT x 329 days
- 2010 Data for Travis County *(provided by Texas Transportation Institute)*
  - Summertime weekday VMT totals = 27,106,899
  - Daily CO<sub>2</sub> = 14,219 tons
  - Daily CH<sub>4</sub> = .56 tons
  - Average CO<sub>2</sub> / mi = 0.0005
  - Average mpg = 21.88



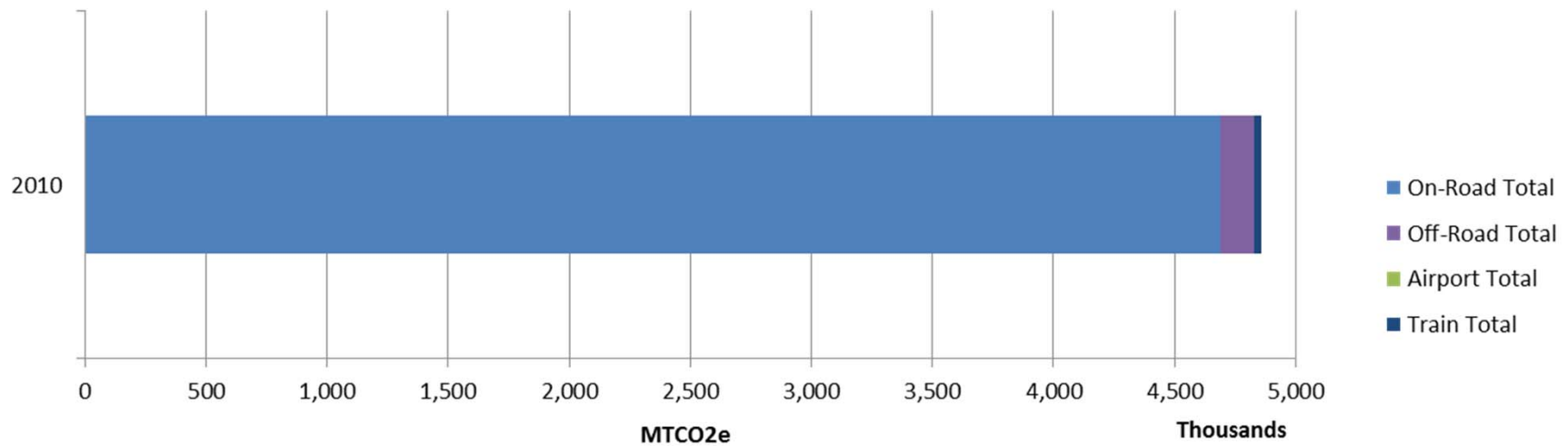
# Vehicle Mix





Source: Texas A&M TTI

# Transportation & Mobile Sources



# Industrial Fugitives

# Reported Emissions from EPA

- Semiconductor
  - Stationary Combustion – Natural Gas used in the destruction of process emissions
  - Process Emissions
    - Nitrous Oxide
    - Sulfur Hexafluoride, Fomblin, Krytox, NF3, Perfluorocyclobutane, Octofluorocyclopentene, PFC-14, PFC-116, HFE-7200, HFE-7500, HT-110, HT-135, HT-170, HT-200, FC-40, HFC-23, HFC-41, PFC-218, FC-3283
- Lime
  - Stationary Combustion in Kilns - Coal & Natural Gas
  - Process Emissions
    - $\text{CaCO}_3 + \text{Heat} \rightarrow \text{CaO} + \text{CO}_2$

**EPA Facility Level Information on Greenhouse Gases Tool (FLIGHT)**

OFFICE OF  
SUSTAINABILITY

CITY OF AUSTIN

# Industrial Process

Source	2011	2012
Freescale EB site	62,897 mtCO <sub>2</sub> e	58,107 mtCO <sub>2</sub> e
Freescale OH site	53,809 mtCO <sub>2</sub> e	59,528 mtCO <sub>2</sub> e
Samsung Austin	406,859 mtCO <sub>2</sub> e	322,024 mtCO <sub>2</sub> e
Spanion	92,188 mtCO <sub>2</sub> e	93,050 mtCO <sub>2</sub> e
Austin White Lime	271,216 mtCO <sub>2</sub> e	301,907 mtCO <sub>2</sub> e
<b>TOTAL</b>	<b>886,969 mtCO<sub>2</sub>e</b>	<b>834,616 mtCO<sub>2</sub>e</b>

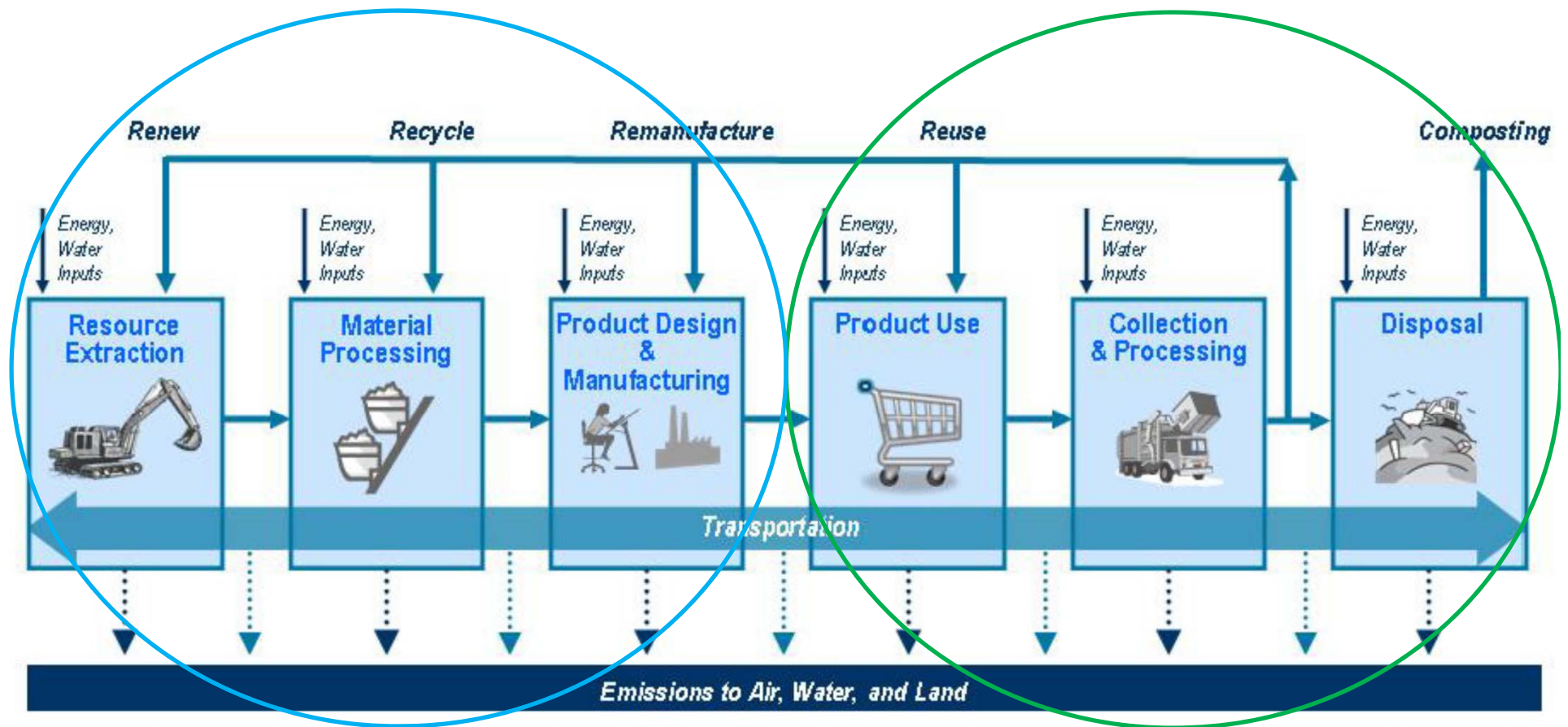
Source: EPA Facility Level Information on Greenhouse Gases Tool (FLIGHT)

<http://ghgdata.epa.gov/ghgp/main.do>



# Waste / Materials Management

# Flow of materials



# Geographic v. Consumption

Figure 1. King County 2008 GHG Emissions by Sector,

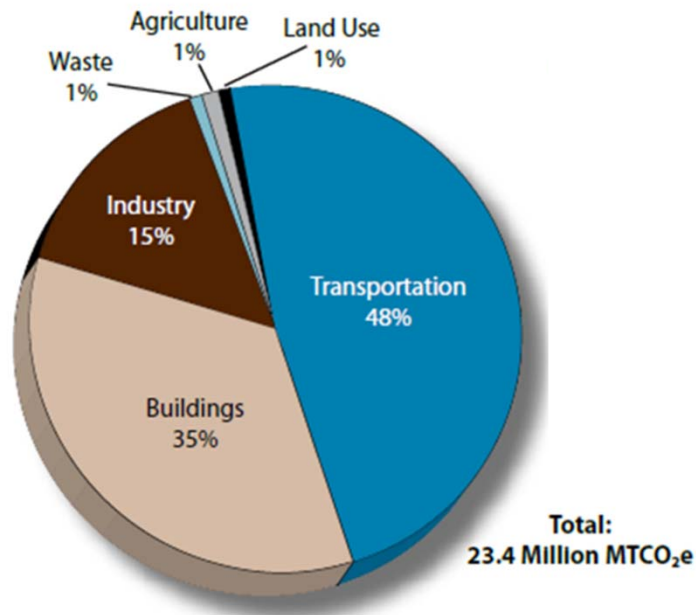
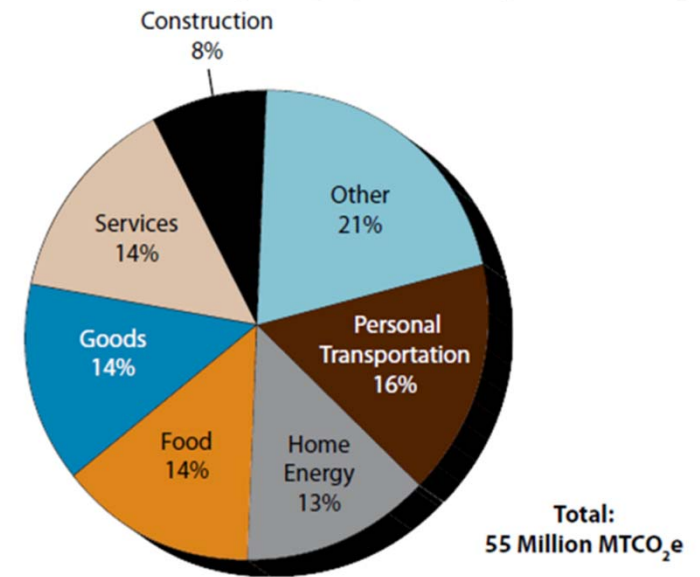


Figure 4. King County 2008 GHG Emissions by Category of Consumption, Consumpt



# Landfills and Wastewater

Source	2010	2011	2012
Texas Disposal Systems Landfill	269,661 mtCO <sub>2</sub> e	293,543 mtCO <sub>2</sub> e	319,286 mtCO <sub>2</sub> e
Sunset Farms Landfill	94,565 mtCO <sub>2</sub> e	78,712 mtCO <sub>2</sub> e	119,776 mtCO <sub>2</sub> e
Waste Management Landfill	60,474 mtCO <sub>2</sub> e	57,935 mtCO <sub>2</sub> e	57,689 mtCO <sub>2</sub> e
FM 812 Landfill	9,193 mtCO <sub>2</sub> e	17,785 mtCO <sub>2</sub> e	25,790 mtCO <sub>2</sub> e
Wastewater treatment plants	32,500 mtCO <sub>2</sub> e	32,500 mtCO <sub>2</sub> e	32,500 mtCO <sub>2</sub> e
<b>TOTAL</b>	<b>466,393 mtCO<sub>2</sub>e</b>	<b>480,475 mtCO<sub>2</sub>e</b>	<b>555,041 mtCO<sub>2</sub>e</b>

Source: EPA Facility Level Information on Greenhouse Gases Tool (FLIGHT)

<http://ghgdata.epa.gov/ghgp/main.do>

# Electricity and Natural Gas

# Sources & Activities

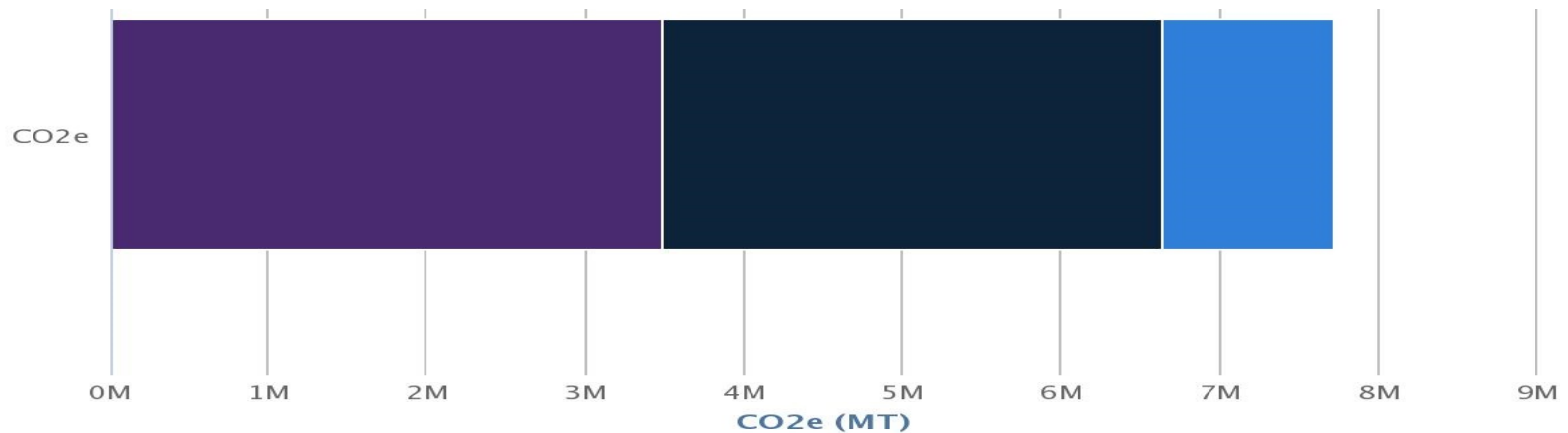
Built environment emissions are attributed to the following sources and activities:

- stationary fuel combustion
- electricity use
- life-cycle (i.e. “upstream”) emissions from energy use
- refrigerant and fire suppressant leakage
- district heating and cooling energy use
- electric power transmission and distribution losses
- electric power production

Included in  
Current  
Inventory  
**Currently Do  
not Track**  
Power Utility  
Inventory

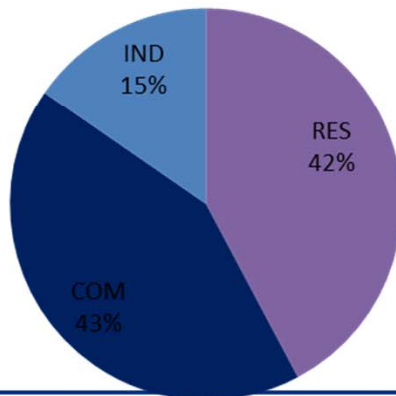


# Electricity & Natural Gas Emissions

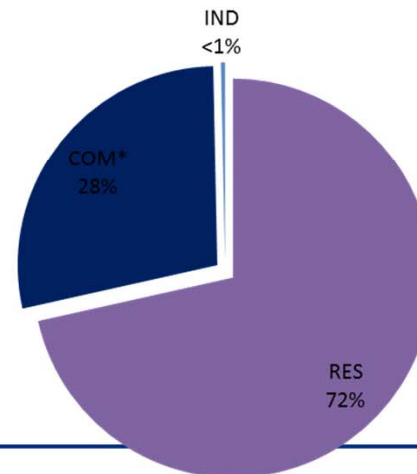


Water & Wastewater Solid Waste Process & Fugitive Emissions Transportation & Mobile Sources Residential Energy Commercial Energy Industrial Energy

**Electricity Use**  
**14.03 Billion kWh**  
**7.4 Million MTCO<sub>2</sub>e**



**Natural Gas Use**  
**112 Million CCF**  
**616,000 MTCO<sub>2</sub>e**



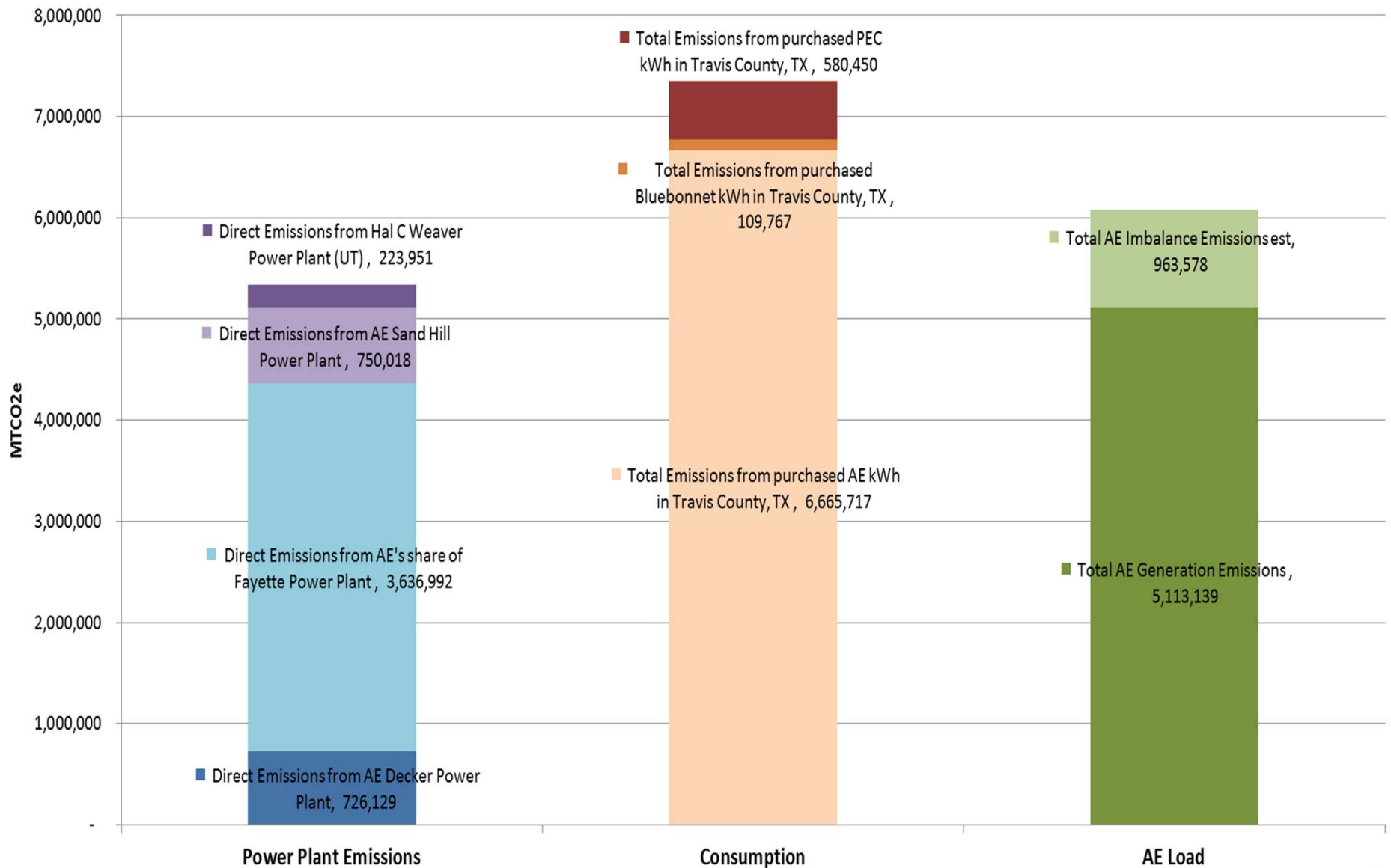
OFFICE OF  
SUSTAINABILITY

CITY OF AUSTIN

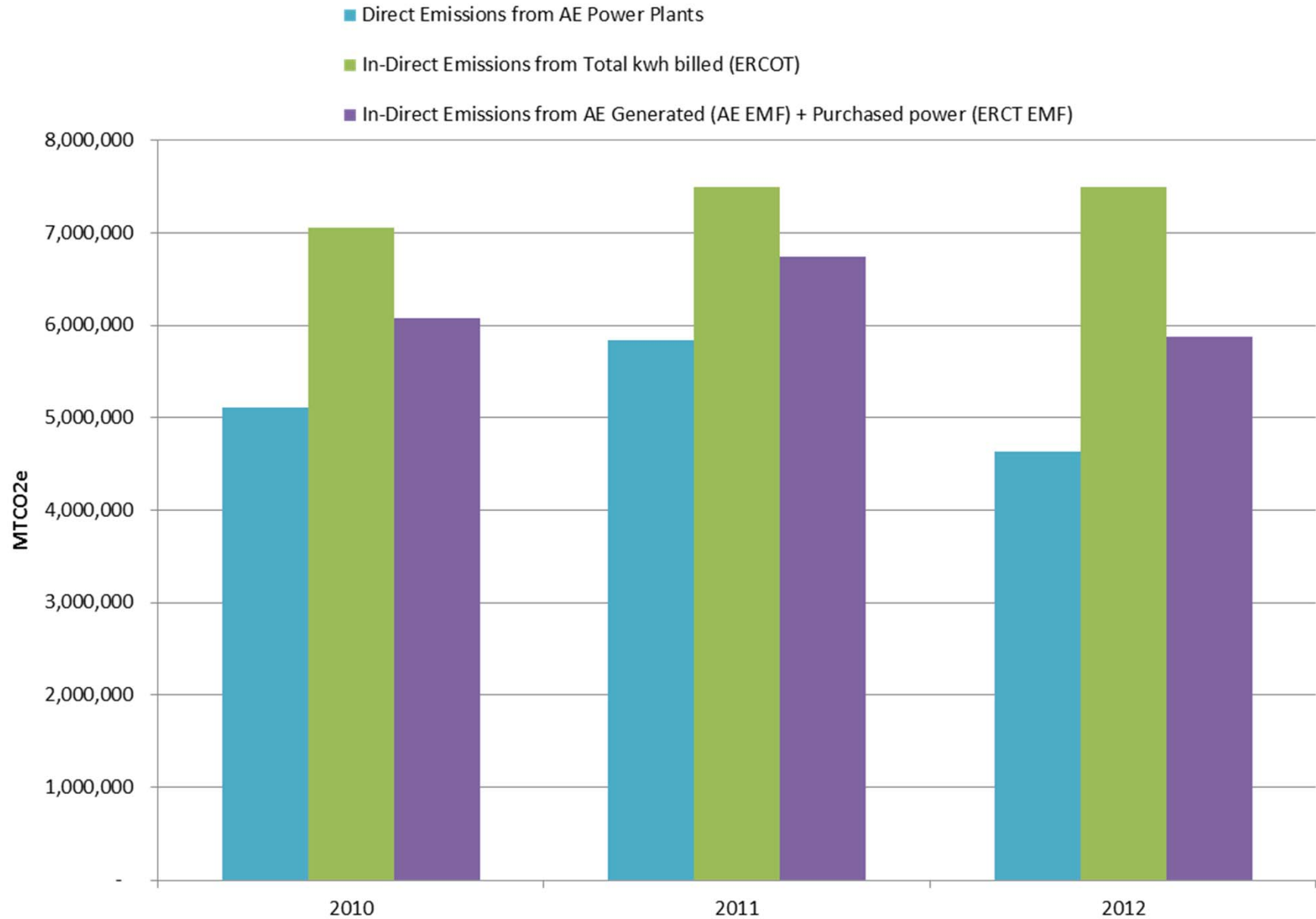
# 3 Approaches

- Power Plant Emissions in Travis County + Fayette
  - Data reported to EPA by Mandatory Reporting Rule standards
- Consumption
  - Total emissions from billed kWh by Travis County customers using ERCOT emission factor of 1.3 lbs/kWh CO<sub>2</sub>e
- AE Load
  - Total emissions from AE owned power plants
  - Total emissions from est kWh imbalance to meet load, purchased by AE using ERCOT emission factor 1.3 lbs/kWh CO<sub>2</sub>e

## 2010 Electricity Carbon Emissions in MTCO<sub>2</sub>e Travis County, TX



## Austin Energy Electricity Emissions



end