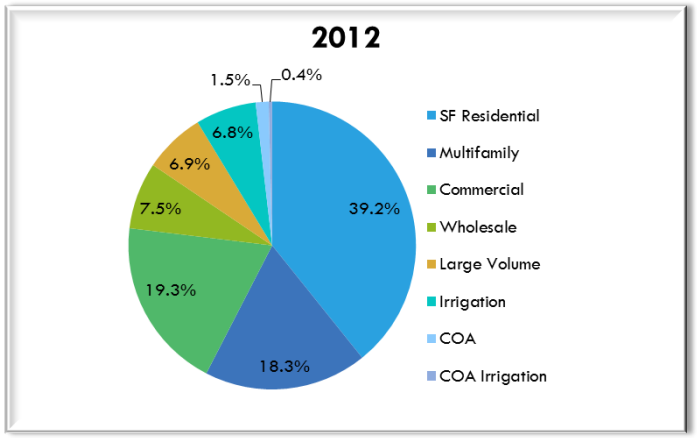
Austin WATER

Austin's Disaggregated Water Demand Model: Using Land Use in a Disaggregated Water Demand Model

April 8, 2019

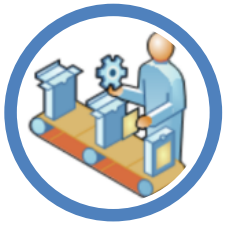
Determining how and where water is used



Residential

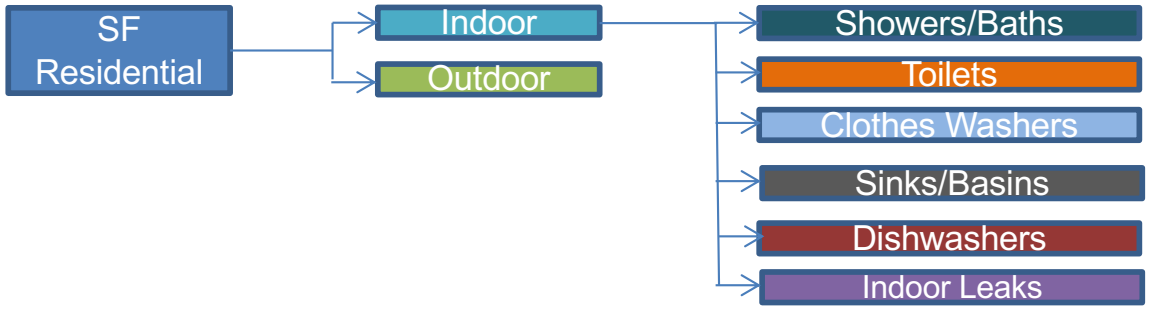
Irrigation

Commercial

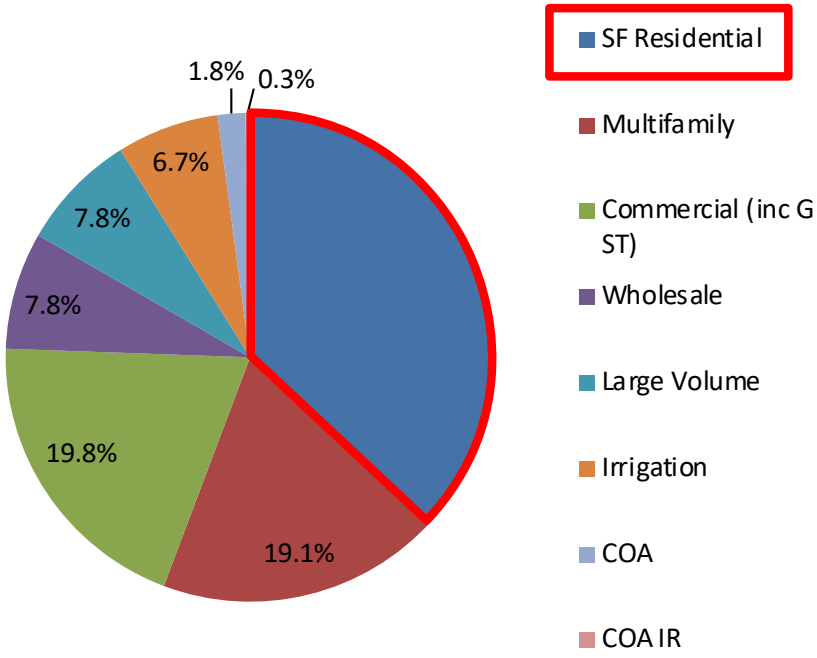


Industrial

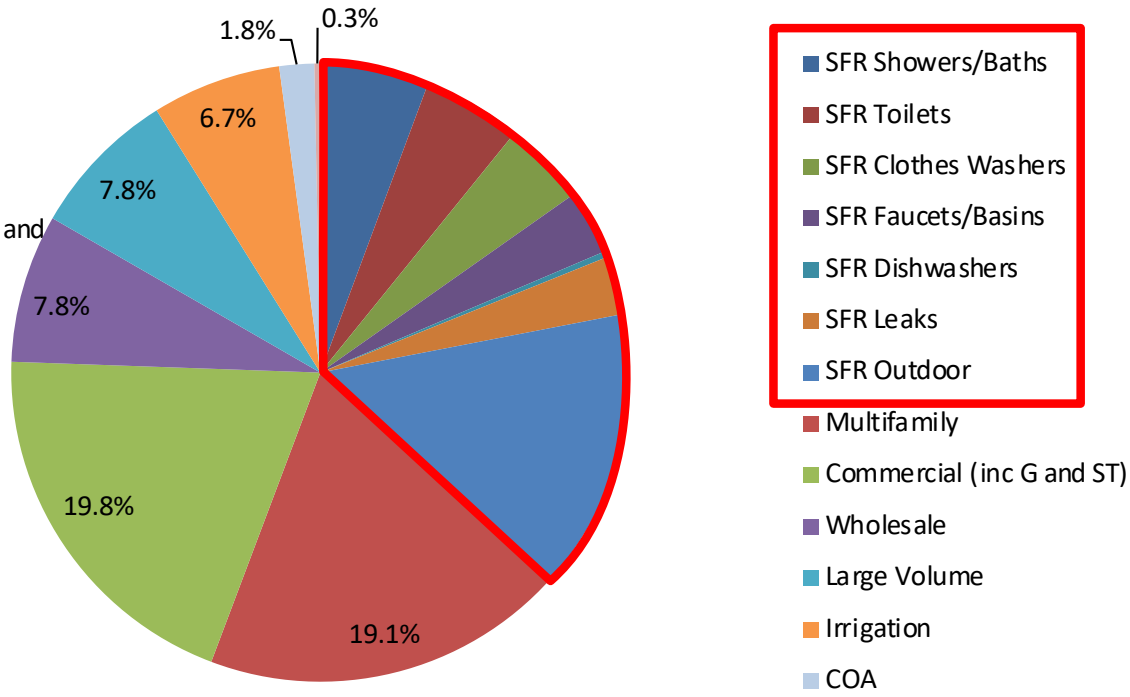
Breaks down water consumption by end-use



2004

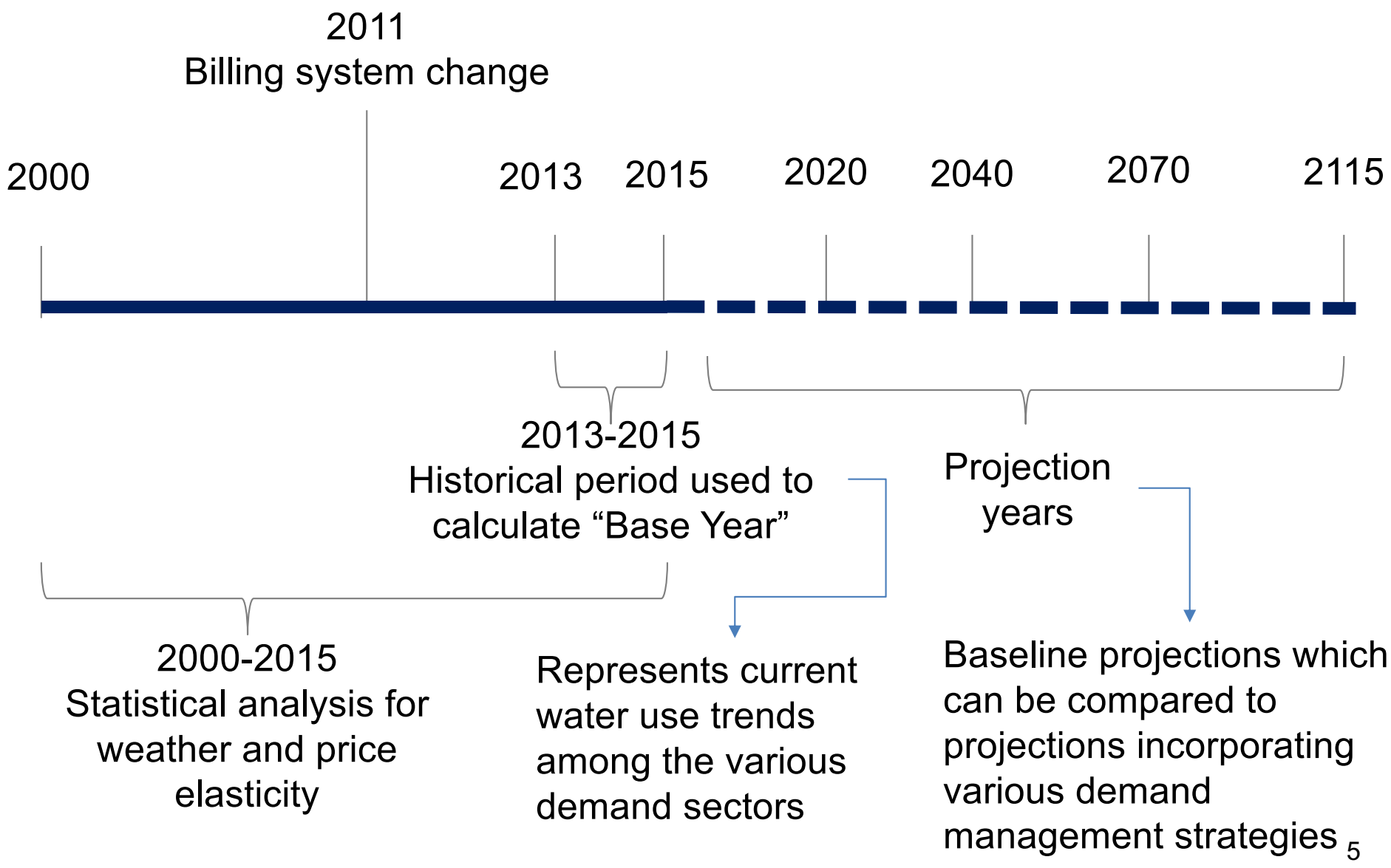


2004 (w/ SFR End-Uses)

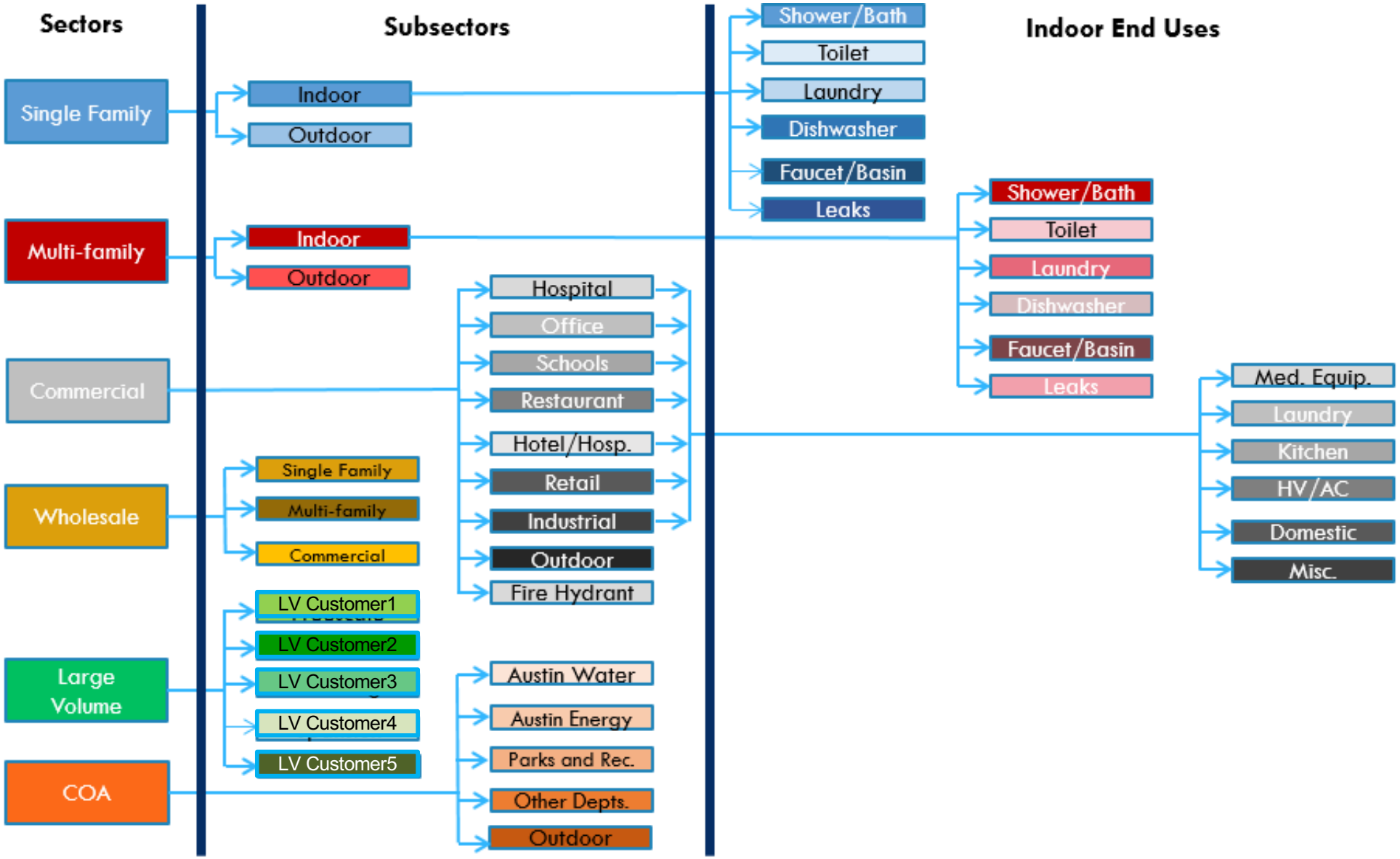


Development of demand projections

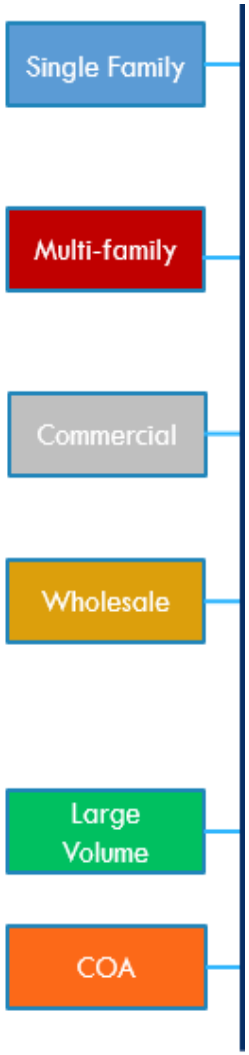
Analysis Timeline

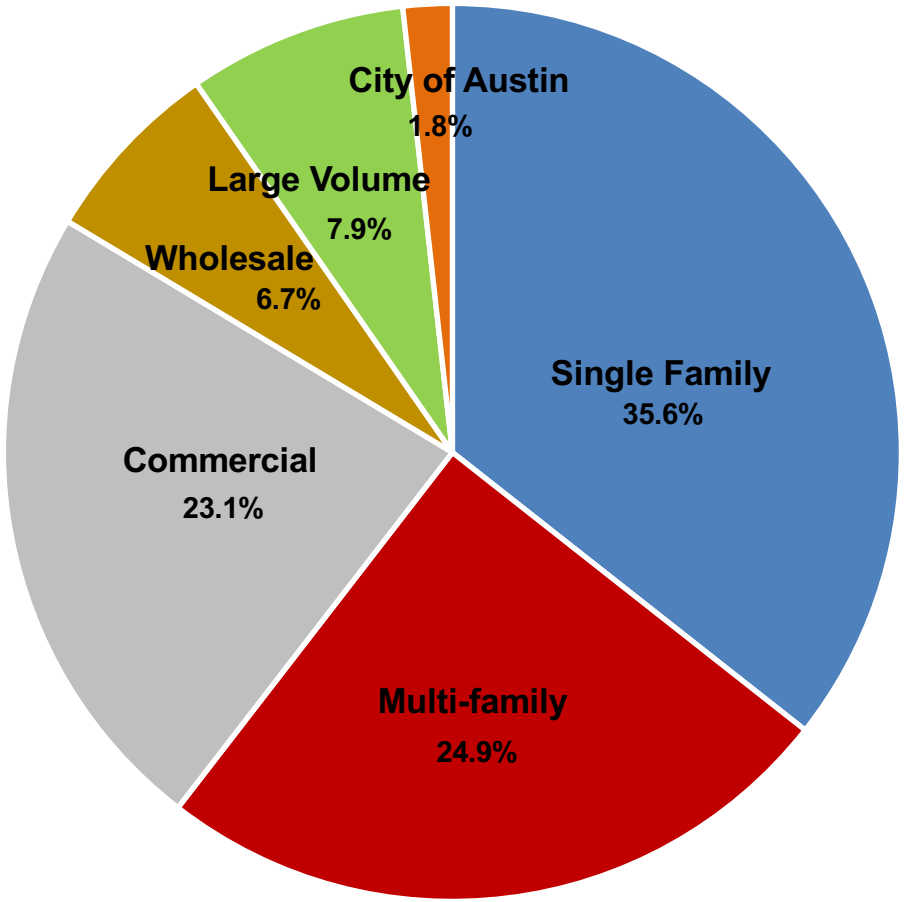


Disaggregation of Customer Data to End Use

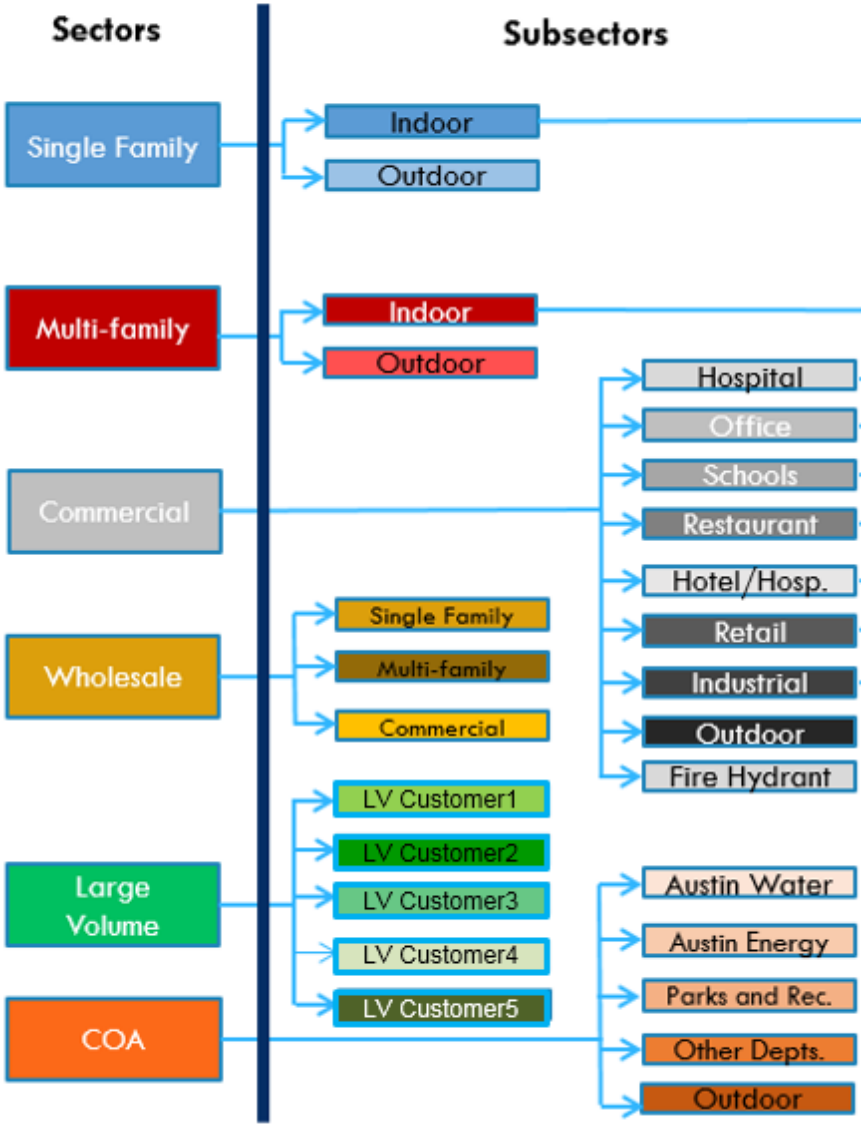


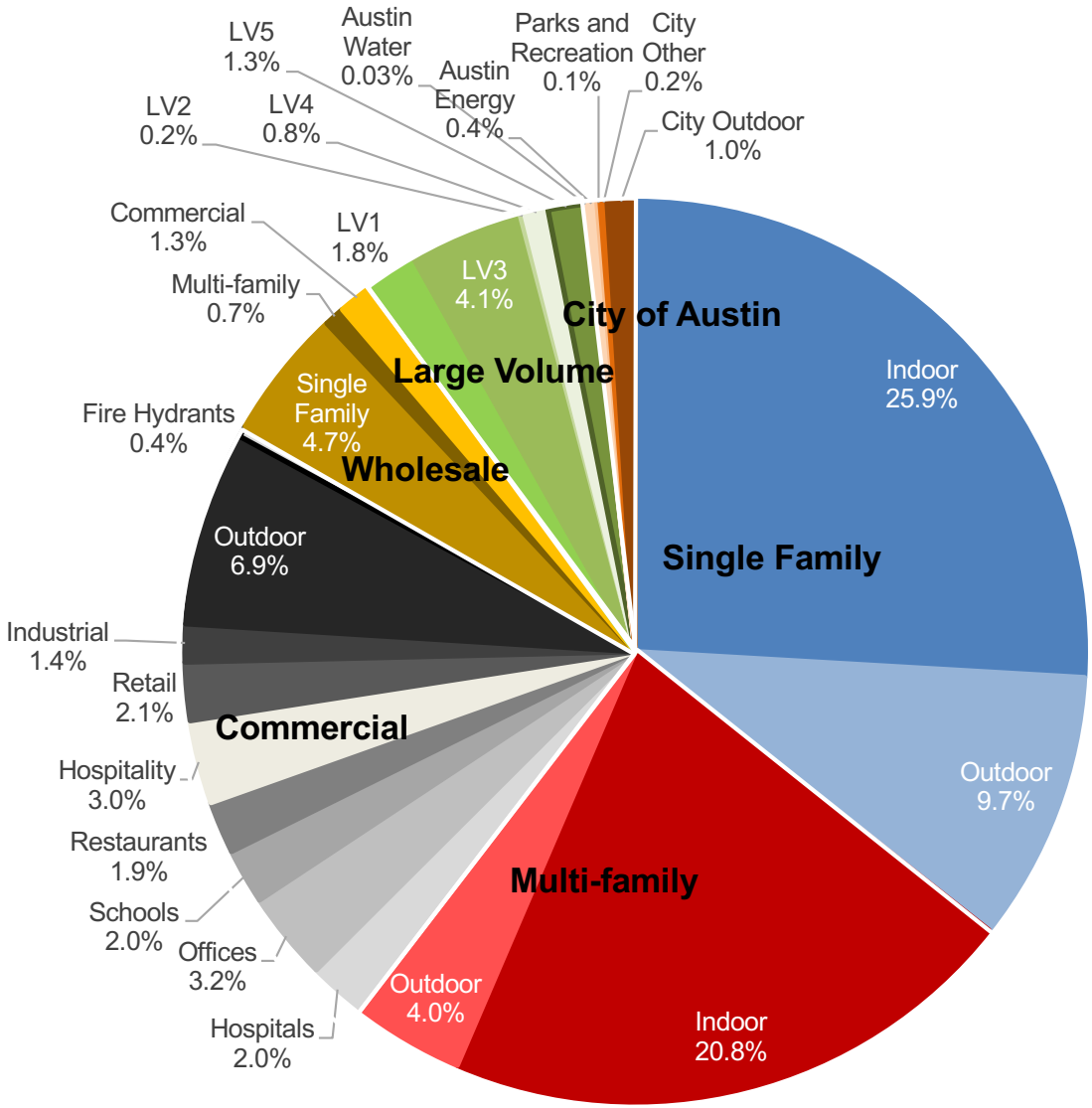
Base Year Consumption Sectors (Averages of 2013-2015)



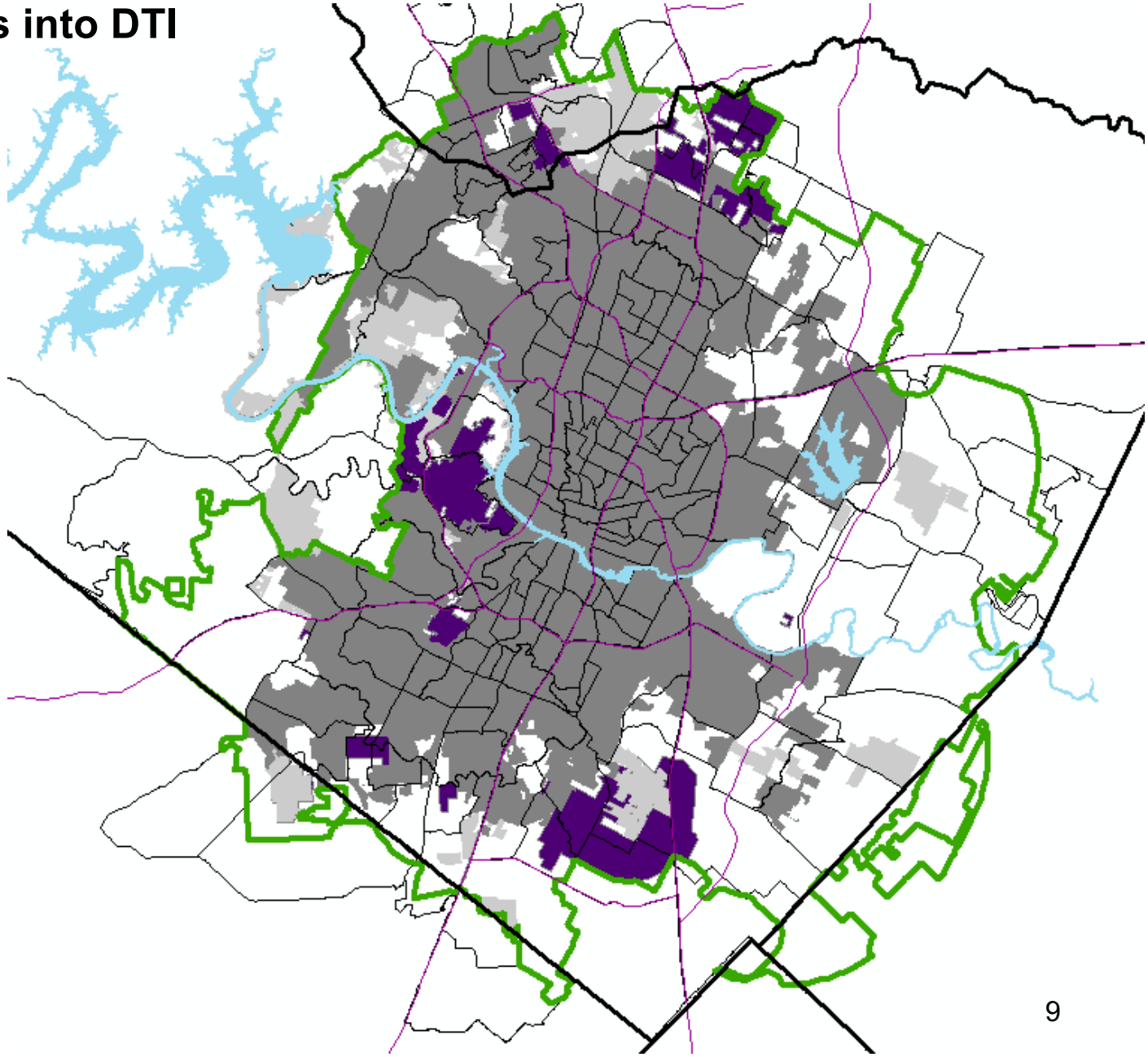


Base Year Consumption Subsectors (Averages of 2013-2015)

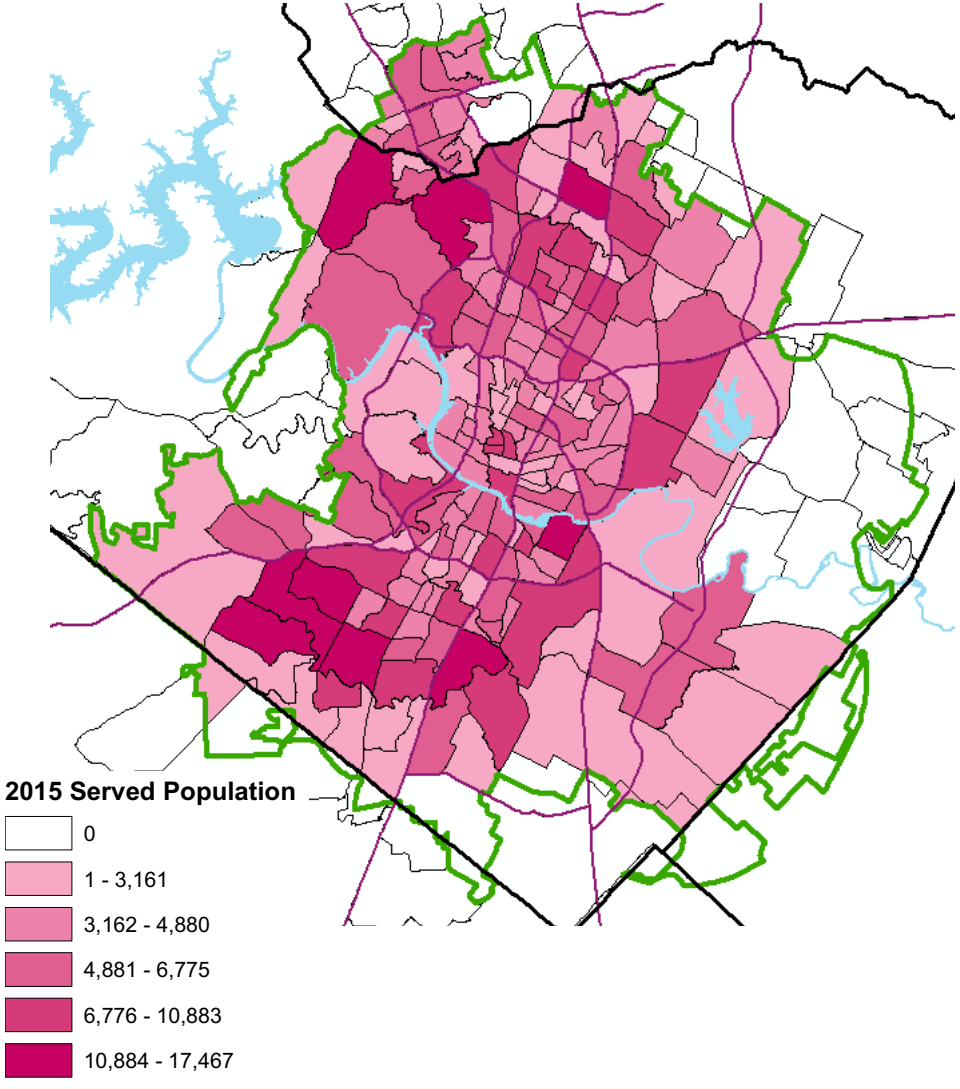




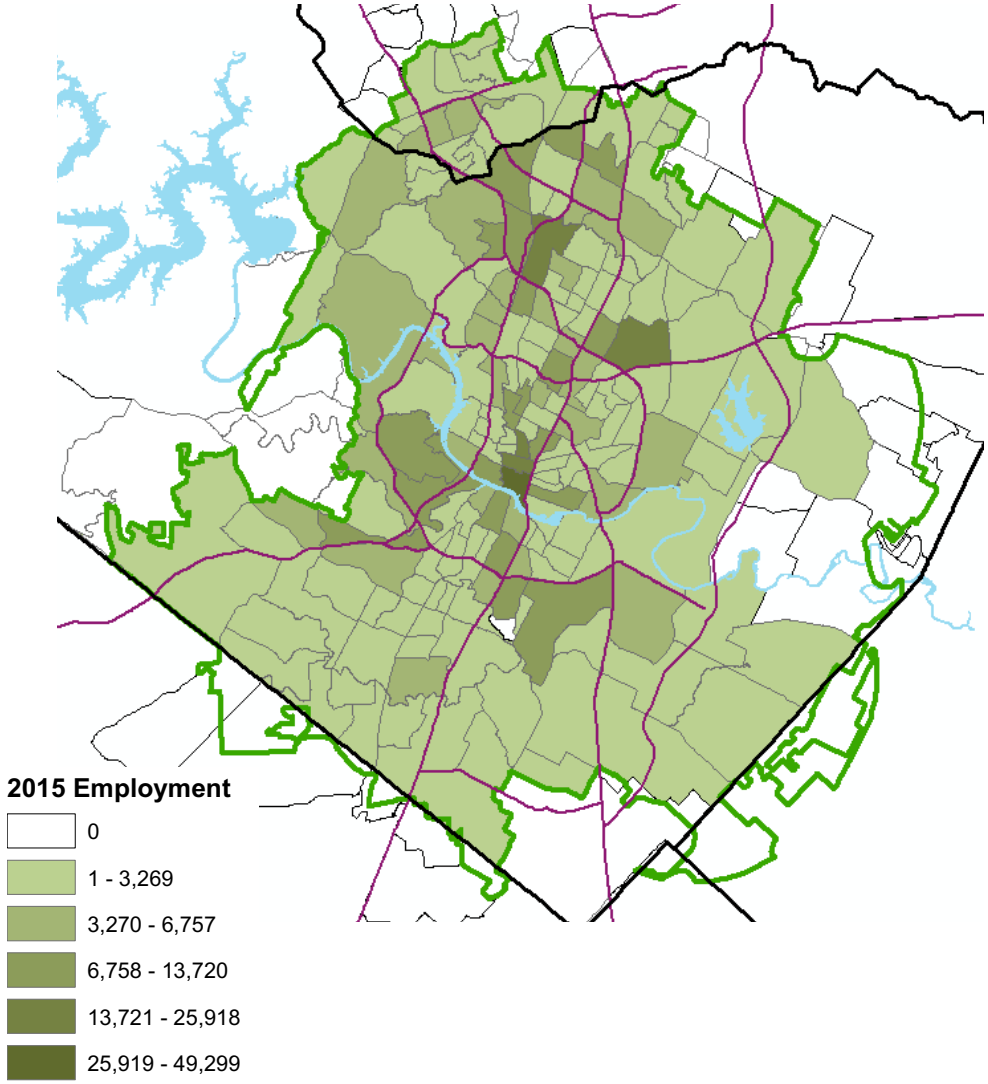
Spatial Disaggregation of Customers & Demands into DTI Polygons



Demographics Used to Calculate Water Use Factors Among Demand Sectors



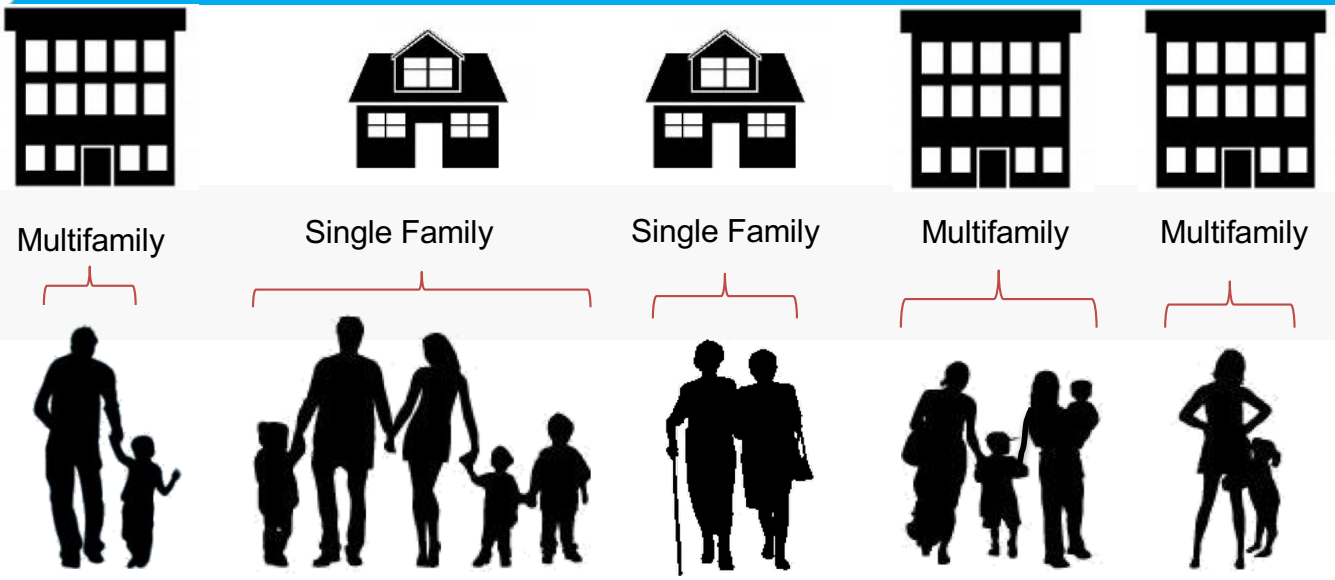
Served Population Distribution



Employment Distribution

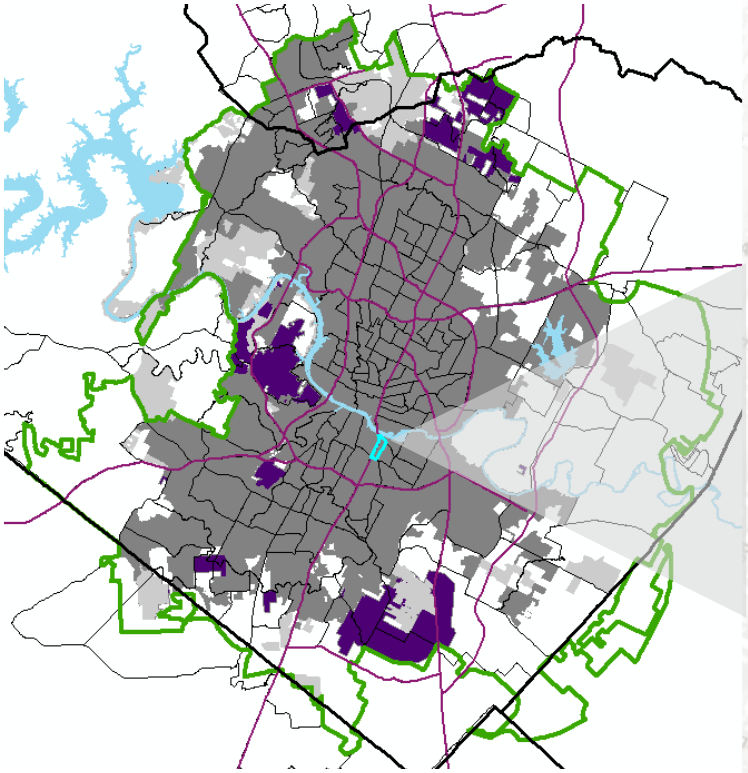
Austin's Disaggregated Demand Model

April 8 2019



Water Use Factor Development

Eg: DTI polygon 129



- Commercial
- Multi-Family Residential
- Single Family Residential

Water Use Factor (WUF) Calculations

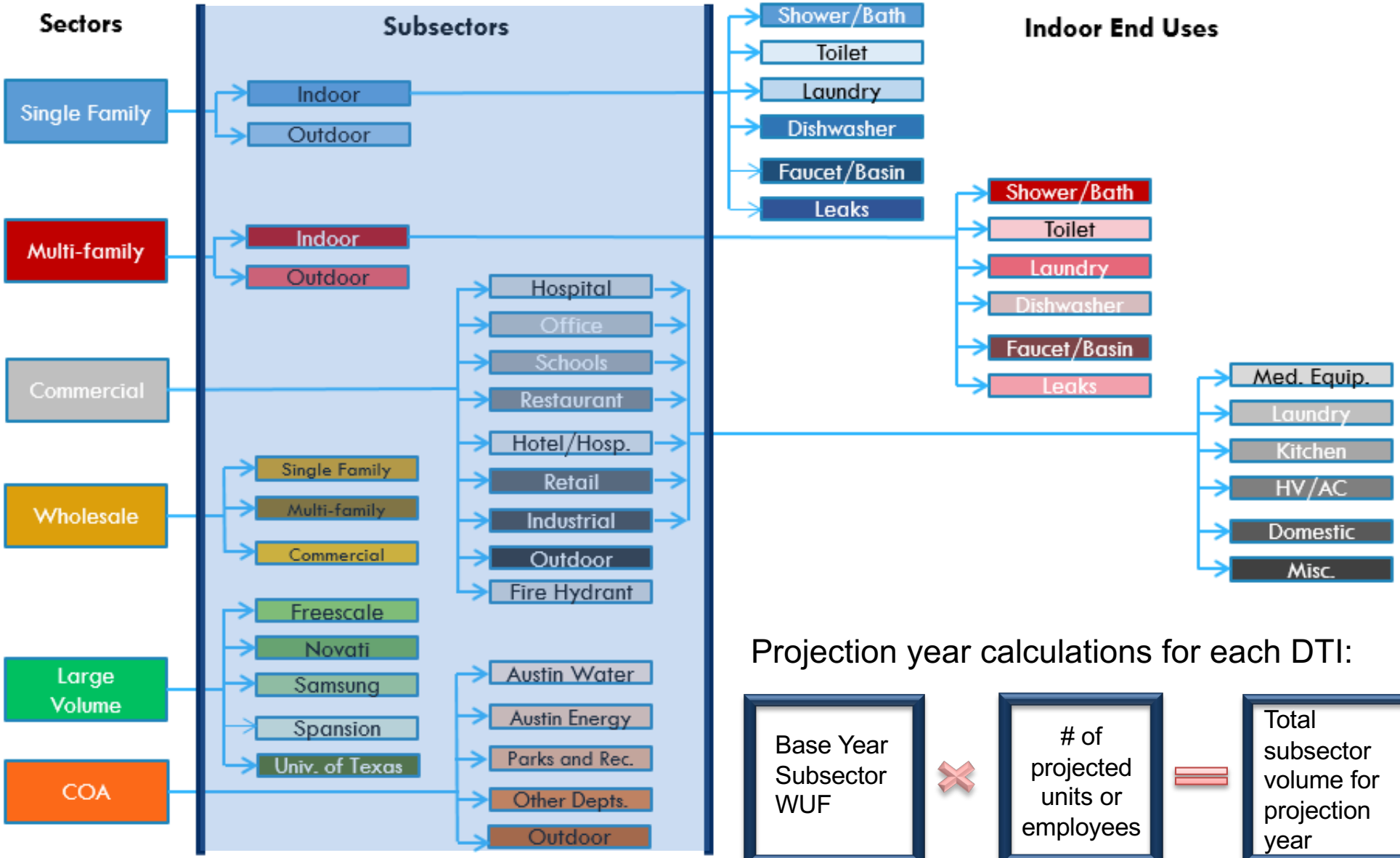
Σ SF Billed Volume / Σ SF Units = Single Family WUF (gal/household/year)

Σ MF Billed Volume / Σ MF Units = Multi-family WUF (gal/household/year)

Σ Industrial Billed Volume / Σ Industrial Employees = Industrial Subsector WUF (gal/employee/year)

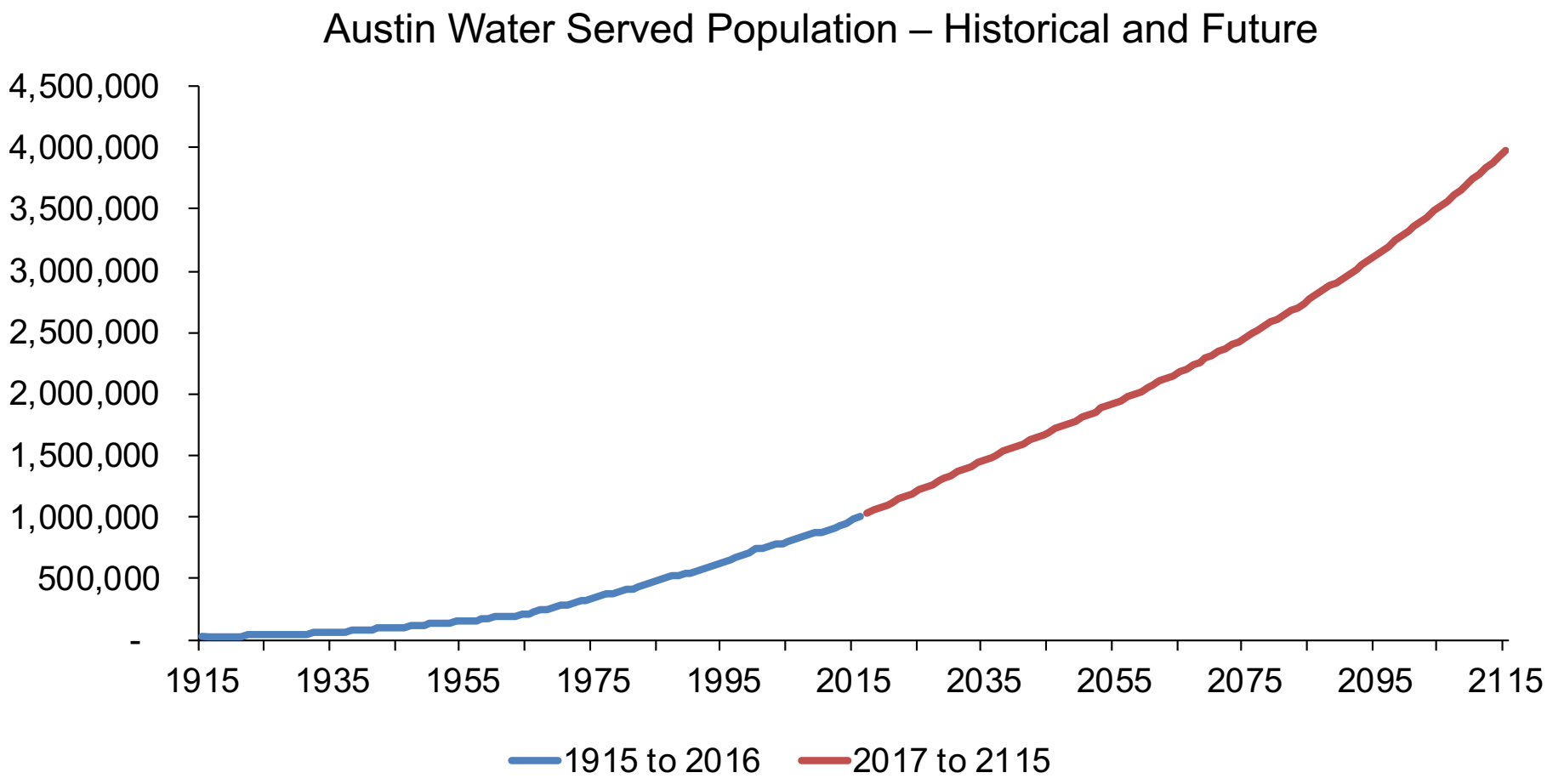
Σ Office Billed Volume / Σ of Office Employees = Office Subsector WUF (gal/employee/year)

Base Year Demand Projections

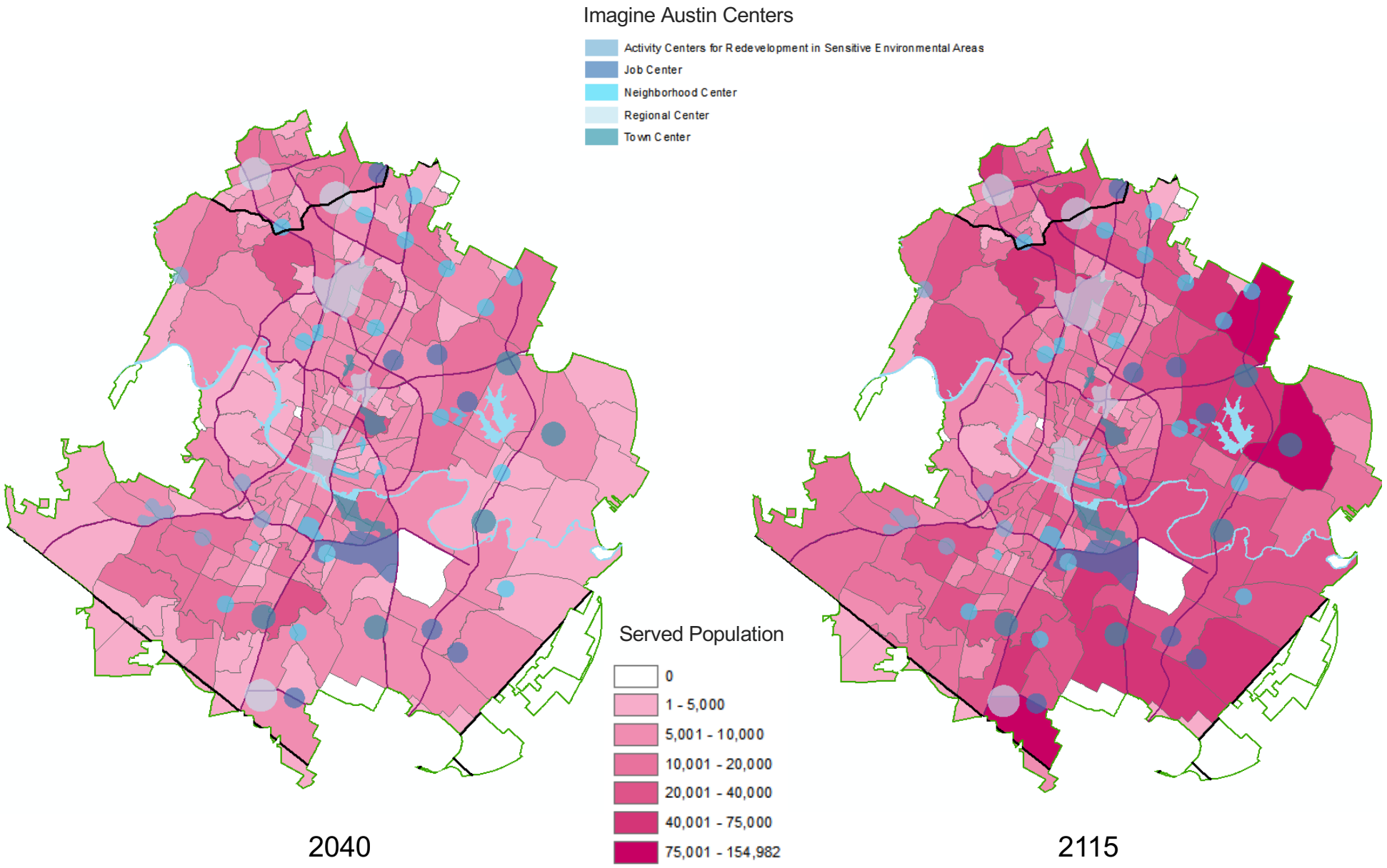


Projection year calculations for each DTI:

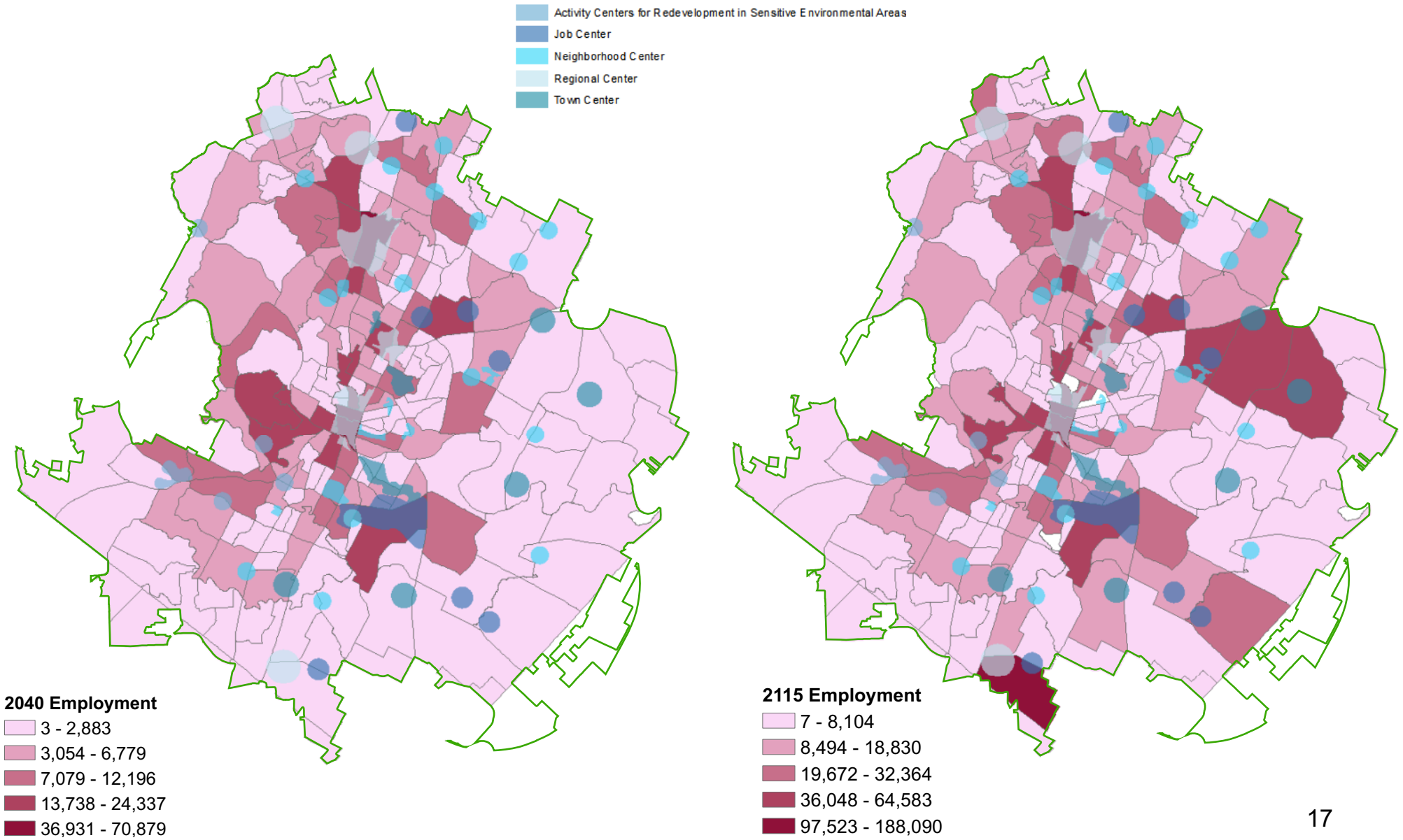
Base Year Subsector WUF	×	# of projected units or employees	=	Total subsector volume for projection year


Austin Water Served Population – Historical and Future
4,500,000
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
-
1915
1935
1955
1975
1995
2015
2035
2055
2075
2095
2115
1915 to 2016
2017 to 2115

Served Population Projections

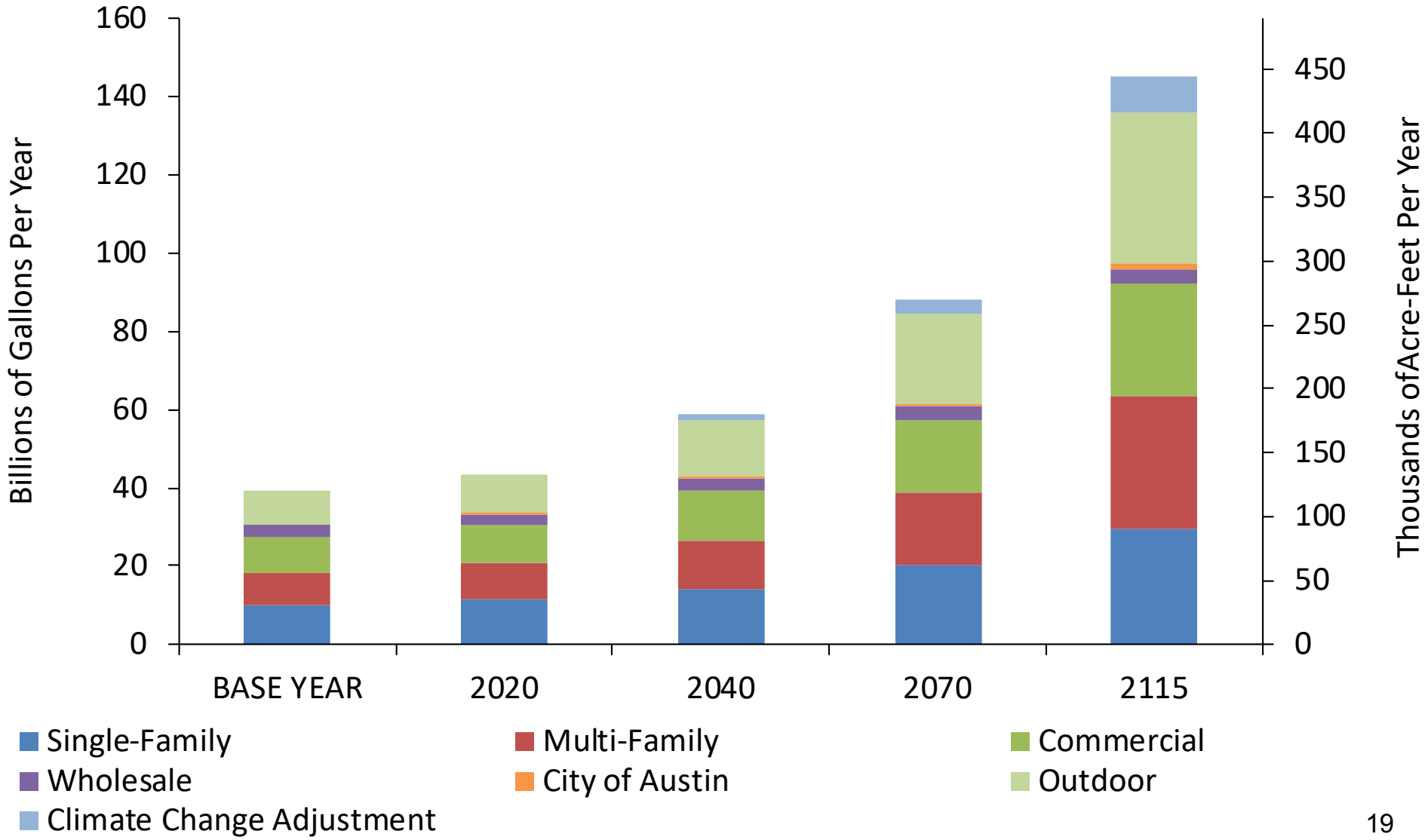


Employment Projections for 2040 and 2115

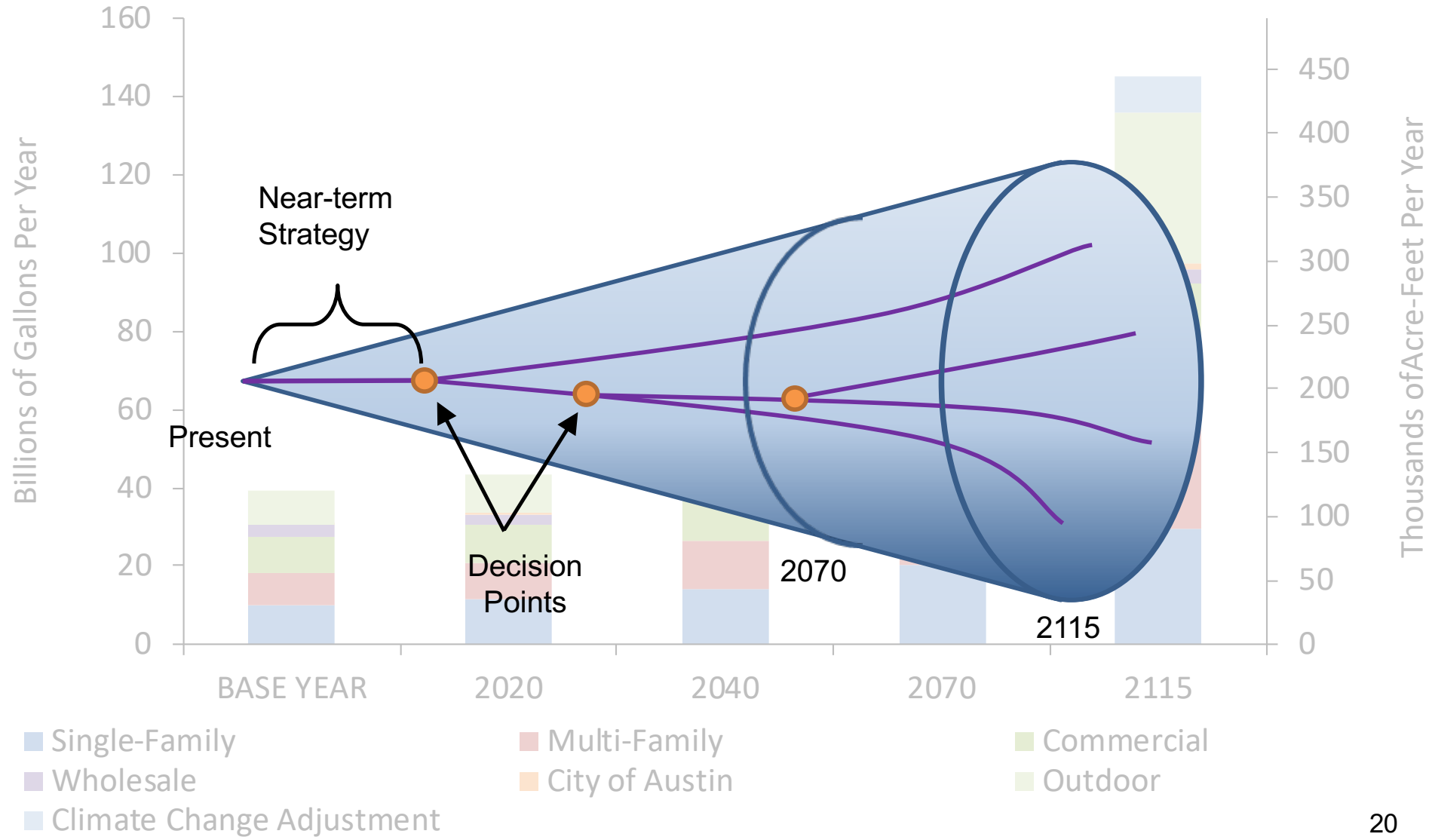


Results From the Model

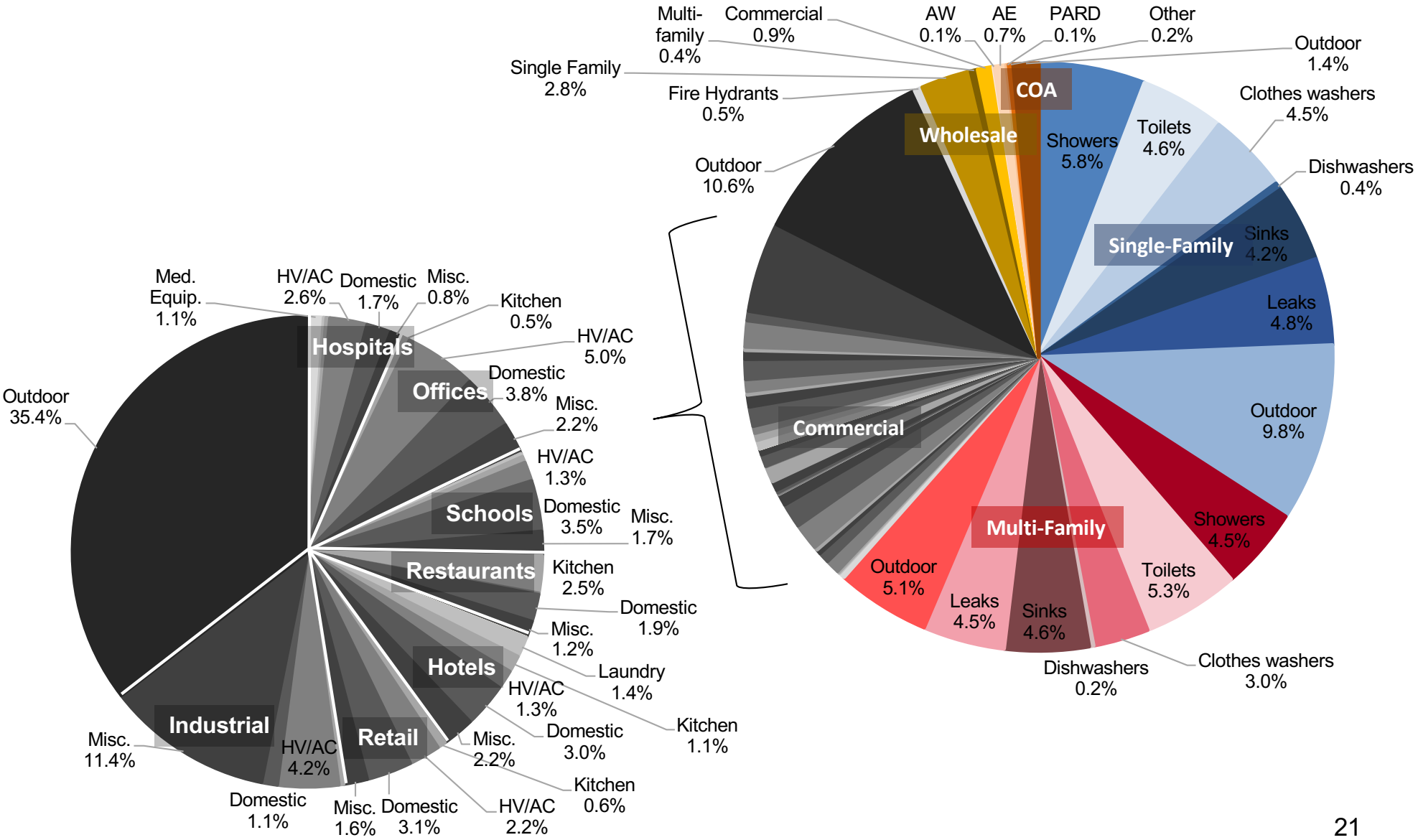
Baseline Demand Projections



Baseline Demand Projections

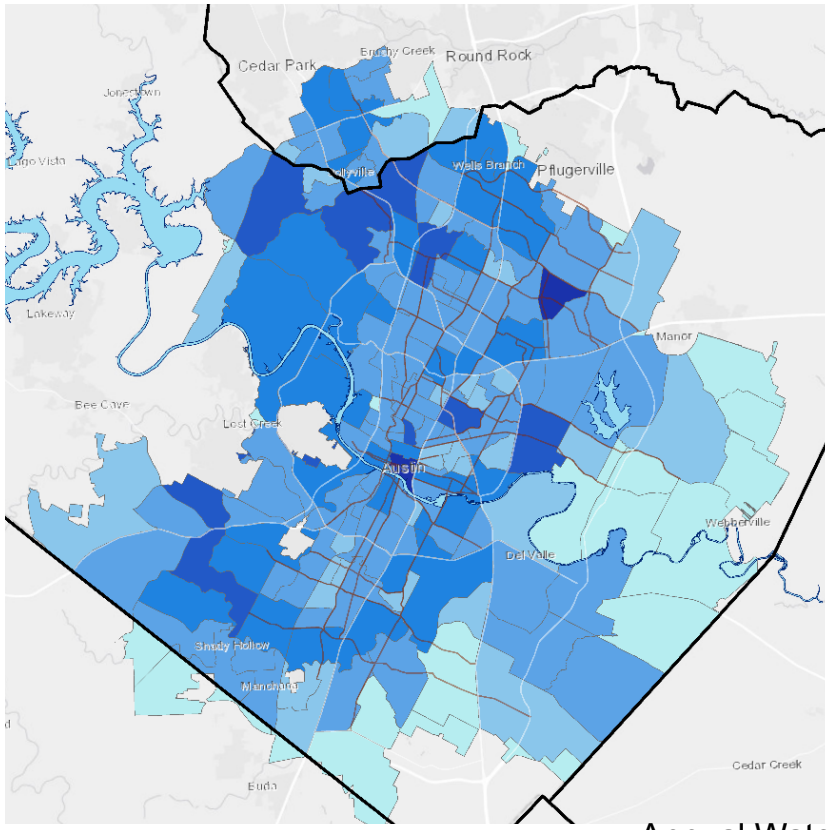


2115 Demand Disaggregation

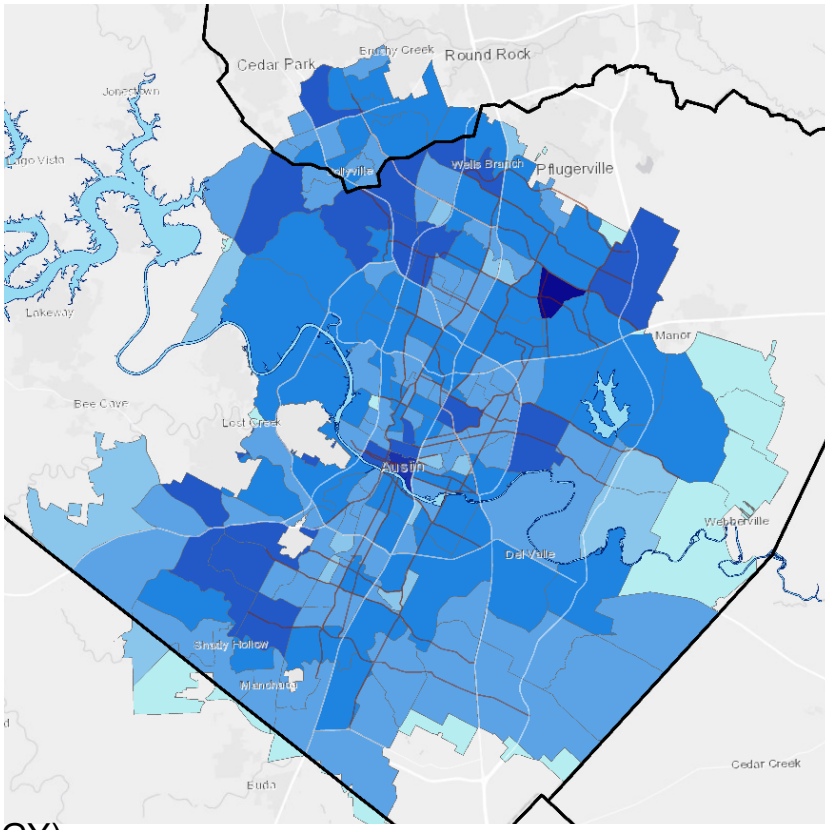


Projected Consumption by DTI Polygon

2020



2040



Annual Water Demand (MGY)

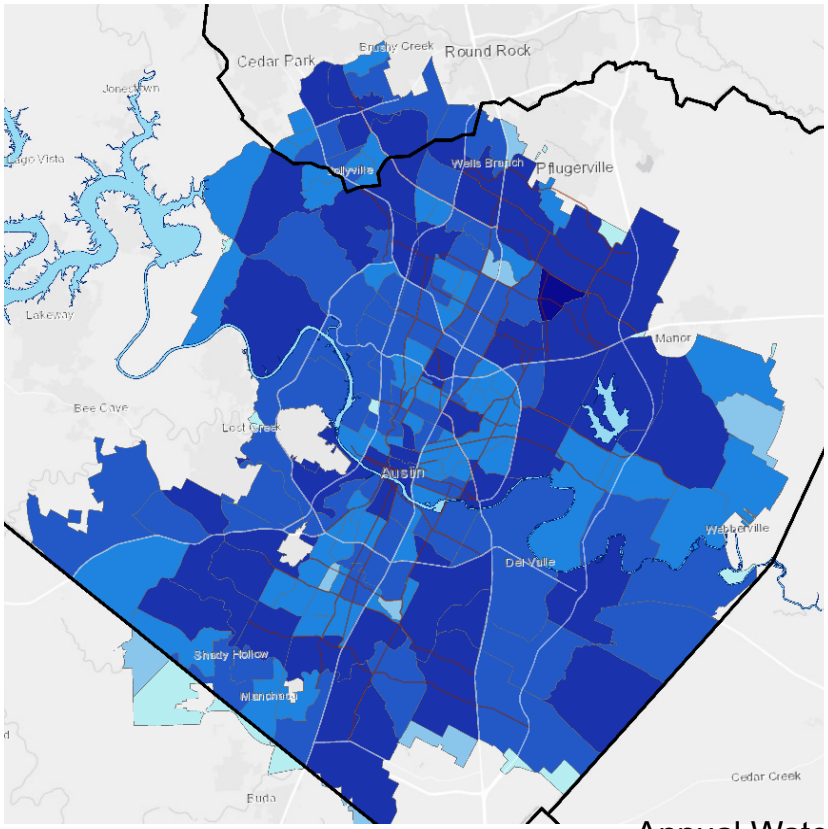
- 0 - 50
- 51 - 100
- 101 - 250
- 251 - 500
- 501 - 1,000
- 1,001 - 2,500
- 2,501 - 5,000

N
W E
S

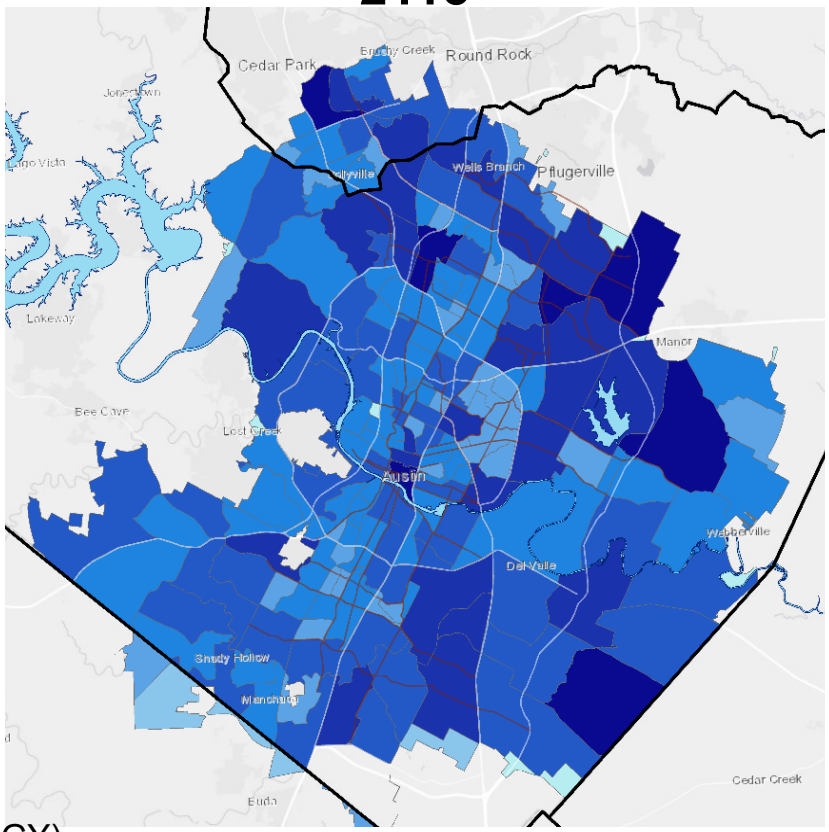
0 3.75 7.5 15 Miles

Projected Consumption by DTI Polygon

2070



2115



Annual Water Demand (MGY)

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- 1,001 - 2,500
- 2,501 - 5,000

N
W E
S

0 3.75 7.5 15 Miles

Applications of the DDM

Water Forward

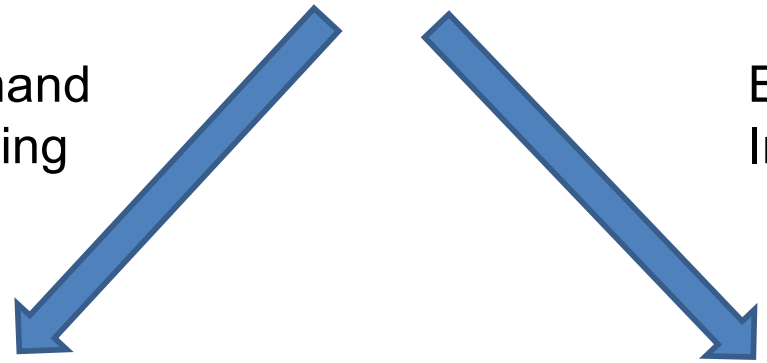
Integrated Water Resource Plan (IWRP)

- Austin Water is leading the development of a 100 year water plan that reflects our community's values
- Goal: Ensure a diversified, sustainable, and resilient water future, with strong emphasis on water conservation
- Incorporates planning for drought and climate change
- Council-appointed Task Force meets monthly
- Interdepartmental coordination and coordination with the community to make sure plan is implementable
- Plan projected to be completed in mid-2018 with planned updates on a five year cycle

DDM & Decentralized Water Supply Planning

High-level demand & supply planning

Evaluation and Implementation



Water Forward Task 6.3: Spatial Analysis

Using spatial information to inform strategic planning in the water sector

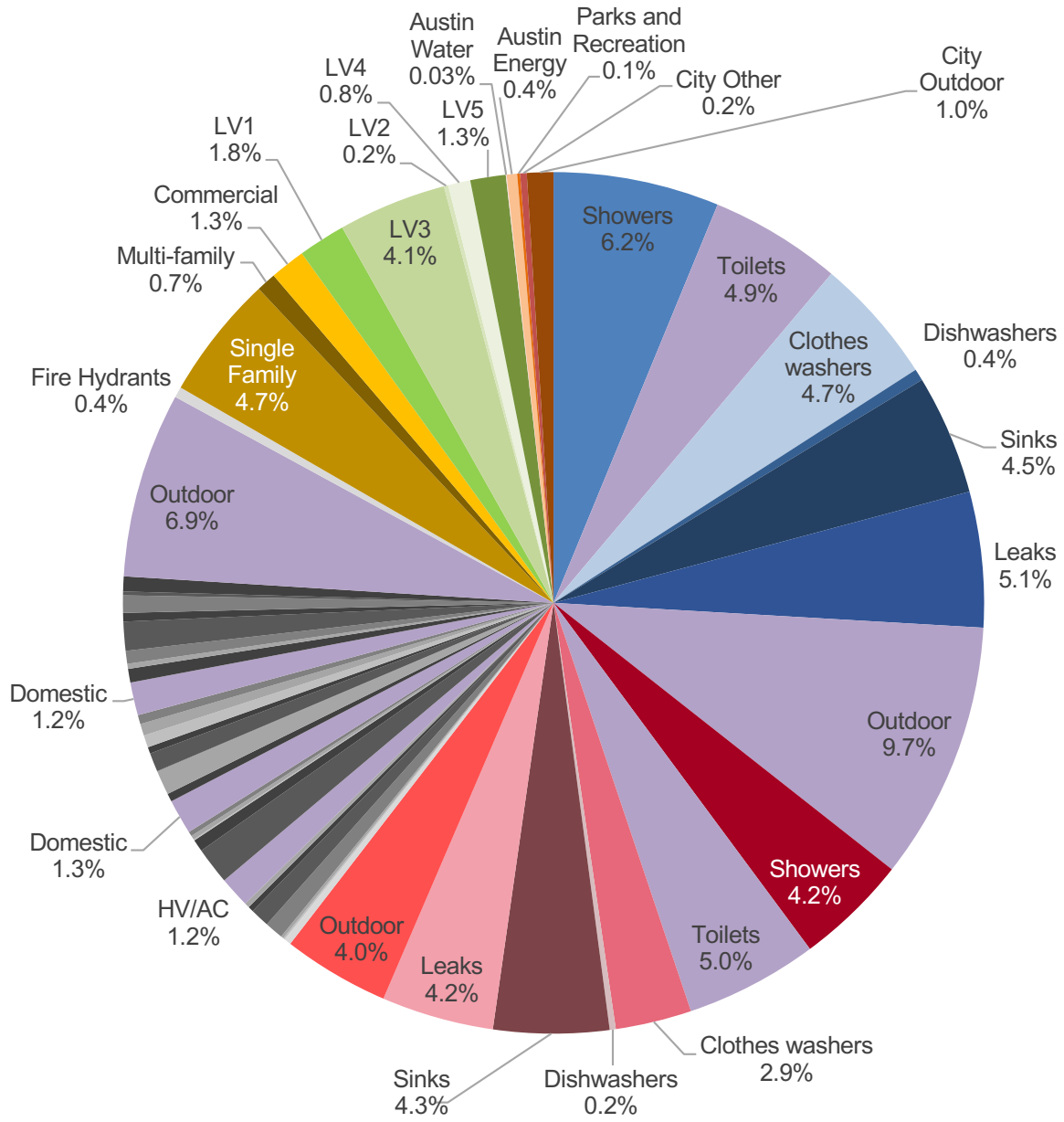
- Location
- Spatial variability
- Geometric attributes
- Scale

Innovative Water Strategies: AW IWS Working Group

Convened to develop a guiding process and framework for the evaluation and implementation of innovative decentralized water and wastewater systems

Task 6.3: Matching End Use Demands to Decentralized Supply Options

Single Family
Multi-family
Commercial
Wholesale
Large Volume
COA



Decentralized Options

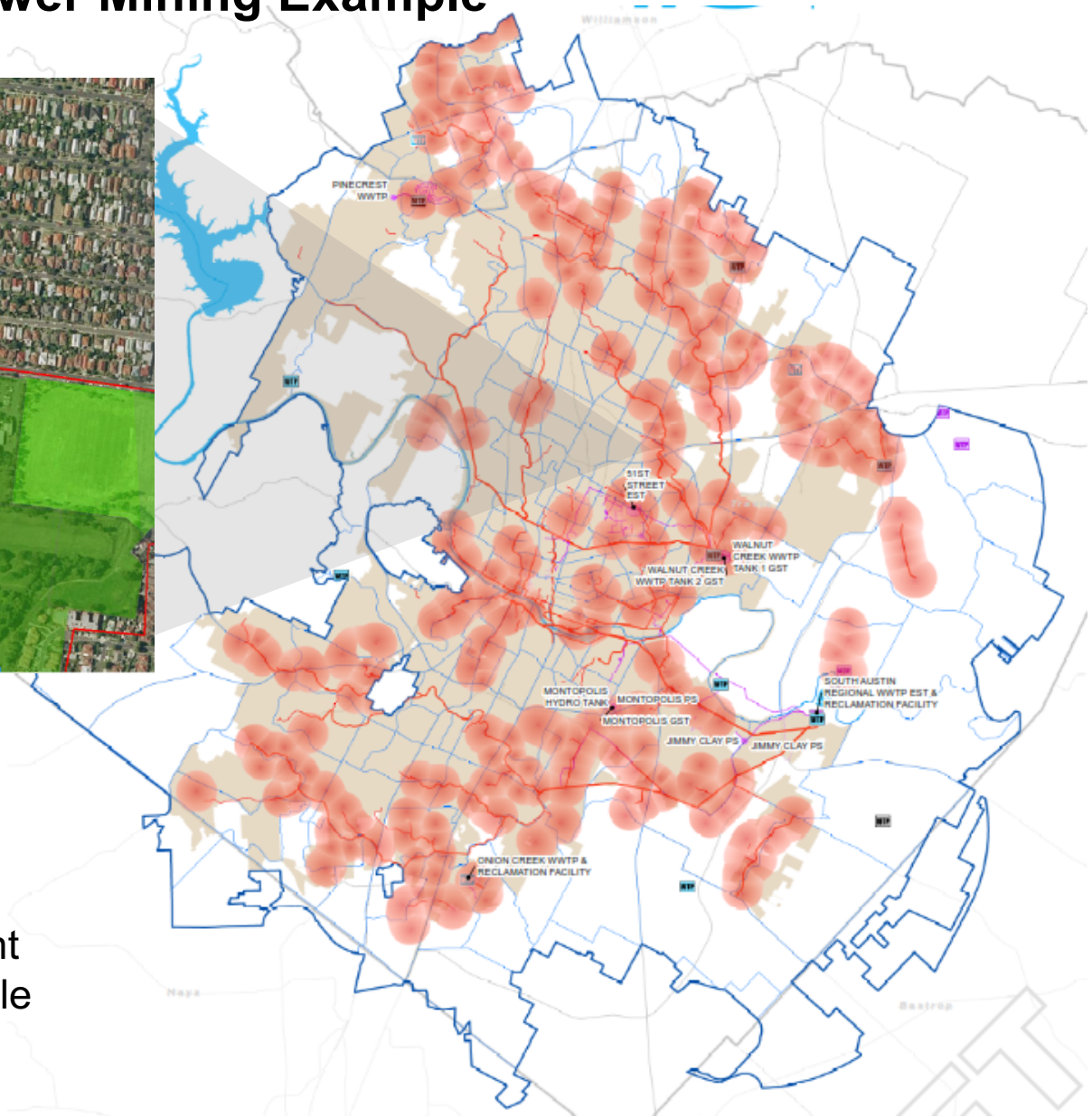
Lot scale

- Rainwater Harvesting
- Stormwater Harvesting
- Greywater Harvesting
- Building Scale Wastewater Reuse

Community scale

- Rainwater Harvesting
- Stormwater Harvesting
- Sewer Mining
- Distributed Wastewater Reuse

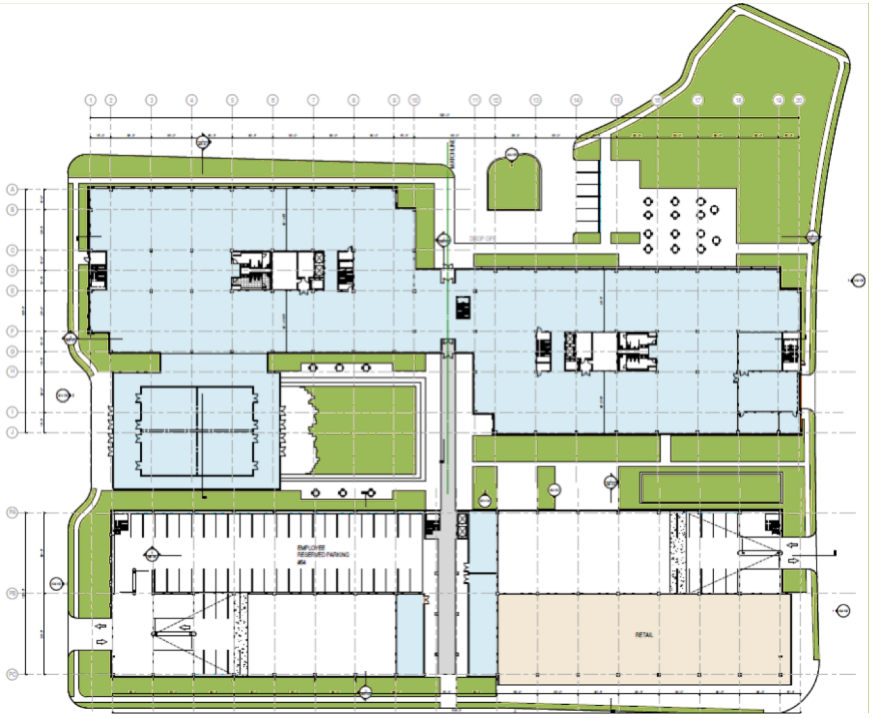
Task 6.3: Sewer Mining Example



Suitable Extraction Points

- Manhole
- Minimum 16-inch sewer line
- Maximum 50-foot sewer depth
- Adequate open space for treatment
- Substantial demands within 0.5-mile radius

IWS Pilot Opportunity: New Development Services Building at Highland Park



Pilot System Goals

- ❑ Onsite collection and reuse:
  - blackwater
  - condensate
  - rainwater
- ❑ Maximum offset of nonpotable demands
- ❑ Technology test & verification
- ❑ Data collection:
  - water quantities & quality
  - energy consumption
  - operations & monitoring
- ❑ Showcase utility innovation
- ❑ Explore new business model approaches

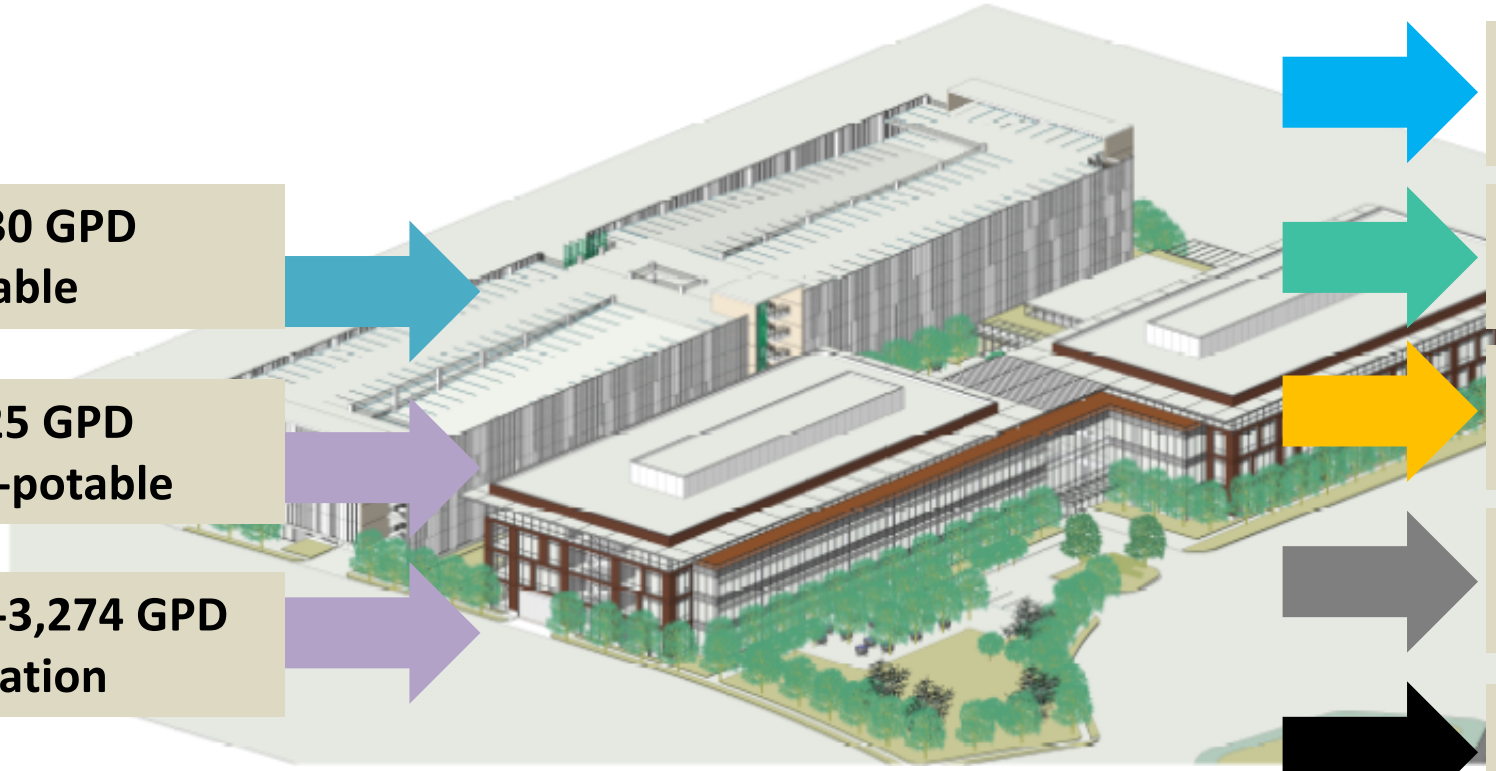
Austin's Disaggregated Demand Model

DEMANDS

1,730 GPD potable

2,725 GPD non-potable

685-3,274 GPD irrigation



SUPPLIES

2,453-5,241 GPD rainwater

3,805-8,130 GPD stormwater

170-1,953 GPD condensate

1,730 GPD graywater

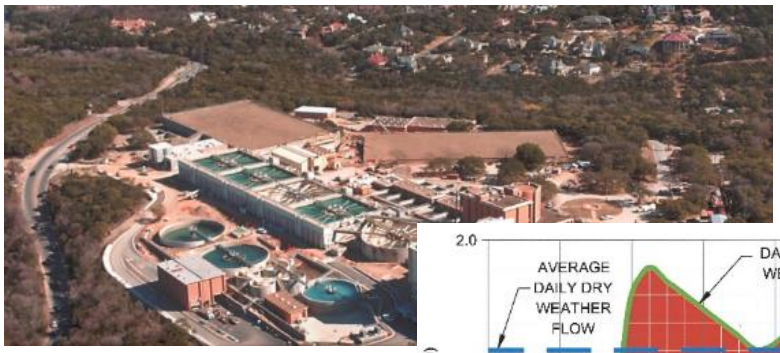
4,455 GPD blackwater

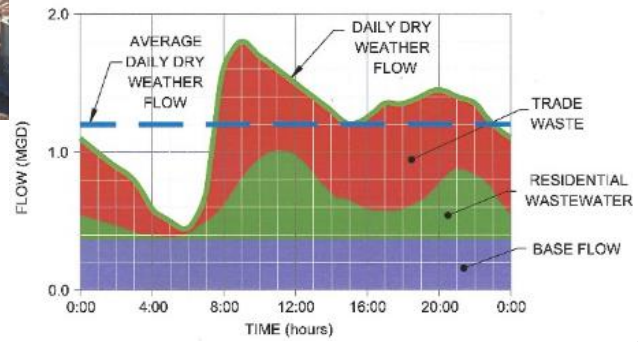
MATCH SUPPLY TO DEMAND

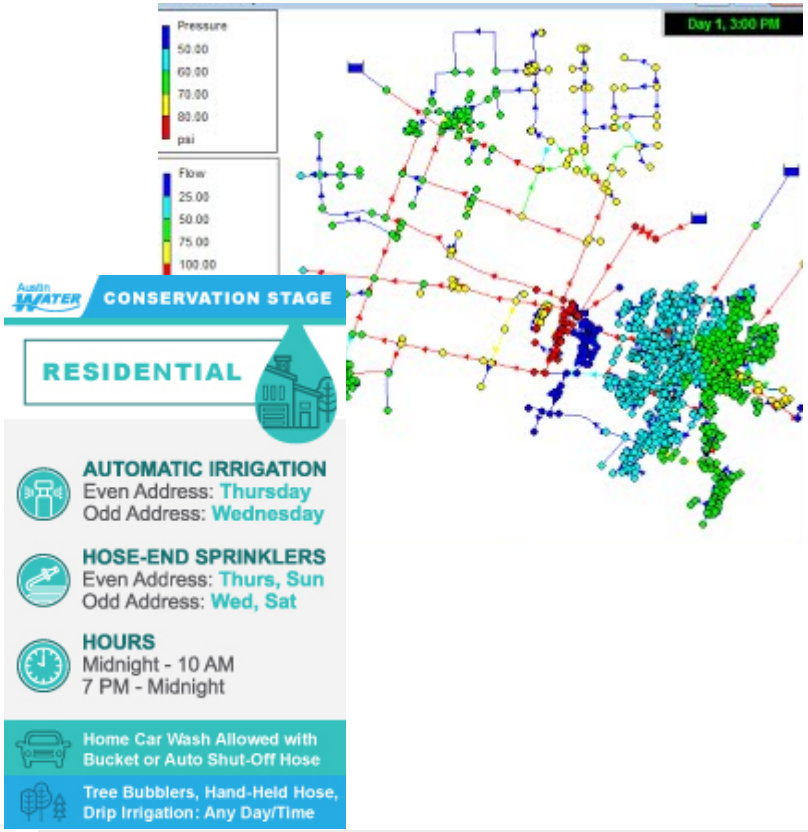
Infrastructure Planning

Infrastructure Planning

- Future Water Demands in Hydraulic Models
- Forecasts for WTP Budgeting and Capacity
- Future Water Demands for CIP Project Capacity Analysis
- Impact Fee Analysis
- Wastewater Flow Analysis
- Water Conservation Impacts on Infrastructure







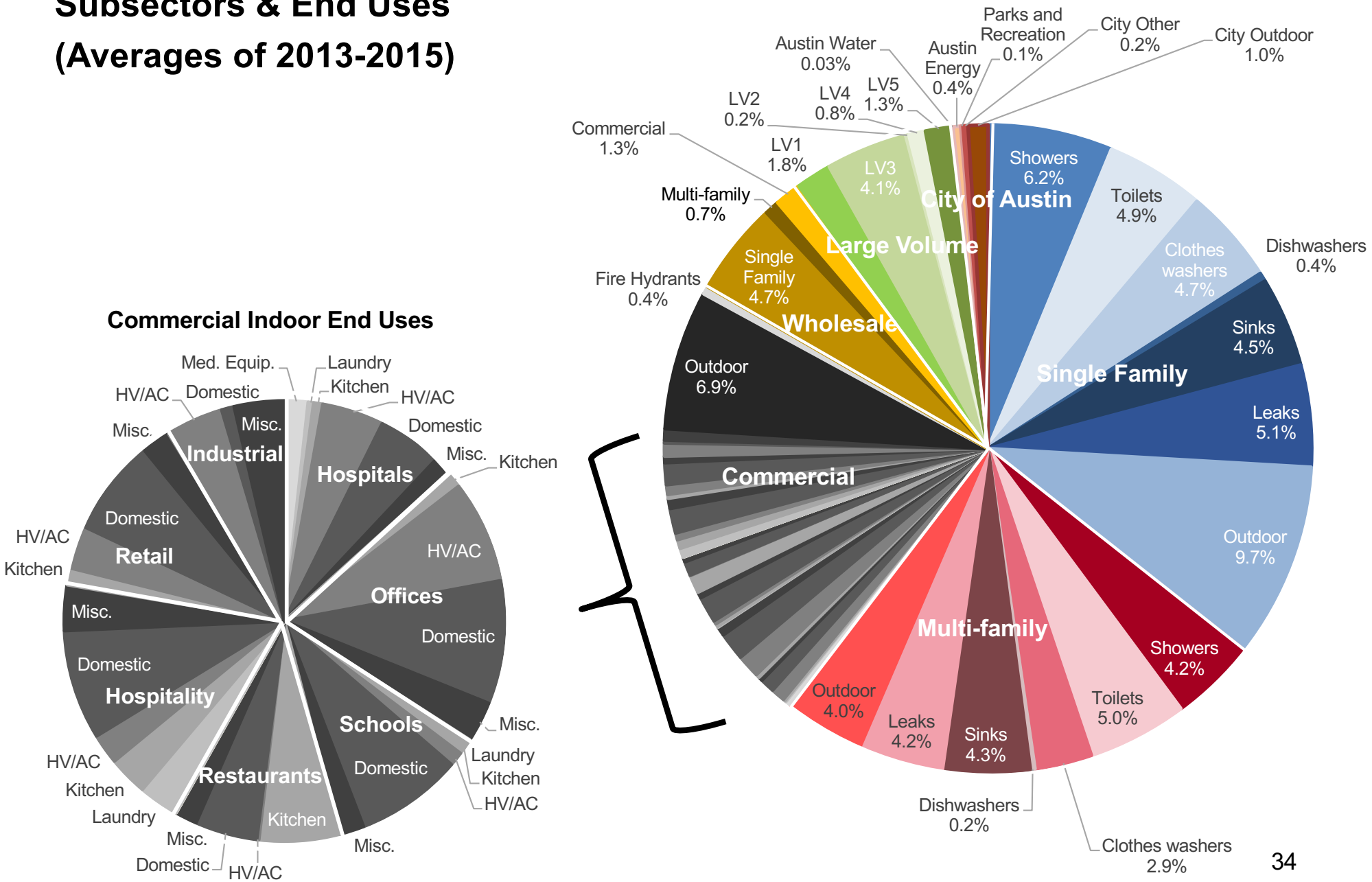
The current City of Austin Water and Wastewater Impact Fees per service unit are presented in the tables below and are also available by meter size. Please note other fees may apply including meter and inspection fees. For more information, please contact 512-972-0000 extension 4.

AWU Impact Fee Schedule for Lots Platted AFTER January 1, 2014

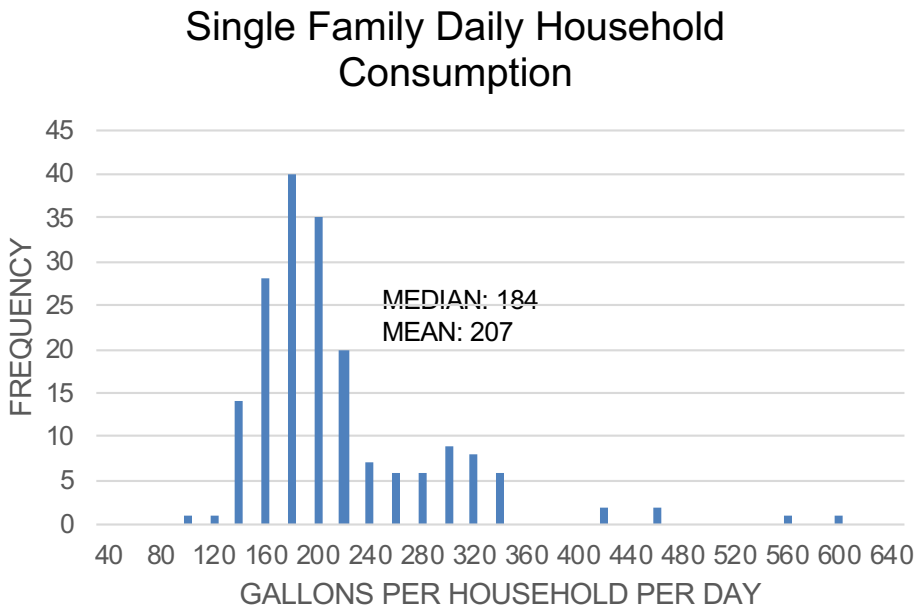
Zone	Water Fee	Wastewater Fee	Water and Wastewater Fee
All Zones	$5,400	$2,200	$7,600

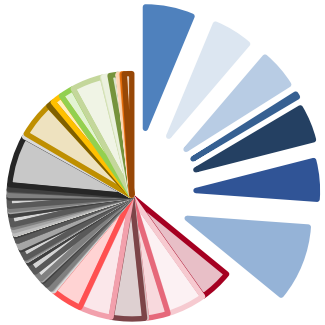
Austin
WATER

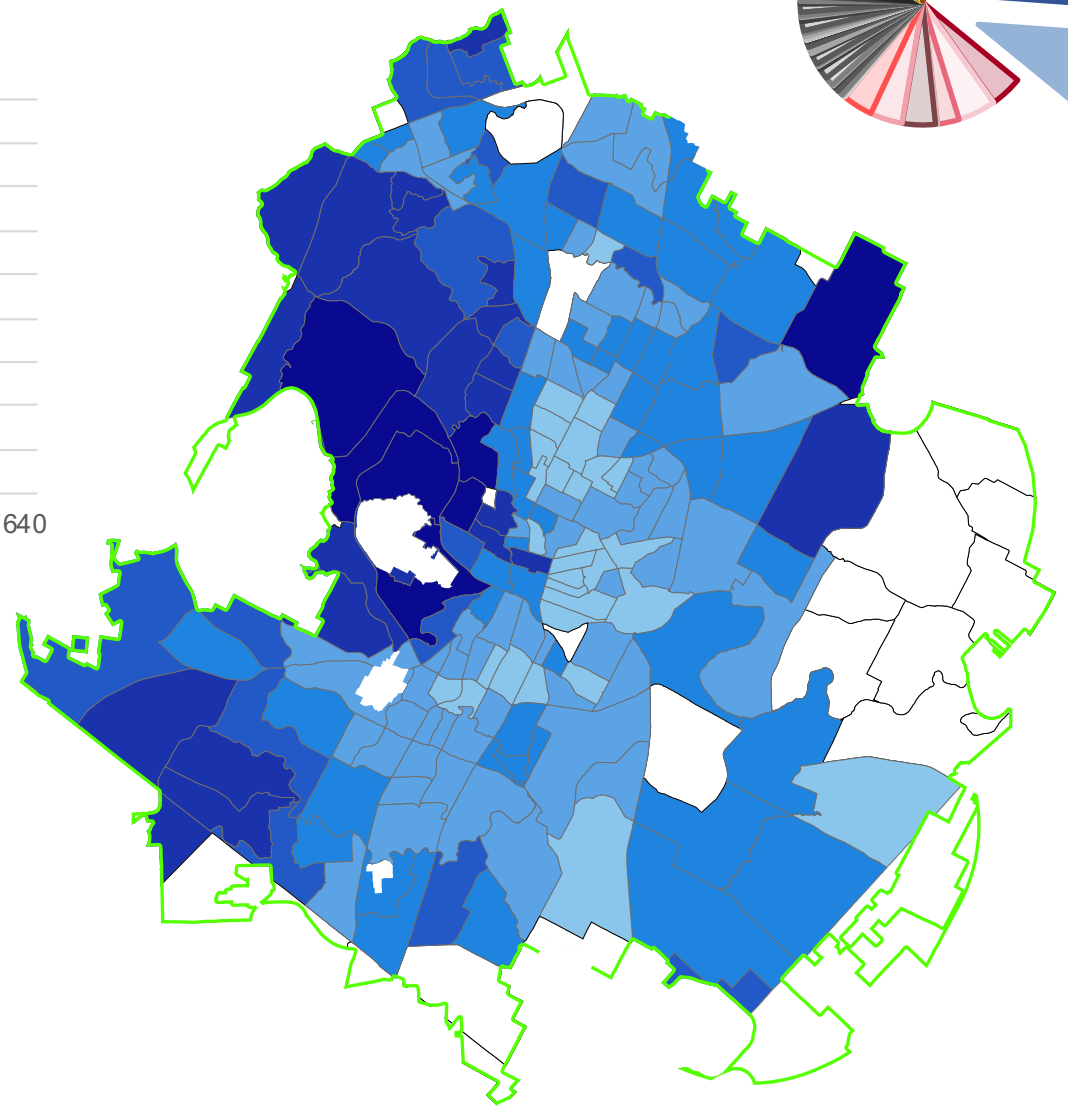
Base Year Consumption Subsectors & End Uses (Averages of 2013-2015)



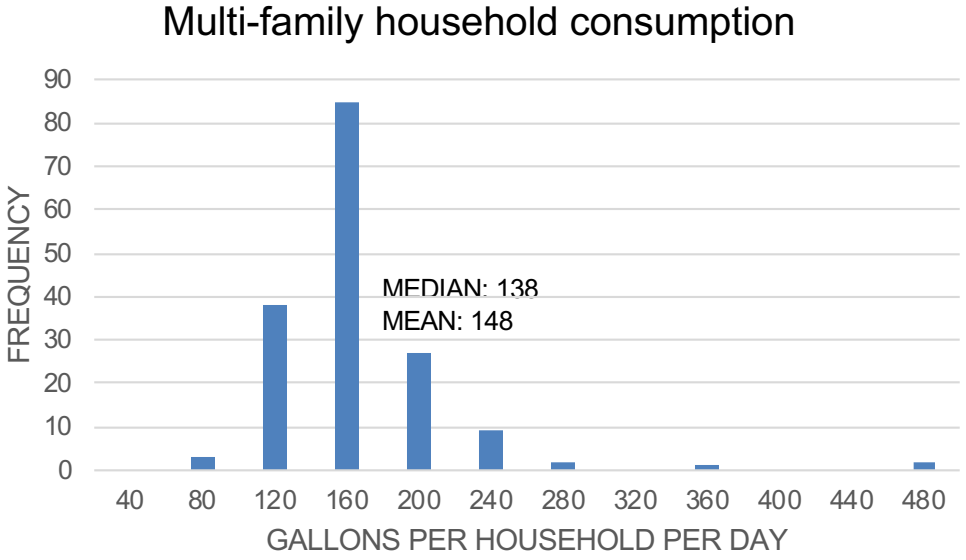
Base Year Single Family Daily Household Consumption

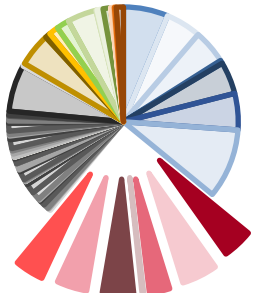


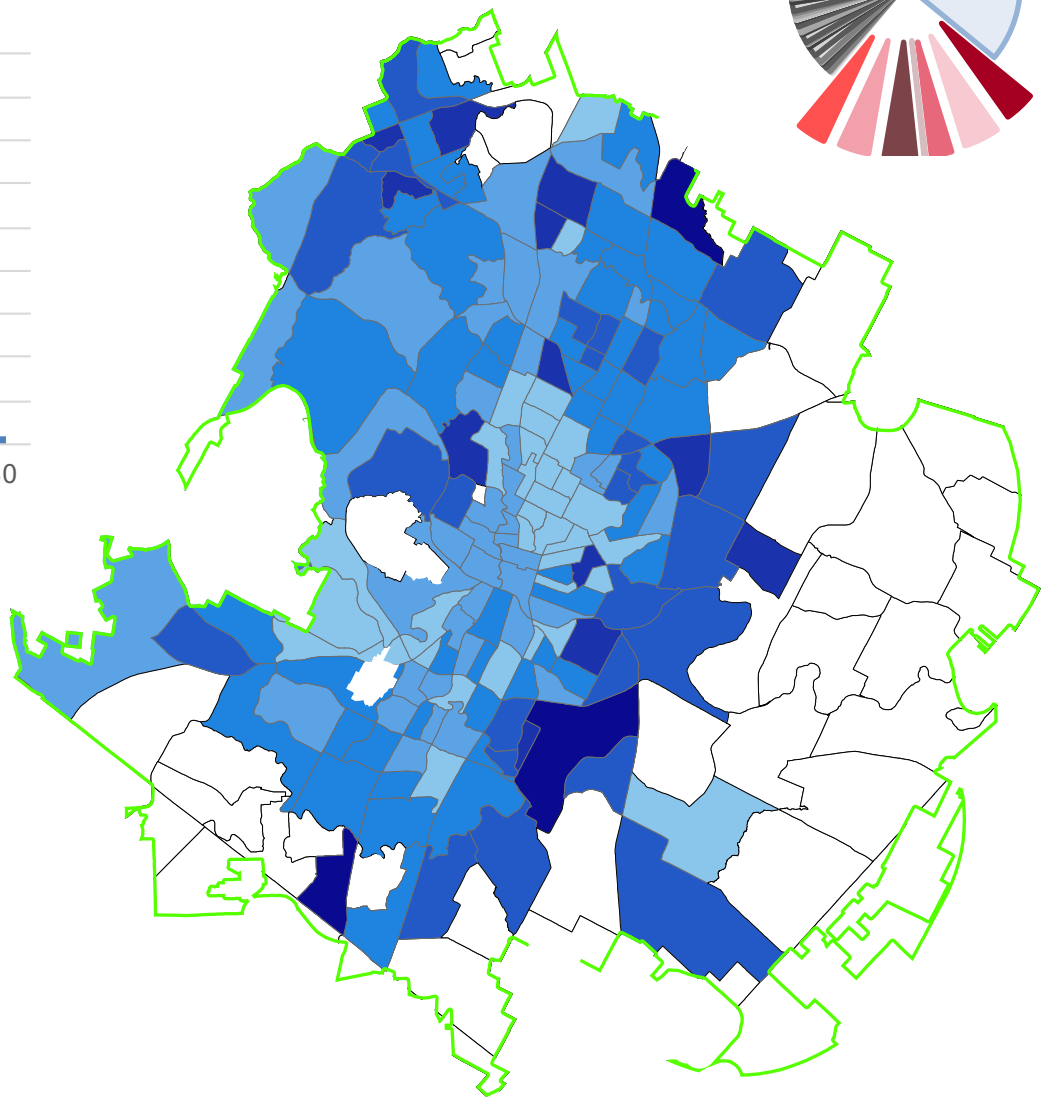




Base Year Multi-Family Daily Household Consumption



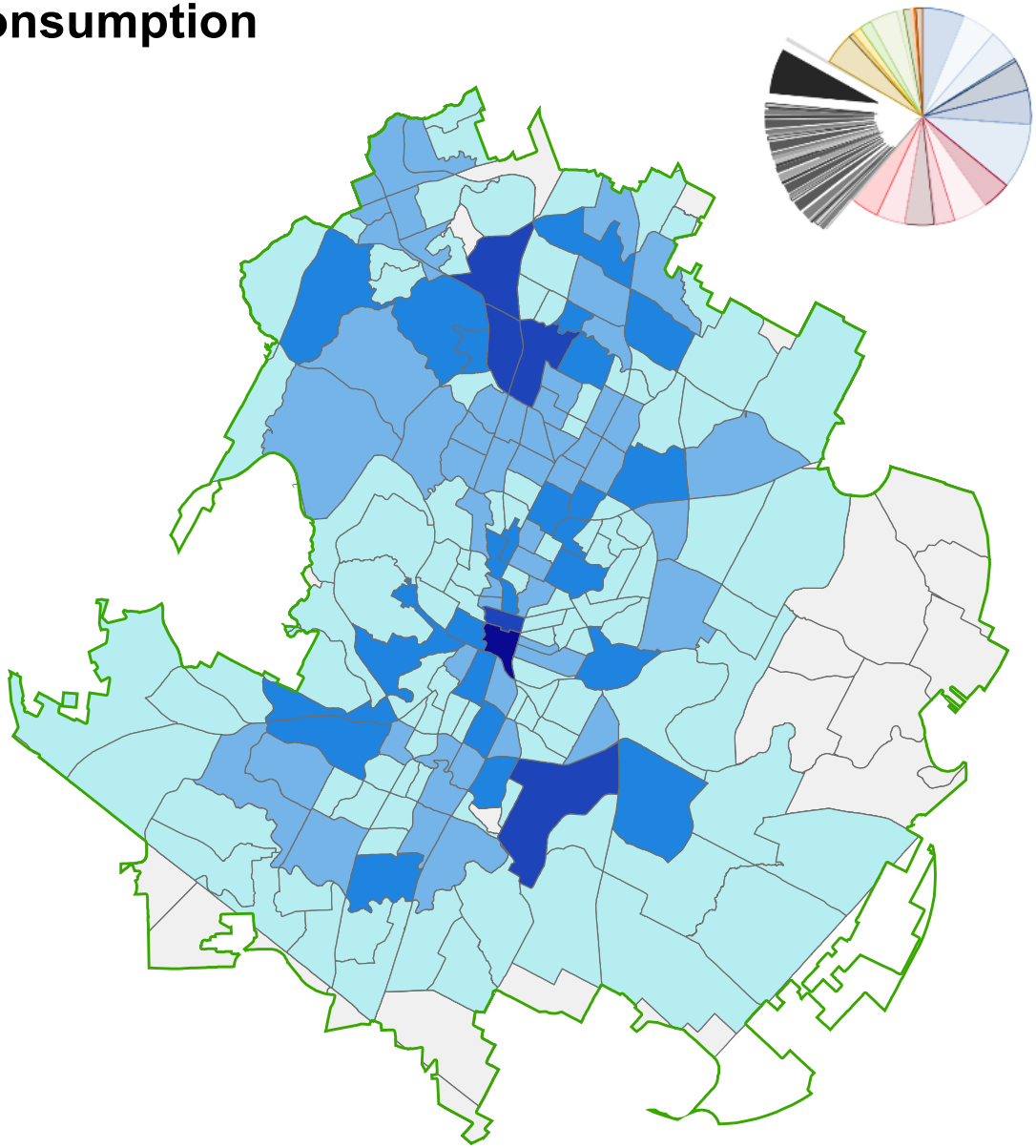


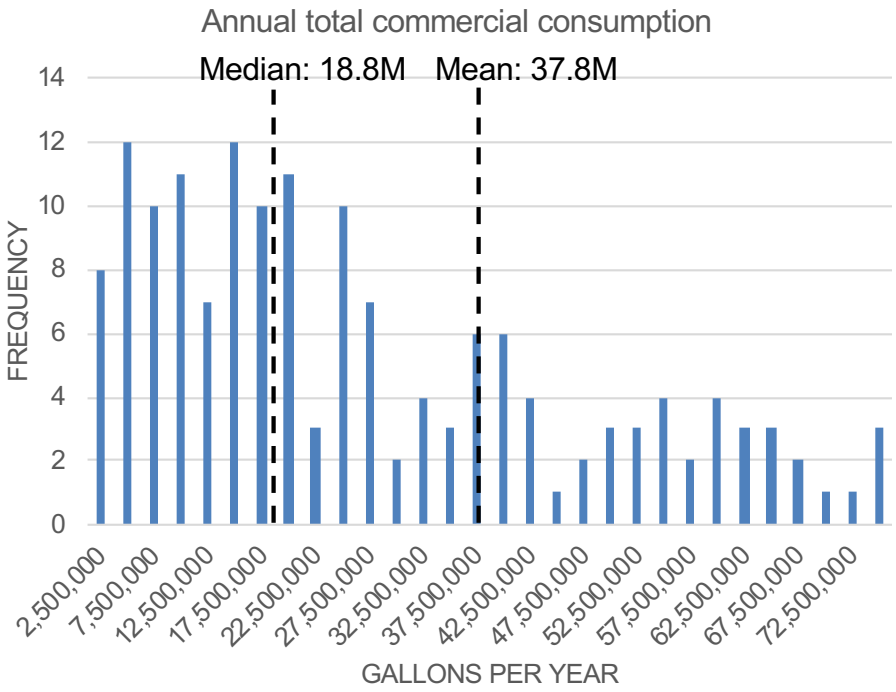


Gallons/Household/Day

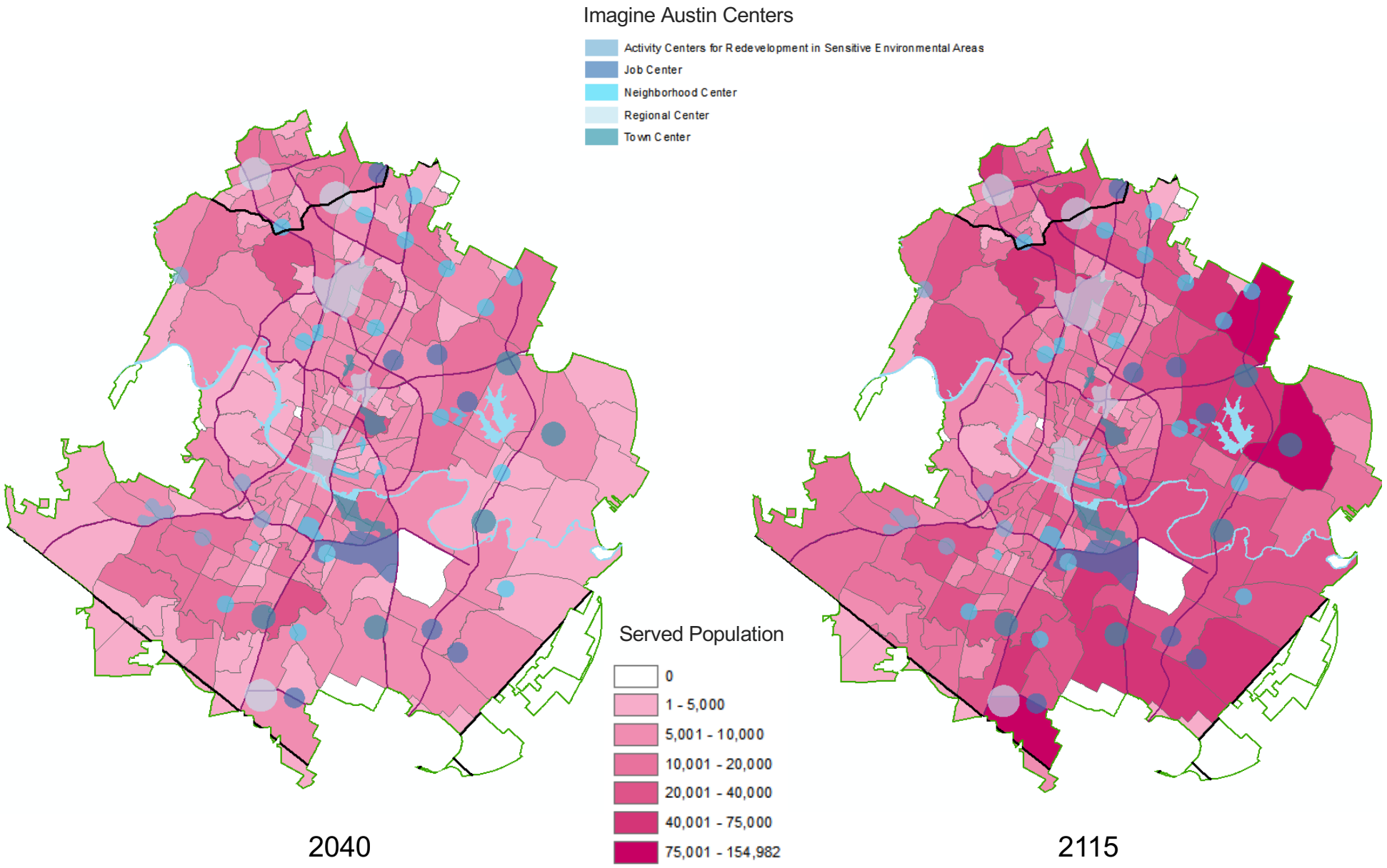
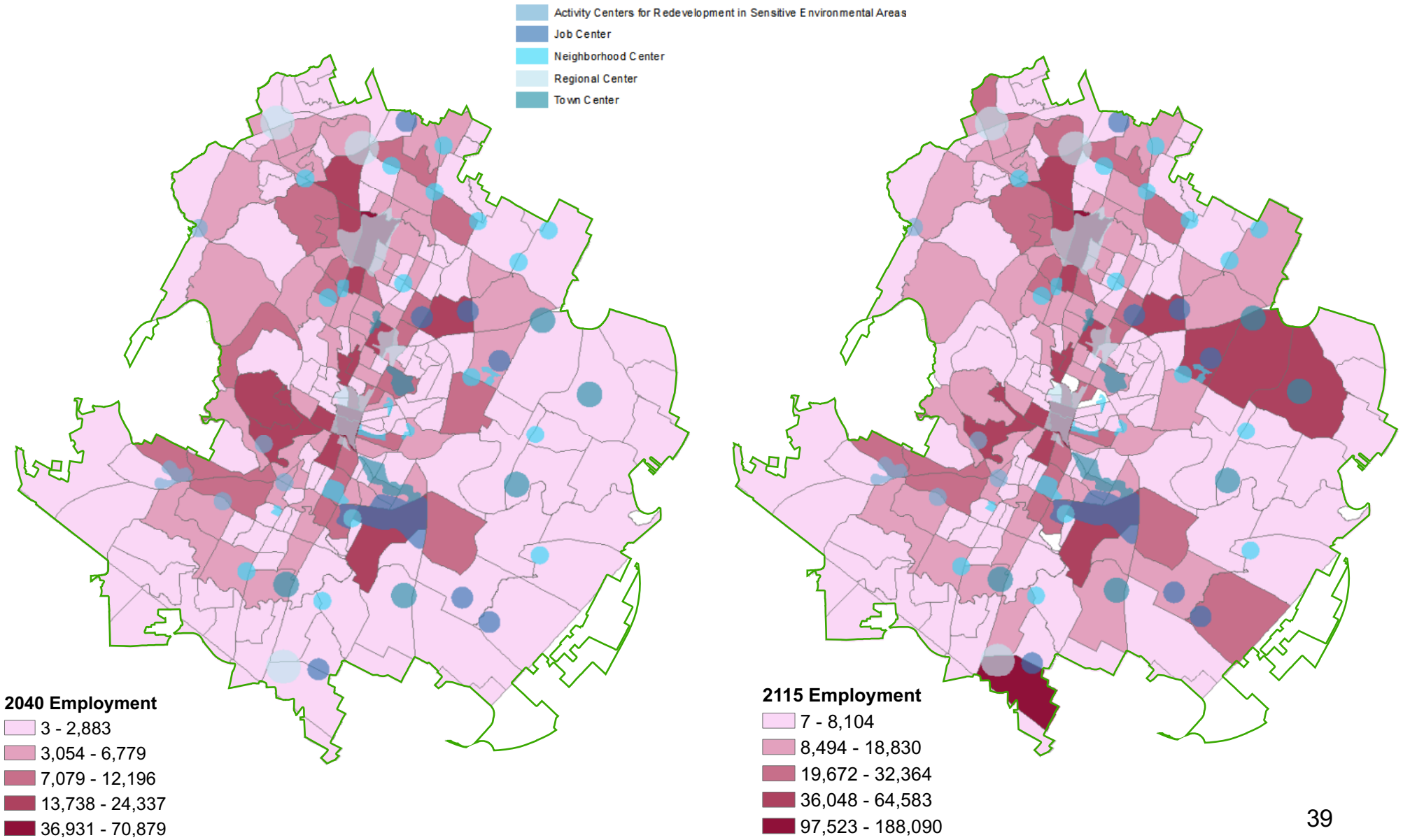
- 0
- 1 - 110
- 111 - 134
- 135 - 159
- 160 - 196
- 197 - 244
- 245 - 479

Base Year Commercial Annual Consumption





Served Population Projections



Employment Projections for 2040 and 2115