Estimating the Conservation Potential of the Commercial/Industrial/Institutional Water-Use Sector in Texas Water Supply Planning Regions C and K

Lacey L. Smith, M.A.Geo

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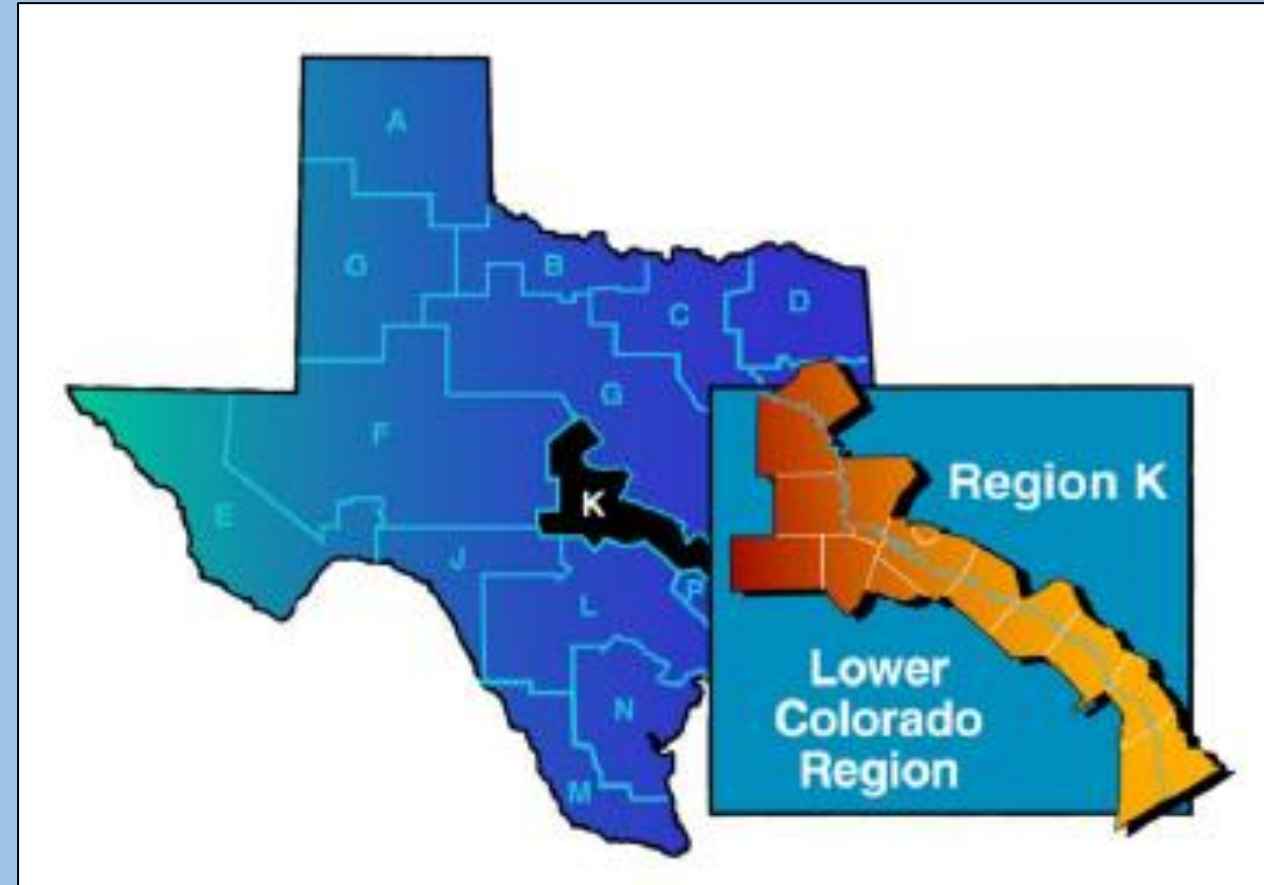# Texas Growth

Figure 5.1 – Projected population in Texas
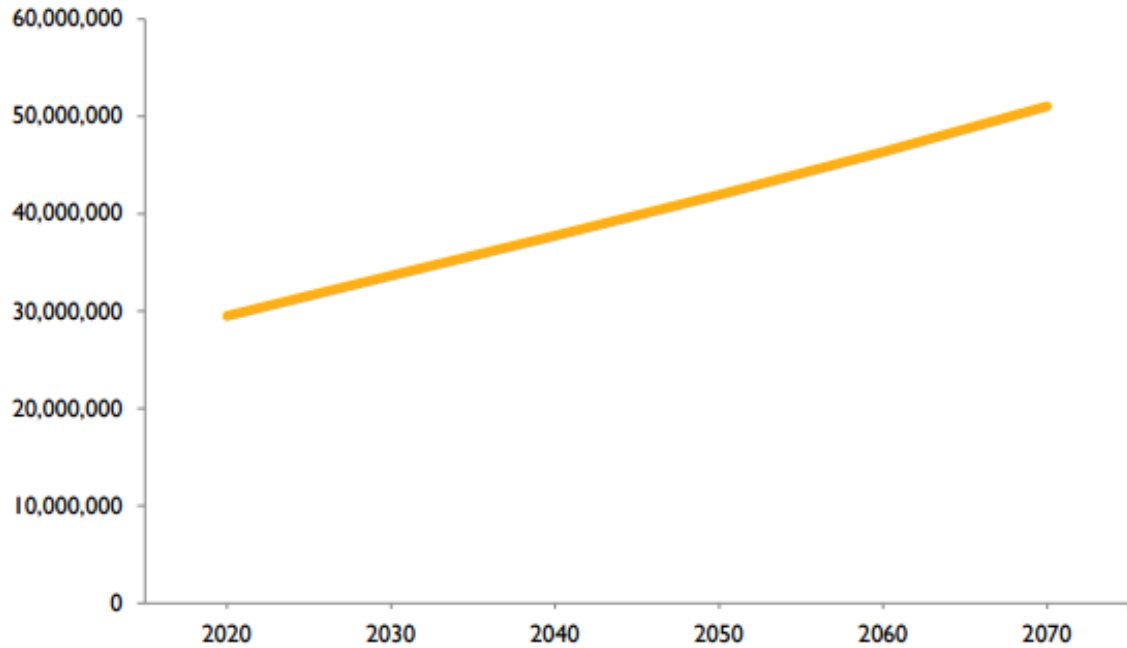
Figure 5.4 – Projected annual water demand in Texas (acre-feet)
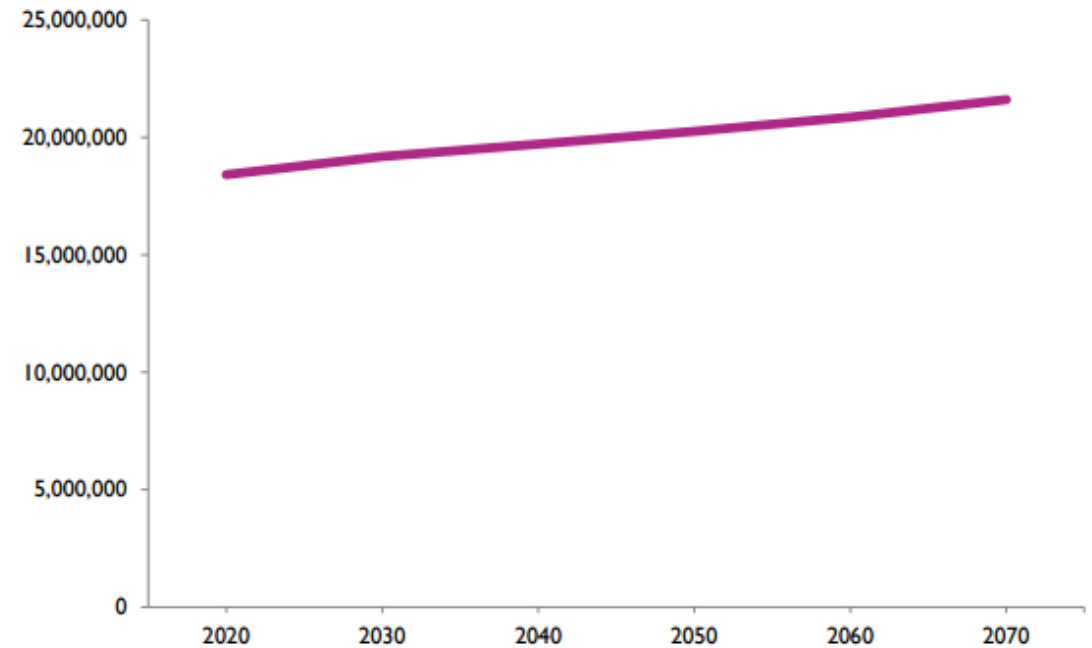
Texas' population is expected to increase more than 70 percent between 2020 and 2070, from 29.5 million to 51 million.

Texas Water Planning Regions C & K

Source: LCRWPG 2015

http://www.regioncwater.org/Documents/2011RegionCWaterPlan/Cover_volume1.pdf
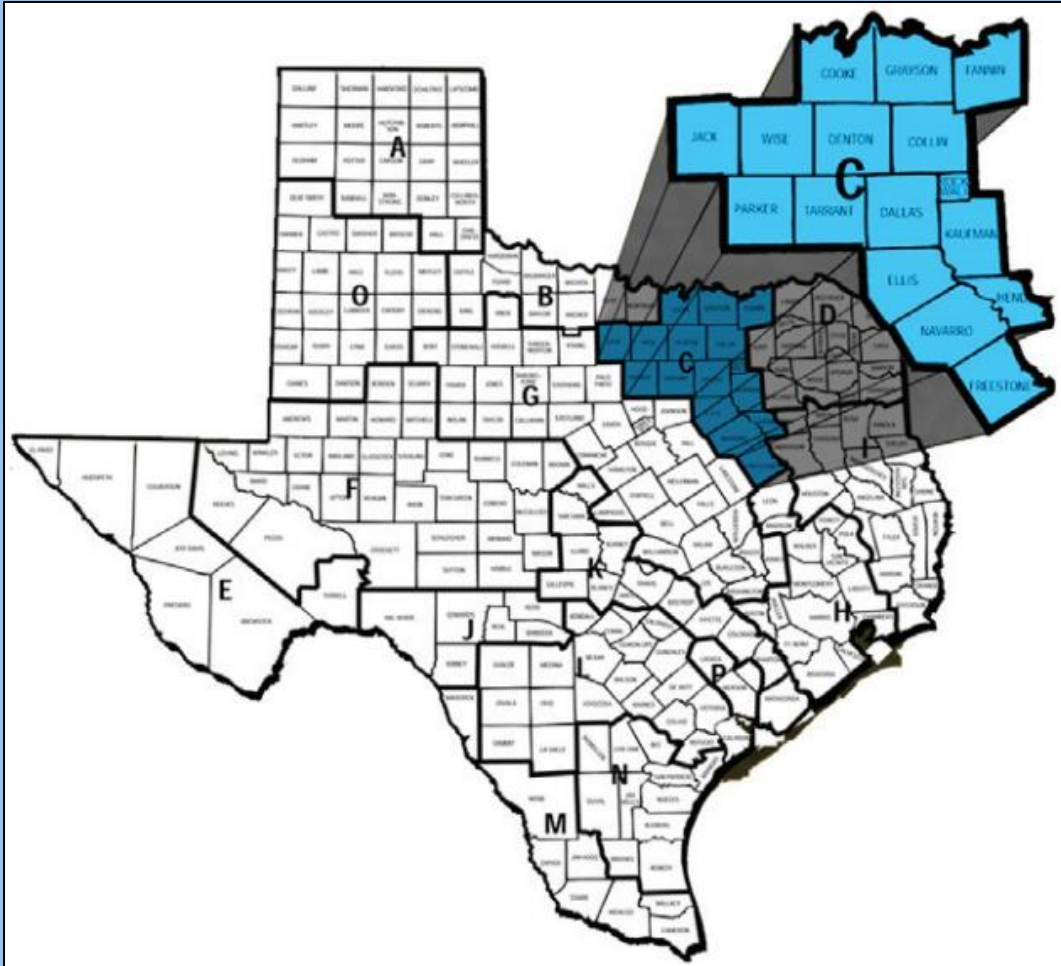
Commercial/Industrial/Institutional (CII)

Commercial Sector

Schools
Hotels
Restaurants
Retail
Offices
Hospitals
Golf Courses
Laundries

Industrial Sector

Dairy Processing
Meat Processing
Fruit and Vegetable Processing
Beverage Processing
Refining
High Tech
Paper
Textiles
Fabricated Metals

What was CII water use in Regions C and K in 2014?
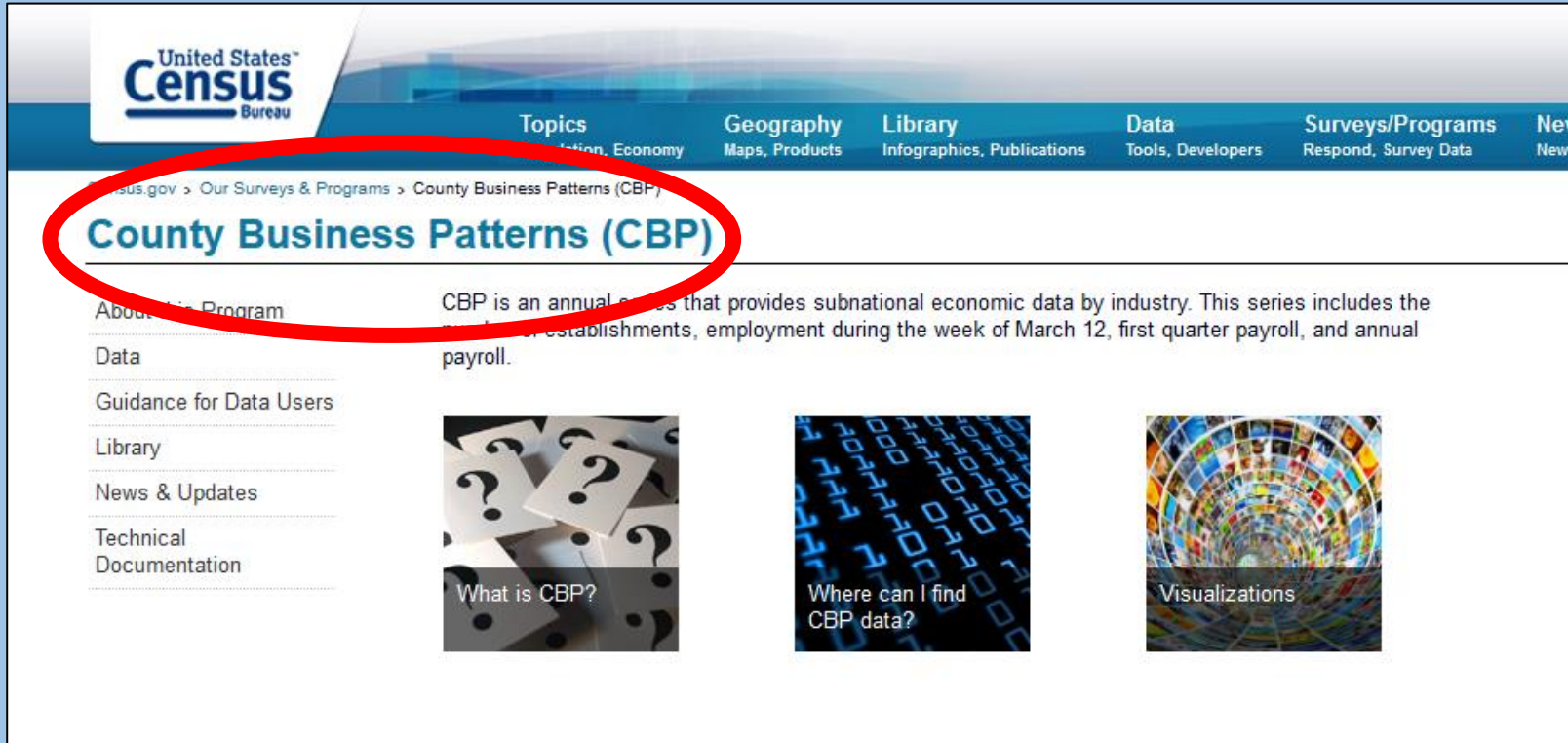
	Region	Yr	Entity	Commercial Connections	Industrial Connections	Institutional Connections	Total Metered Connections	UnMetered Connections	Commercial Volume	Industrial Volume	Institutional Volume	Total Metered Volume	UnMetered Volume
2	C	2014	ABLES SPRINGS WSC	9	2	5	1,141	140	2,475,200	160,200	121,900	58,445,000	3,815,155
3	C	2014	TOWN OF ADDISON	1,029	11	31	3,629	0	518,082,550	2,454,600	14,323,920	1,537,987,650	0
4	C	2014	AIR PARK HOA	0	0	0	32	0	0	0	0	3,110,546	0
5	C	2014	CITY OF ALLEN	1,393	98	218	34,225	0	665,916,000	62,980,000	246,702,000	3,842,373,000	0
6	C	2014	ALTOGA WSC	0	0	0	290	21	0	0	0	21,268,300	1,400,000
7	C	2014	CITY OF ALVORD	57	0	0	536	0	0	0	0	81,389,046	0
8	C	2014	ANGUS WSC	21	0	0	358	0	2,938,100	0	0	25,273,700	0
9	C	2014	CITY OF ANNA	143	0	4	4,379	10	27,588,520	0	2,527,941	372,911,275	4,153,000
10	C	2014	ARLEDGE RIDGE WSC	0	0	0	528	42	0	0	0	31,002,700	5,900,000
11	C	2014	CITY OF ARLINGTON	5,603	39	243	148,362	0	3,115,681,000	654,904,000	811,396,000	16,989,901,000	134,922,642
12	C	2014	CITY OF ATHENS	796	0	109	5,848	2	243,590,700	0	65,739,300	730,607,500	42,661,200
13	C	2014	CITY OF AUBREY	87	0	13	1,113	0	6,646,020	0	13,766,267	78,519,067	1,599,499
14	C	2014	MONARCH UTILITIES LP-AURORA VISTA	8	0	0	135	0	248,000	0	0	13,816,000	1,877,000
15	C	2014	AVALON WATER SUPPLY AND SEWER SERVICE CORP	0	0	9	340	0	0	0	2,514,600	25,957,000	0
16	C	2014	CITY OF AZLE	190	0	0	5,061	0	16,273,500	0	0	439,824,322	6,457,367
17	C	2014	CITY OF BAILEY	0	0	0	164	12	0	0	0	9,462,800	49,600
18	C	2014	OUR WSC	0	0	0	57	0	0	0	0	2,869,200	0
19	C	2014	CITY OF OF BALCH SPRINGS	842	0	0	9,819	0	101,124,000	0	0	639,216,000	0
20	C	2014	CITY OF BARDWELL	7	0	0	266	8	88,100	0	0	1,219,765	10,200
21	C	2014	CITY OF BARRY	0	0	0	100	0	0	0	0	4,097,500	0
22	C	2014	BARTLEY WOODS WSC	0	0	0	183	0	0	0	0	13,549,400	0
23	C	2014	CROSS TIMBERS WSC	53	0	6	2,208	0	12,042,853	0	1,892,109	384,427,342	0
24	C	2014	CARROLL WATER COMPANY-EMERALD FOREST SUBDIVISION	0	0	0	59	0	0	0	0	4,601,983	0
	C	2014	MONARCH UTILITIES LP-										

Identify water use by sector

Sector	Description
11	Agriculture, Forestry, Fishing and Hunting
21	Mining, Quarrying, and Oil and Gas Extraction
22	Utilities
23	Construction
31-33	Manufacturing
42	Wholesale Trade
44-45	Retail Trade
48-49	Transportation and Warehousing
51	Information
52	Finance and Insurance
53	Real Estate and Rental and Leasing
54	Professional, Scientific, and Technical Services
55	Management of Companies and Enterprises
56	Administrative and Support and Waste Management and Remediation Services
61	Educational Services
62	Health Care and Social Assistance
71	Arts, Entertainment, and Recreation
72	Accommodation and Food Services
81	Other Services (except Public Administration)
92	Public Administration

44-45   Retail Trade[T]

441   **Motor Vehicle and Parts Dealers**

4411   **Automobile Dealers**

44111   New Car Dealers

441110   New Car Dealers

44112   Used Car Dealers

441120   Used Car Dealers

4412   **Other Motor Vehicle Dealers**

44121   Recreational Vehicle Dealers

441210   Recreational Vehicle Dealers

44122   Motorcycle, Boat, and Other Motor Vehicle Dealers

441222   Boat Dealers

441228   Motorcycle, ATV, and All Other Motor Vehicle Dealers

4413   **Automotive Parts, Accessories, and Tire Stores**

44131   Automotive Parts and Accessories Stores

441310   Automotive Parts and Accessories Stores

44132   Tire Dealers

441320   Tire Dealers

442   **Furniture and Home Furnishings Stores**

4421   **Furniture Stores**

11.1 COMMERCIAL AND INSTITUTIONAL (CI) EMPLOYMENT FIGURES (2014)

Subsector	Subcategories, if applicable	Associated NAICS Code	Employment
Restaurants		7225	87,379
Hotels		72111	19,775
Hospitals		622	47,496
Grocery		44511	20,432
Misc. Retail	Motor Vehicle and Parts Dealers	441	15,996
	Furniture and Home Furnishings	442	3,941
	Electronics and Appliance	443	4,495
	Building Material/Garden Equipment	444	8,002
	Beer/Wine/Liquor	4453	885
	Health and Personal Care	446	7,029
	Gas Stations	447	5,738
	Clothing and Accessories	448	15,716

Next step: determine water use by sector

Use of gallons/employee/day metric

- Other metrics exist
  - Hospital: gallons/patient bed/day
  - Hotel: gallons/guest/day
  - Restaurant: gallons/patron/day

- Most readily available data (Gleick et al. 2003)

Restaurant water use, Collin County, TX 2014

34,743 employees x 265 G/E/D x 225 (workdays/yr) =

2,071,551,375 gallons or
6,357 acre-feet
used by the restaurant industry
in Collin County, TX in 2014

Table 11: 2014 Commercial and Institutional Water Use by Subsector (acre-feet)

Region C		Region K	
Restaurants	68,979	Restaurants	14,799
Hotels	5,532	Hotels	2,383
Hospitals	7,624	Hospitals	2,213
Grocery	5,728	Grocery	2,687
Misc. Retail	25,566	Misc. Retail	8,358
Schools	6,160	Schools	2,043
Office Buildings	83,570	Office Buildings	9,532
Laundry	4,684	Laundry	1,078
TOTAL	207,843	TOTAL	43,093

Table 12: 2014 Industrial Water Use by Subsector (acre-feet)

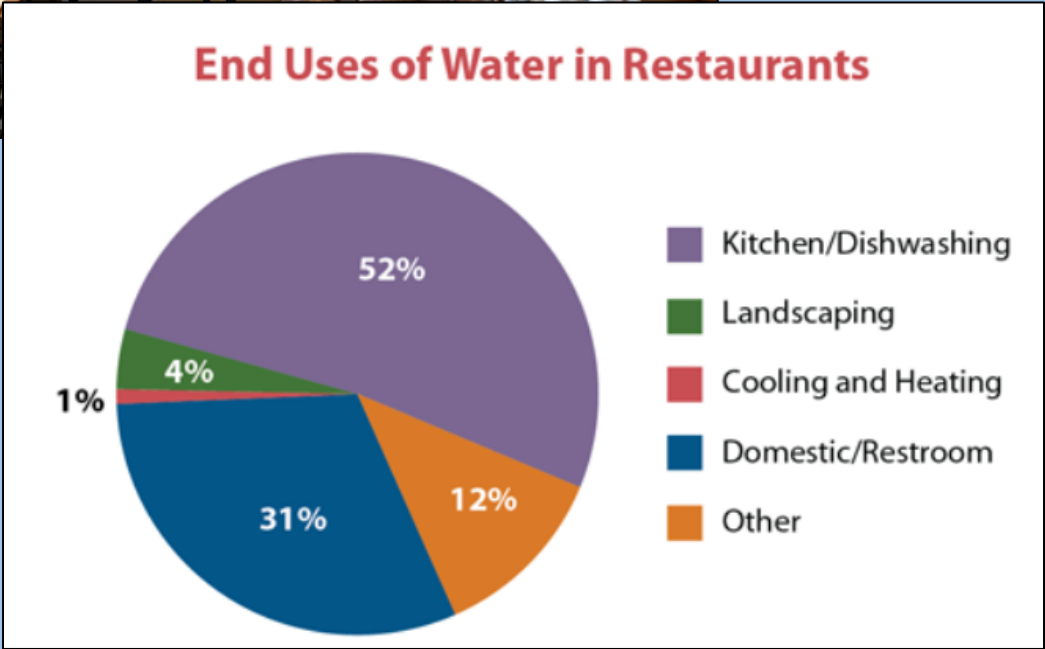| Region C		Region K	
Meat Processing	3,804	Meat Processing	411
Dairy Products	2,604	Dairy Products	433
Preserved Fruits and Vegetables	6,654	Preserved Fruits and Vegetables	1,152
Beverage Manufacturing	6,490	Beverage Manufacturing	1,209
Textile Manufacturing	614	Textile Manufacturing	91
Paper and Pulp	1,280	Paper and Pulp	0
Fabricated Metals	5,024	Fabricated Metals	657
High Tech	4,761	High Tech	2,306
TOTAL	31,230	TOTAL	6,260

2014 Water Use Results

- Region C CII total: **239,074** acre-feet used in 2014
  - 77,902,501,974 gallons

- Region K CII total: **49,353** acre-feet
  - 16,081,724,403 gallons

- Comparison to TWDB data analysis
  - Region C: TWDB data gives a 35% higher figure
  - Region K: TWDB data gives a 1% higher figure
  - Uncertainties inherent in the data

Example:

How do individual restaurants use water?

End Uses of Water in Restaurants

- Kitchen/Dishwashing — 52%
- Landscaping — 4%
- Cooling and Heating — 1%
- Domestic/Restroom — 31%
- Other — 12%

Source: EPA WaterSense
(https://www3.epa.gov/watersense/commercial/docs/factsheets/restaurants_fact_sheet_508.pdf)

RESTAURANTS	
2014 use (acre-feet):	34,474
END USE	Water Use (acre-feet)
Kitchen/dishwashing	17,926
Domestic/restroom	10,687
Other	4,137
Landscaping	1,379
Cooling/heating	345

Conservation Potential Results

- Feasibility of examining fixtures
  - Perhaps better measured by in situ audits

Conservation Potential Results

- Commercial/institutional: estimated between 25 and 50 percent savings
  - Represent a range of potential conservation savings

- Industrial: estimated between 24 and 36 percent savings
  - Gleick et al. (2003) estimated 30% industrial potential savings

Conservation Potential Results

	Low	High
Region C	58,664	113,976
Region K	11,998	23,318

Acre-feet of water that could have been saved in 2014 assuming decrease in water use by given percentages

Conservation Potential Results

- Water conserved through fixture upgrades in Region C could account for 46-91% of expected water shortage by 2020

- Water conserved through fixture upgrades in Region K could account for 4-7% of expected water shortage by 2020

Conclusion and Recommendations

- Combining GED figures with NAICS employment data is a useful method of determining water use
  - Proved to be fairly accurate
  - Identify top water-using industries
  - More detailed industry analysis

Conclusion and Recommendations

- On-site audits
  - Identify on-site problems
  - More accurate water use metrics

- Energy savings from efficient fixtures

- Cost of fixture replacement/implementation