This presentation premiered at WaterSmart Innovations

watersmartinnovations.com



IDENTIFYING, CODING AND CLASSIFYING INDUSTRIAL, COMMERCIAL AND INSTITUTIONAL WATER USERS

WATERSMART INNOVATIONS 2019

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PLUMMER

REFLECTIONS





HOW CAN YOU UNDERTAKE A MAJOR PLUMBING RETROFIT AT A HIGH SCHOOL AND END UP DOUBLING WATER USE?

When you find that a meter bypass has been open for the last five years





WHEN DOES A WATER OR ENERGY AUDIT MAKE NO ECONOMIC SENSE?

When the building is vacant or no longer exists.





WHEN DOES A COOLING TOWER ALMOST ELIMINATE BLOWDOWN, BUT SAVES NO WATER?

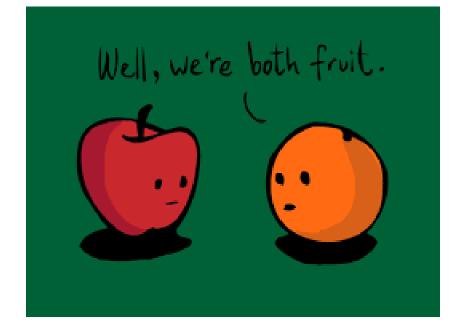
When the float valve is stuck wide open.





WHEN DO SIDE BY SIDE COMPARISONS FAIL TO WORK?

When you compare apples to oranges.





IT IS NOT WHAT IT IS?

No, It is Not!





KNOW THY CUSTOMER

No two customers are ever the same.





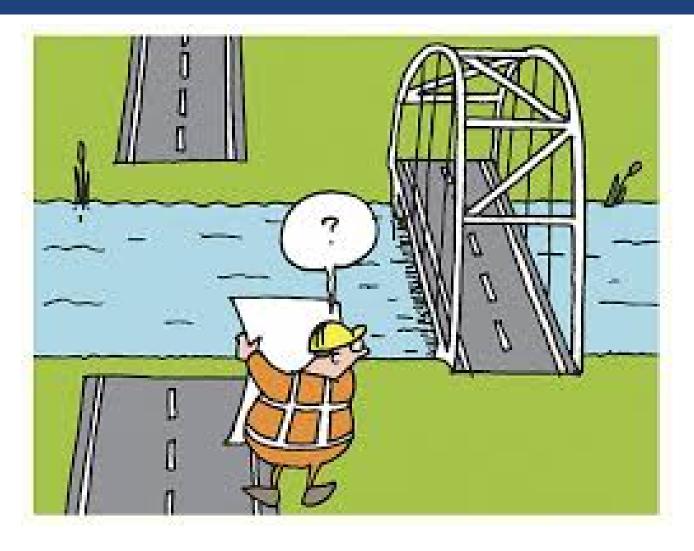
PURPOSE

- Classification and Categorization ICI Water Use
- Identification of Trends in Consumption
- Identification of Outliers
- Benchmarking and Identification of Major Drivers
- Identification of the Potential for Future Reductions
- Determination of Specific Targets





DEALING WITH DISCREPANCES





EXAMPLE OF COMMON ICI CUSTOMER DATABASE

BP_Name	City	House_Number	Street_Name	Zip	contract_Account	Meter_Number	Feb_08	Mar_08	Apr_08	May_08	Jun_08	Jul_08	Aug_08	Sep_08	Oct_08	Nov_08	Dec_08
"3400 CARLISLE LLC"	DALLAS	3400	CARLISLE ST	75204	100577689	654171	0	0	0	0	0	0	0	0	0	0	0
"3400 CARLISLE LLC"	DALLAS	3400	CARLISLE ST	75204	100577679	263062	0	0	0	0	0	0	0	0	0	0	0
% T-MOBILE NCNEAL , JAMES E	DALLAS	9660	AUDELIA RD	75238	100562633	775934	0	0	0	0	0	0	0	0	0	0	0
% T-MOBILE NCNEAL , JAMES E	DALLAS	9660	AUDELIA RD	75238	100514127	775934	0	0	0	0	0	0	0	0	0	0	0
% T-MOBILE NCNEAL , JAMES E	DALLAS	9660	AUDELIA RD	75238	100306312	687609	2100	1700	2600	1900	2400	2100	4600	1800	2000	1900	2500
1 GALLERIA PLACE LTD PARTNERSHIP	DALLAS	5454	PETERSON LN	75240	100014814	400731	294700	323800	248400	262800	312200	246700	645600	354600	417400	370300	301100
1 GALLERIA PLACE LTD PARTNERSHIP	DALLAS	5454	PETERSON LN	75240	100014814	367623	396800	503800	407100	301100	443300	458800	732200	440300	445200	336500	0
1 GALLERIA PLACE LTD PARTNERSHIP	DALLAS	5454	PETERSON LN	75240	100014814	428817	245500	271900	249500	285900	305200	283800	706600	378100	423400	363800	282200
1 GALLERIA PLACE LTD PARTNERSHIP	DALLAS	5454	PETERSON LN	75240	100014814	556456	245200	348600	255300	209600	289400	135500	341200	280900	275600	188700	187000
1 GALLERIA PLACE LTD PARTNERSHIP	DALLAS	5454	PETERSON LN	75240	100014814	651872	416000	464000	357900	379900	409000	358700	752000	361300	572300	537300	545700
1 GALLERIA PLACE LTD PARTNERSHIP	DALLAS	5454	PETERSON LN	75240	100014814	715883	265200	239200	156900	193900	159000	145400	409200	175500	189900	171400	220900
1 GALLERIA PLACE LTD PARTNERSHIP	DALLAS	5454	PETERSON LN	75240	100014814	732272	0	0	0	0	0	0	0	0	0	0	0
1 MCKINNEY PLAZA INC	DALLAS	3232	MCKINNEY AVE	75204	100436077	654962	0	0	0	0	0	0	0	0	0	0	0
1 MCKINNEY PLAZA INC	DALLAS	3232	MCKINNEY AVE	75204	100292842	329649	0	267400	288300	443100	956900	0	0	0	0	0	0
1 MCKINNEY PLAZA INC	DALLAS	3232	MCKINNEY AVE	75204	100292842	792882	0	0	0	0	0	0	0	0	0	1878100	468000
1 MCKINNEY PLAZA INC	DALLAS	3232	MCKINNEY AVE	75204	100212116	654962	0	232100	392400	0	293000	363900	0	59000	262600	128100	125600
10210 CENTRAL PL PRTN	DALLAS	10210	N CENTRAL EXPY	75231	100354422	683549	0	187000	0	99100	209300	136200	0	291800	102500	0	152600
10220 HARRY HINES LLC	DALLAS	10220	HARRY HINES BLVD	75220	100341036	400730	0	21400	32000	0	0	0	0	0	0	0	0
10300 N CENTRAL LLC	DALLAS	10300	N CENTRAL EXPY	75231	100517686	266080	0	0	0	0	0	0	0	0	0	0	0
10300 N CENTRAL LLC	DALLAS	10300	N CENTRAL EXPY	75231	100517686	870862	0	0	0	0	0	0	0	0	0	0	0
10300 N CENTRAL LLC	DALLAS	10260	N CENTRAL EXPY	75231	100509532	694780	0	0	0	0	0	0	0	0	0	0	0
10300 N CENTRAL LLC	DALLAS	5455	BLAIR RD	75231	100509530	616779	0	0	0	0	0	0	0	0	0	0	0
10300 N CENTRAL LLC	DALLAS	5455	BLAIR RD	75231	100509530	694786	0	0	0	0	0	0	0	0	0	0	0
10300 N CENTRAL LLC	DALLAS	10300	N CENTRAL EXPY	75231	100509529	601635	0	0	0	0	0	0	0	0	0	0	0
10300 N CENTRAL LLC	DALLAS	10300	N CENTRAL EXPY	75231	100352485	266080	0	88200	100800	80700	170400	181600	219300	365800	156900	0	122900
10300 N CENTRAL LLC	DALLAS	10260	N CENTRAL EXPY	75231	100352478	694780	9600	1300	16700	41800	51100	158100	287600	160000	93800	319100	172900
10300 N CENTRAL LLC	DALLAS	10300	N CENTRAL EXPY	75231	100352115	601635	3600	31300	48000	71600	99300	214000	234100	235800	154100	143200	116600
10300 N CENTRAL LLC	DALLAS	5455	BLAIR RD	75231	100352107	616779	26100	24100	22300	29500	25800	24800	23800	23200	23700	22500	23300
10300 N CENTRAL LLC	DALLAS	5455	BLAIR RD	75231	100352107	694786	25800	26500	23100	32000	28200	23600	85300	21100	24800	29200	27100
10551 MILLER PARTNERS	DALLAS	10551	MILLER RD	75238	100038219	622998	45400	47600	50900	48900	76700	58100	64000	61400	133400	92200	32300
10588 STONE CANYON PARTNERS LP	DALLAS	10588	STONE CANYON RD	75230	100466690	476263	0	0	0	0	0	0	0	0	0	0	0

TYPICAL DISCREPANCES

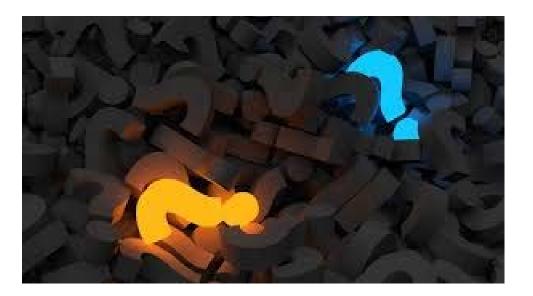
- Changes in account entries over time
- Varying Units of Measurement
 - Cubic Feet
 - CCF
 - Gallons
 - 100 Gallons
 - kGal
- Missing and Incorrect Data





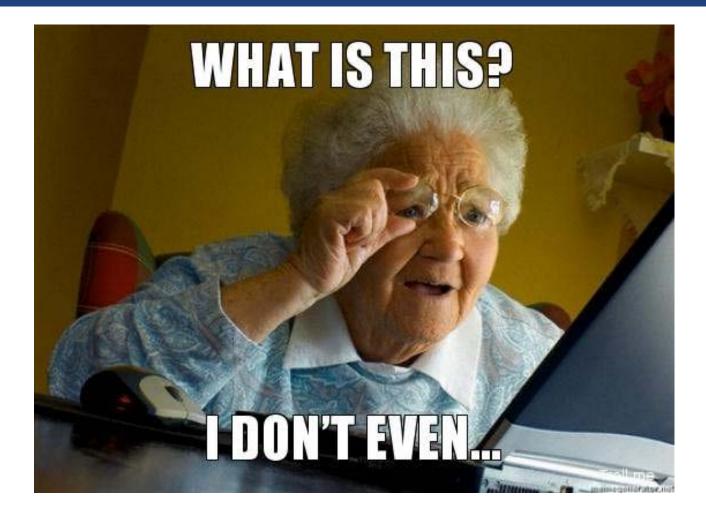
WHERE IS IT?

- Mailing Address, Meter Address or Business Address?
- Same Address, Different Entry?
- Completely Wrong Address
- Misspelling





WHAT IS IT?





WHAT IS IT?

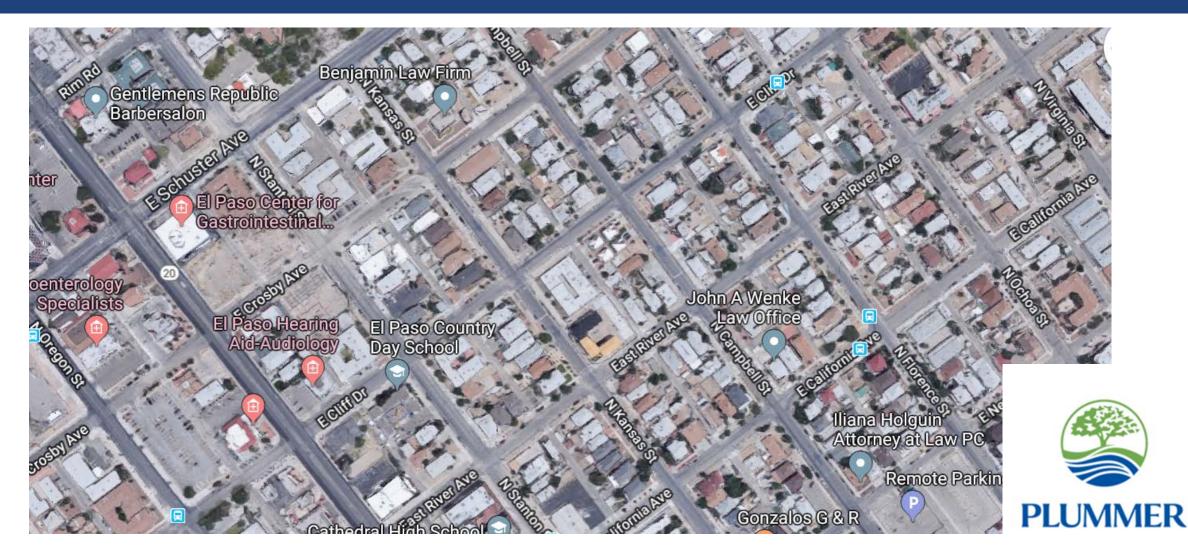
- Account Name Is it?
 - Misspelled?
 - Abbreviated?
 - Inconsistent?
 - Wrong?
 - Slang?
 - Numbers?
 - Property Owner?



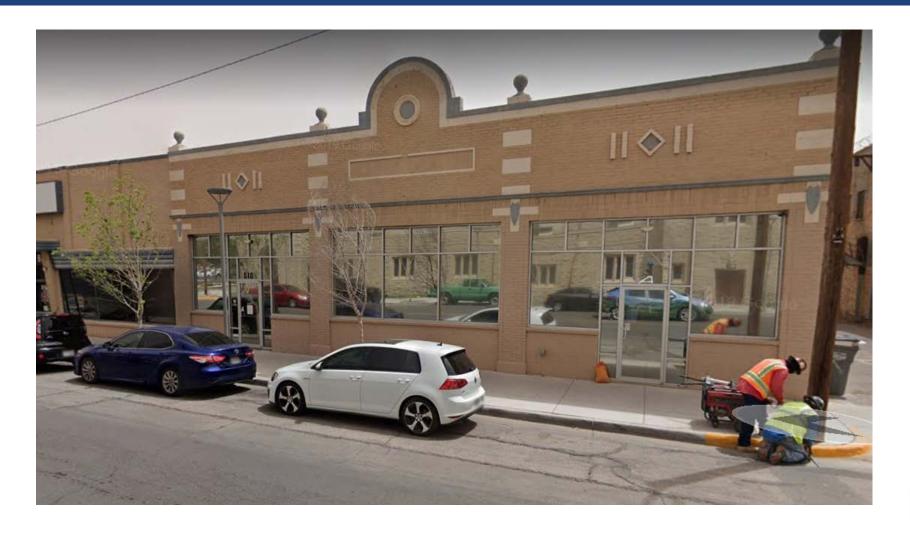




IDENTIFYING THE CUSTOMERS



STILL IDENTIFYING THE CUSTOMER





THE PROCESS





WHAT IS NAICS?

- North American Industry Classification System (NAICS)
 - Process of assigning businesses 2 to 6-digit codes that refer to a specific sector or sub-sector of an industry
- Designed for business information, not water meters. For that reason, the application
 of codes in our NAICS categorization and analysis is based on the business activity
 that uses the most water from a water meter



WHY CARE ABOUT NAICS CODING?

- Can be used to provide more specific information about a water utility's ICI customer base
- Allows water consumption standards to be established, meaning businesses that are outliers (high or low/no water users) within their specific industry can be identified
 - These usually fall through the cracks and allow room for additional conservation efforts
- Used by TWDB and TCEQ



WHAT DOES NAICS CODING LOOK LIKE?

NAICS Code	TCEQ ICI Category*	Type of Business	Specialty (2017 NAICS US Title)				
541330	COMMERCIAL	PROFESSIONAL, SCIENTIFIC, & TECHNICAL SERVICES	ENGINEERING SERVICES				
561510	COMMERCIAL	ADMINISTRATIVE AND SUPPORT AND WASTE MANAGEMENT AND REMEDIATION SERVICES	TRAVEL AGENCIES				
611110	INSTITUTIONAL	EDUCATIONAL SERVICES	ELEMENTARY AND SECONDARY SCHOOLS				
622110	INSTITUTIONAL	HEALTH CARE AND SOCIAL ASSISTANCE	GENERAL MEDICAL AND SURGICAL HOSPITALS				
335911	INDUSTRIAL	MANUFACTURING	STORAGE BATTERY MANUFACTURING				
335912	INDUSTRIAL	MANUFACTURING	PRIMARY BATTERY MANUFACTURING				
531110	MULTIFAMILY*	REAL ESTATE AND RENTAL AND LEASING	LESSORS OF RESIDENTIAL BUILDINGS & DWELLINGS ²¹				

*Health care and social assistance businesses that are usually under the Institutional sector but were similar to apartments in water usage were moved under the Multifamily sector (nursing homes, retirement communities, residential substance abuse hospital, etc.)

DEFINITIONS

- Commercial use The use of water by a place of business, such as a hotel, restaurant, or office building. This does not include multi-family residences or agricultural, industrial, or institutional users.
- Industrial use The use of water in processes designed to convert materials of a lower order of value into forms having greater usability and commercial value, and the development of power by means other than hydroelectric, but does not include agricultural use.
- Institutional use The use of water by an establishment dedicated to public service, such as a school, university, church, hospital, prison, or government facility. All facilities dedicated to public service are considered institutional regardless of ownership
- Multifamily use Use of water by apartments, retirement homes, nursing homes, and other longterm living facilities.

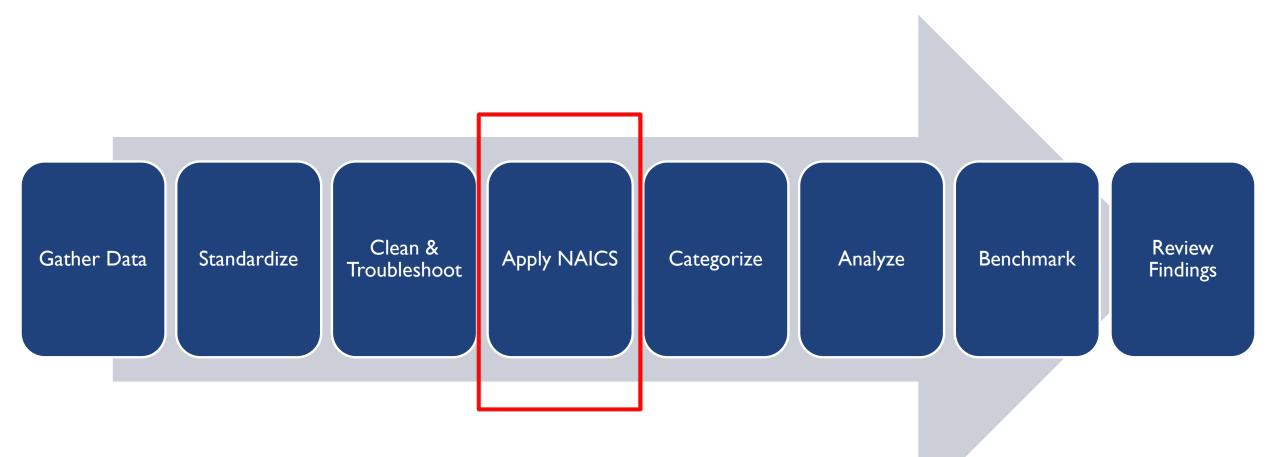


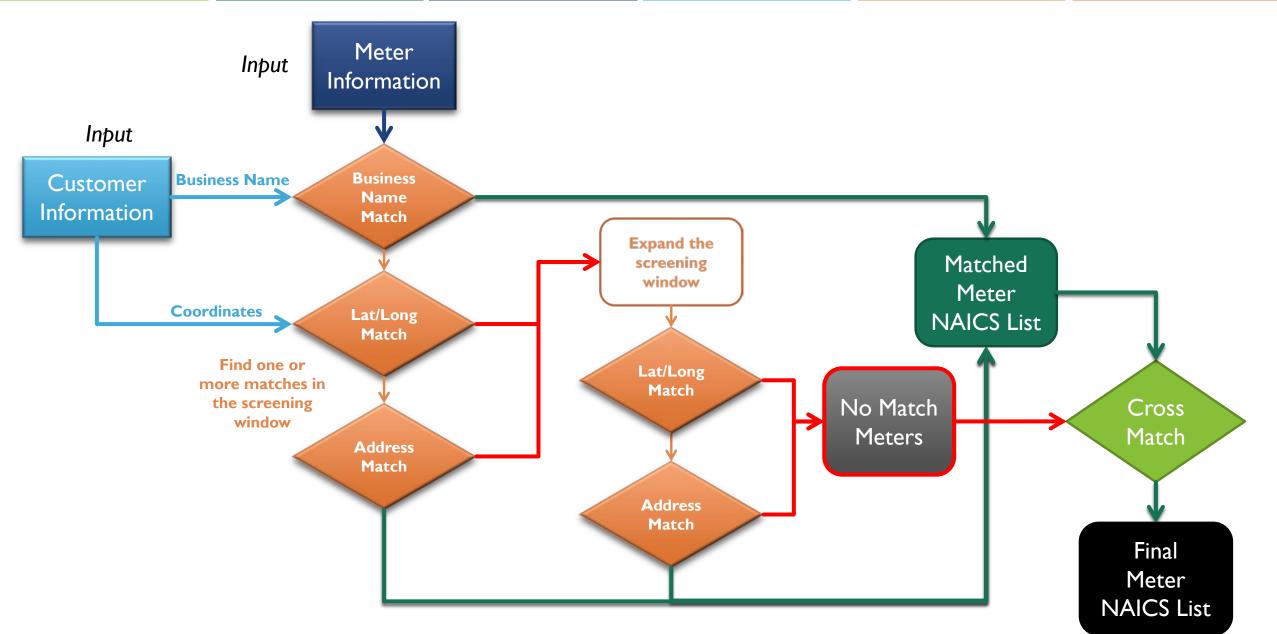
NAICS.COM

www.NAICS.com

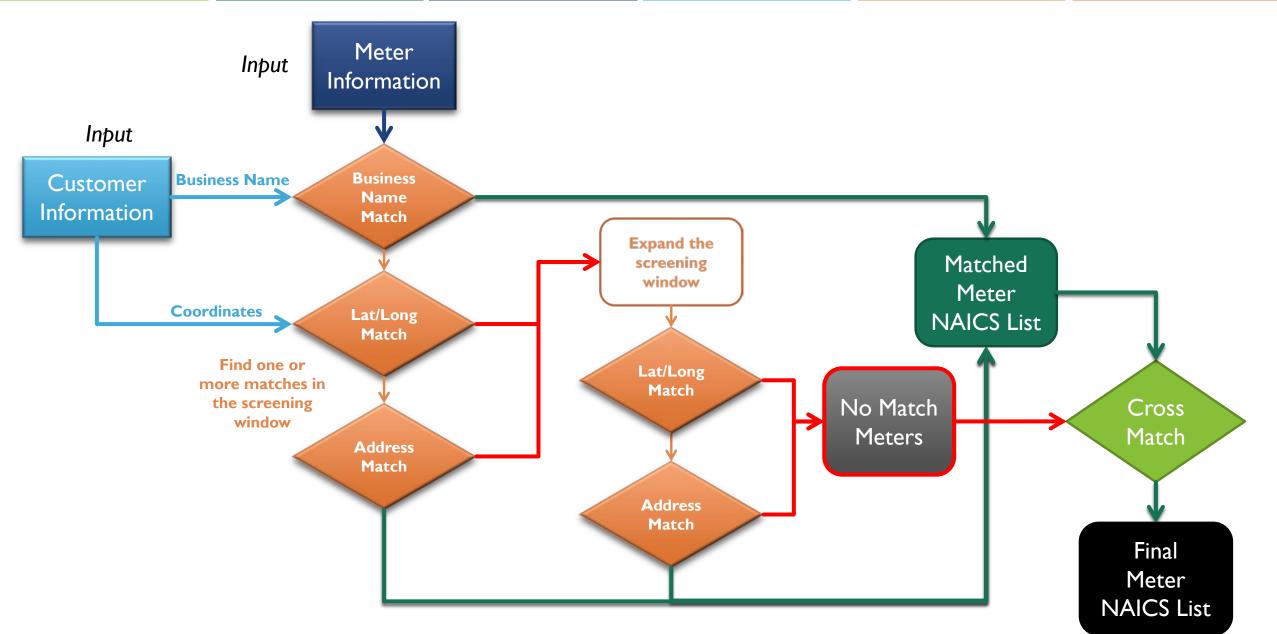


THE PROCESS



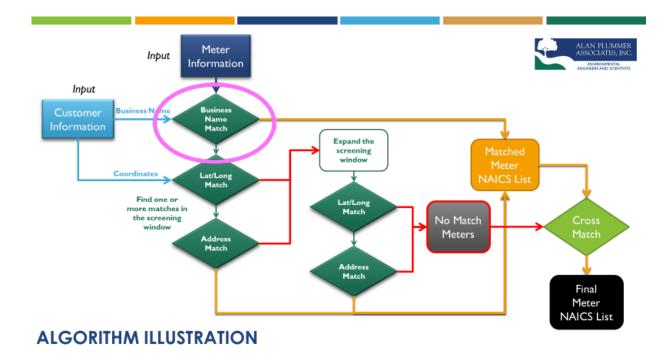


ALGORITHM ILLUSTRATION



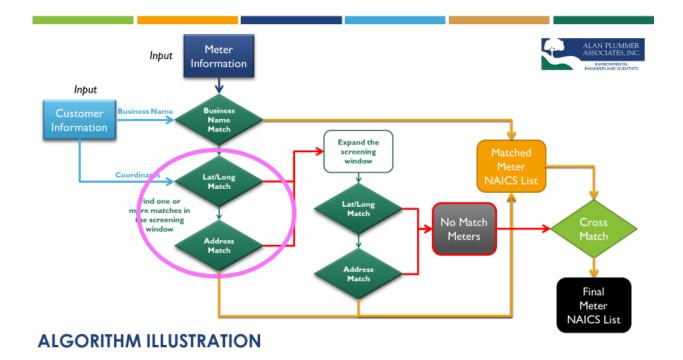
ALGORITHM ILLUSTRATION

BUSINESS NAME MATCHING



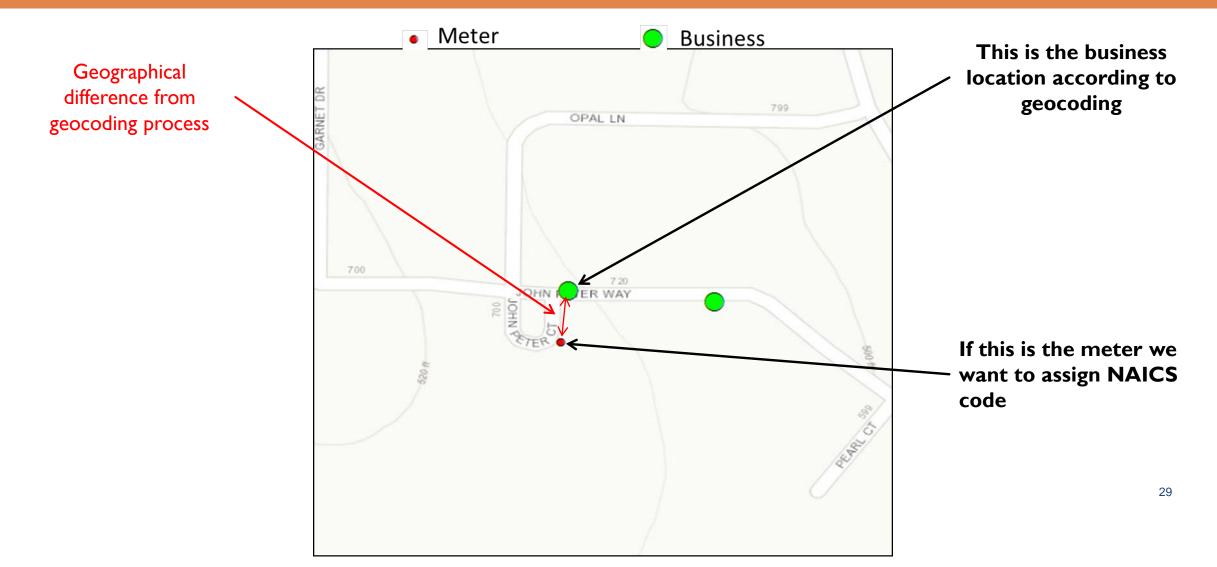
- Frequent Word Finder
 - LLC, CO., LLC, Assoc.,
- Meaningful Words
 - ISD, HOA, Church, Restaurant
- Business Name does not always match Customer Name of Record
- The most common ways of naming a business is using the place's/city's name
 - San Marcos Premium Outlet, Allen Mobile Service, Austin Pets Alive...etc.
 - Only provides geographical information
- Including these words may reduce the accuracy of matching:
 - Jack Corporation <-> Jason Corporation
 - Receives very high match score from the matching function since the word "Corporation" takes a huge portion o²⁷the business name.

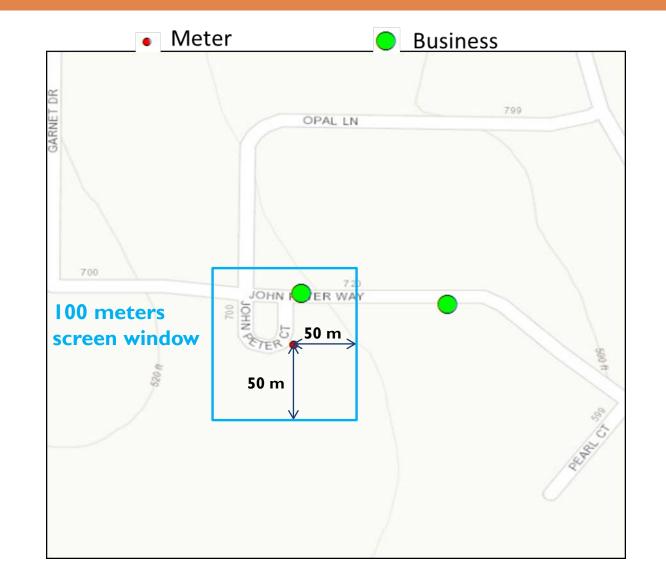
GEOGRAPHICAL MATCH



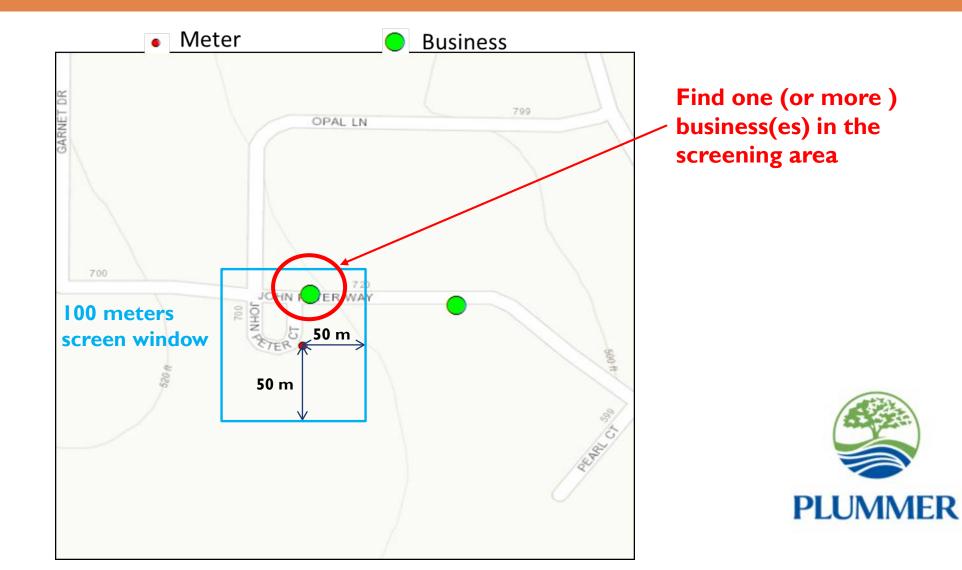
- Provided addresses are geocoded
- 100 m² screening window to find a geographical match

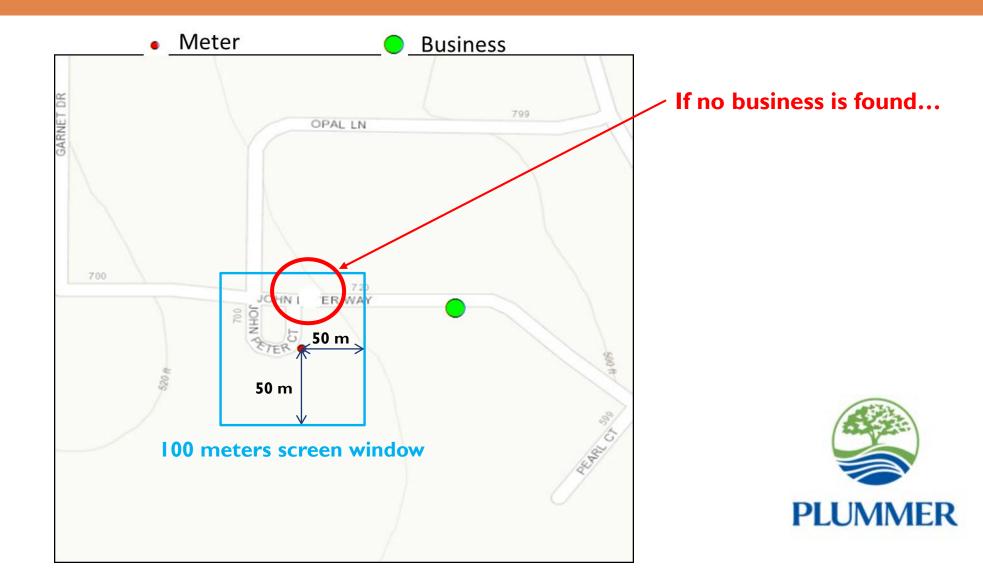


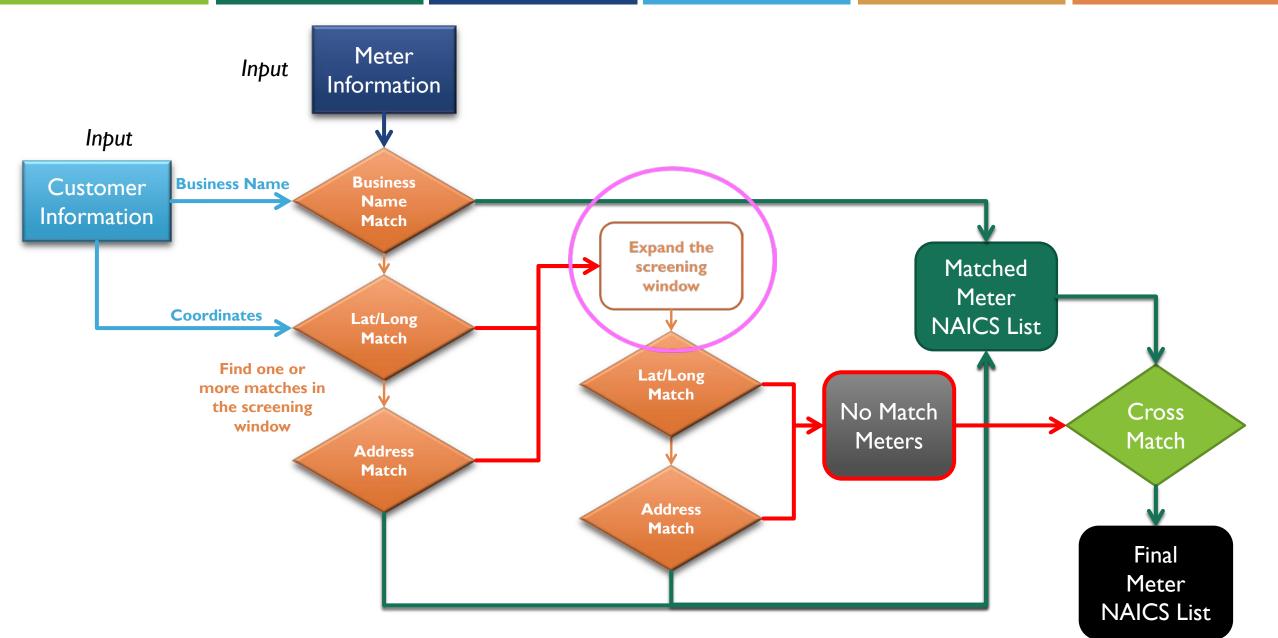




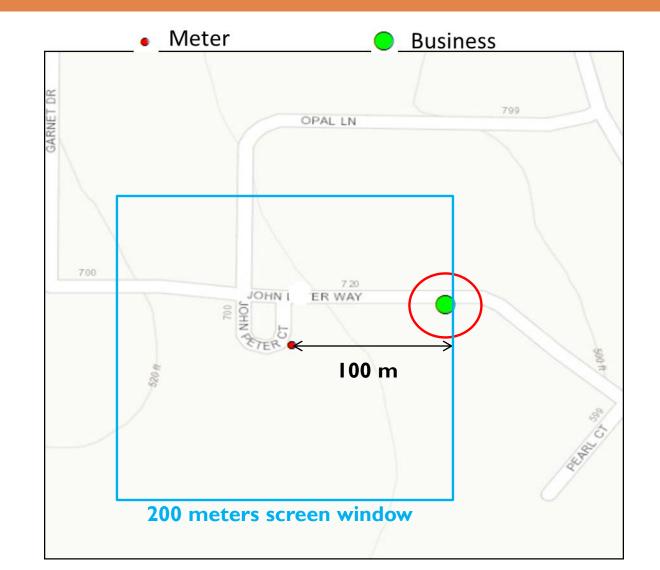






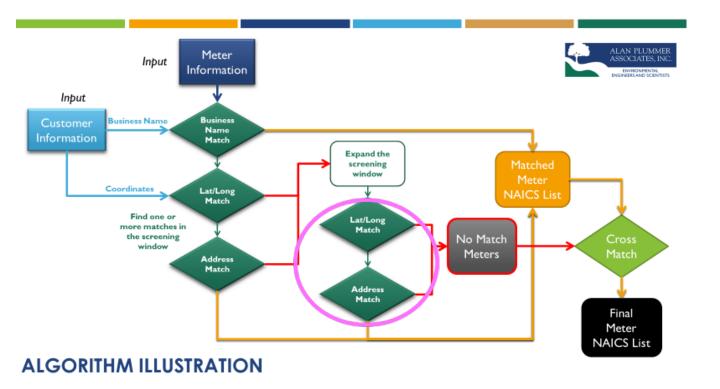


ALGORITHM ILLUSTRATION



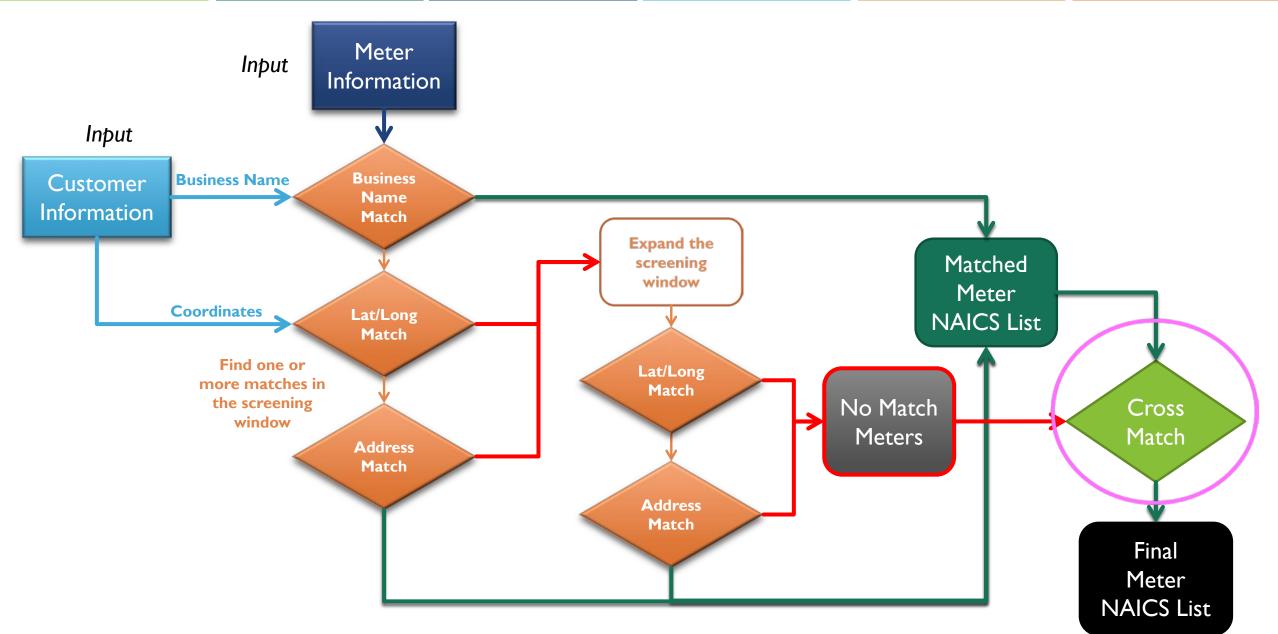


STREET ADDRESS MATCH



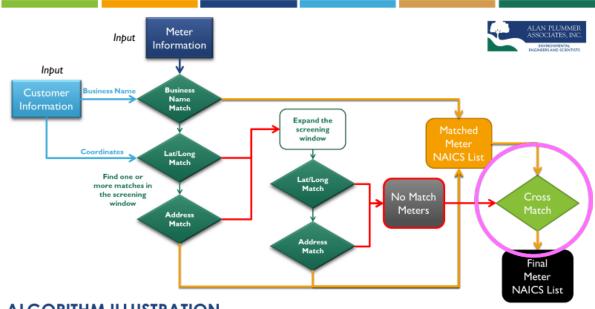
- Check the street address to see if the meter is referring to the right business
 - Street Number
 - Street Name





ALGORITHM ILLUSTRATION

CROSS MATCH

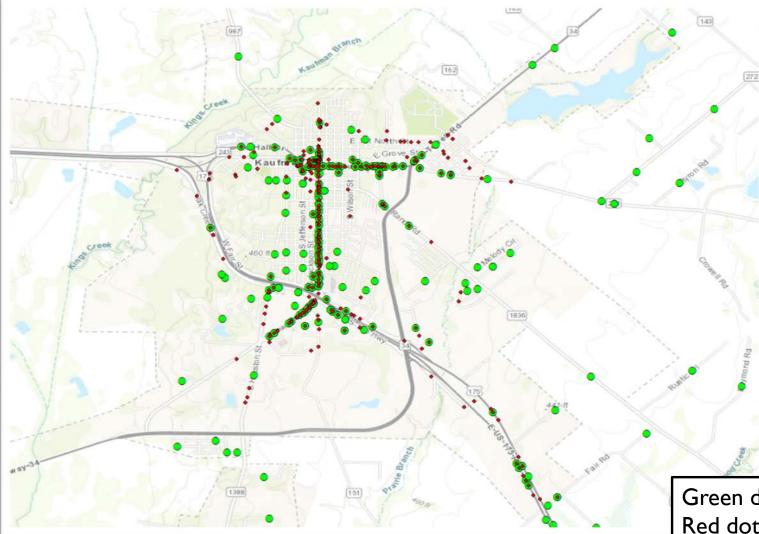


ALGORITHM ILLUSTRATION

- Can be regarded as the second check in this algorithm.
- The purpose of this step is to check if there are any "not matched" meters have the same customer name in the "matched" meter customer name list.



WHAT DOES GEOCODING LOOK LIKE?





Green dots: geocoded businesses Red dots: geocoded meters

DUN & BRADSTREET OPTIMIZATION



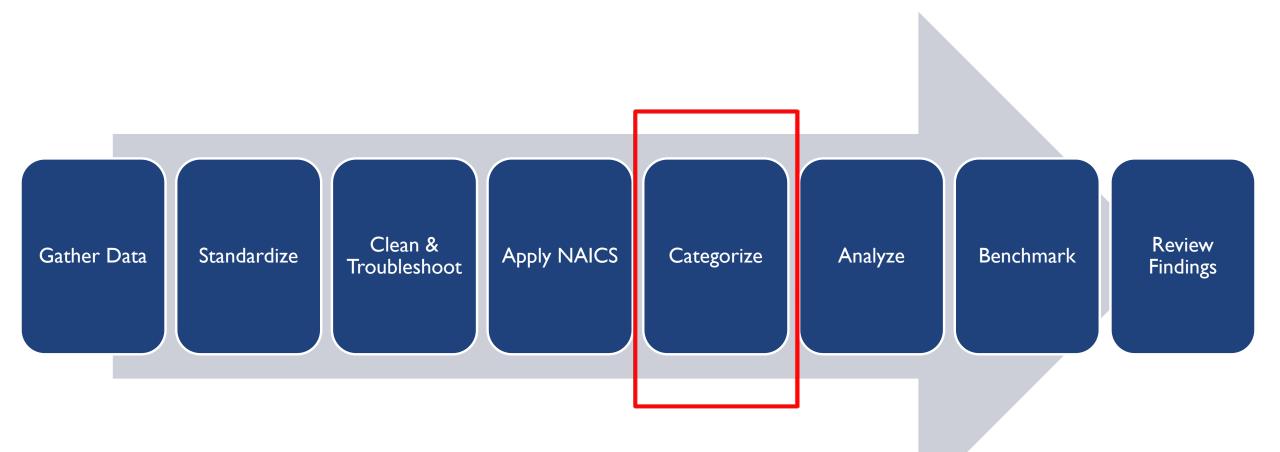


WHAT WE'VE LEARNED

- Some NAICS codes hardcoded in script to any meter with "HOA" (531110) and "CHURCH" (813110) in the customer name.
- Accuracy constrained by the quality and quantity of the provided customer data.
 - Misspellings (e.g. medium vs Median; customer names)
 - Inconsistencies in naming
 - Abbreviations (e.g. PLM)
 - Little to no business information (business owner/customer vs business name)
 - Missing data



THE PROCESS



WHAT DOES NAICS CATEGORIZATION LOOK LIKE?

Code Industry Title

11	Agriculture, Forestry, Fishing and Hunting				
21	Mining				
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 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)				



WHAT DOES NAICS CATEGORIZATION LOOK LIKE?

<u>Codes</u>	Titles			
44-45	Retail Trade			
4411	Automobile Dealers			
441110	New Car Dealers			
441120	Used Car Dealers			
4412	Other Motor Vehicle Dealers			
441210	Recreational Vehicle Dealers			
441222	Boat Dealers			
441228	Motorcycle, ATV, and All Other Motor Vehicle Dealers			
	Automotive Parts, Accessories, and Tire Stores			
4413	Automotive Parts, Accessories, and Tire Stores			
4413 441310	Automotive Parts, Accessories, and Tire Stores Automotive Parts and Accessories Stores			
441310	Automotive Parts and Accessories Stores			
441310 441320	Automotive Parts and Accessories Stores Tire Dealers			
441310 441320 4421	Automotive Parts and Accessories Stores Tire Dealers Furniture Stores			
441310 441320 4421 442110	Automotive Parts and Accessories Stores Tire Dealers Furniture Stores Furniture Stores			
441310 441320 4421 442110 4422	Automotive Parts and Accessories Stores Tire Dealers Furniture Stores Furniture Stores Home Furnishings Stores			

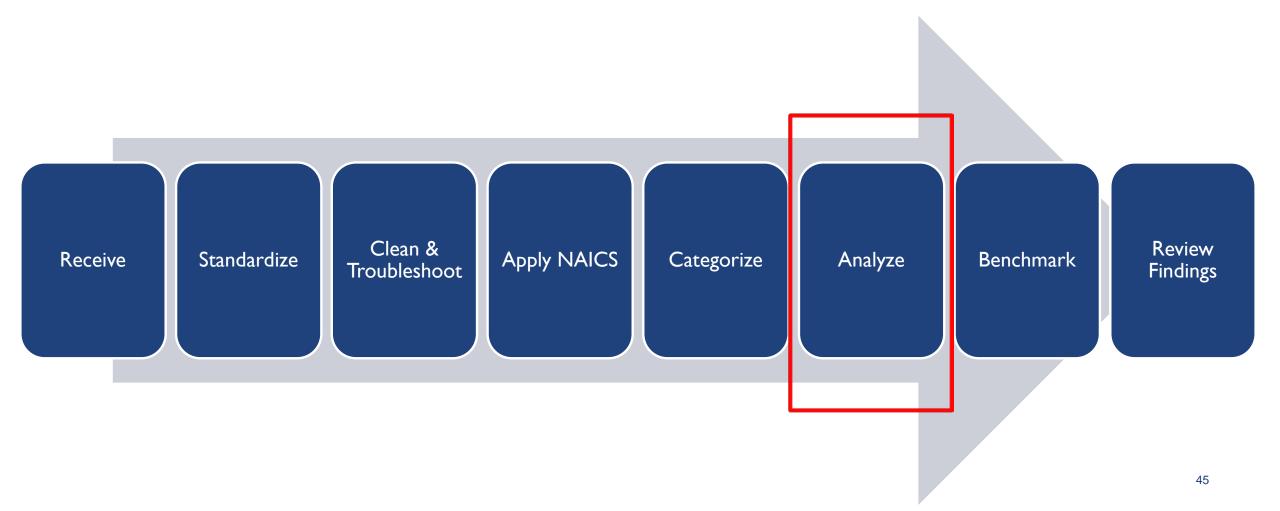


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THE PROCESS

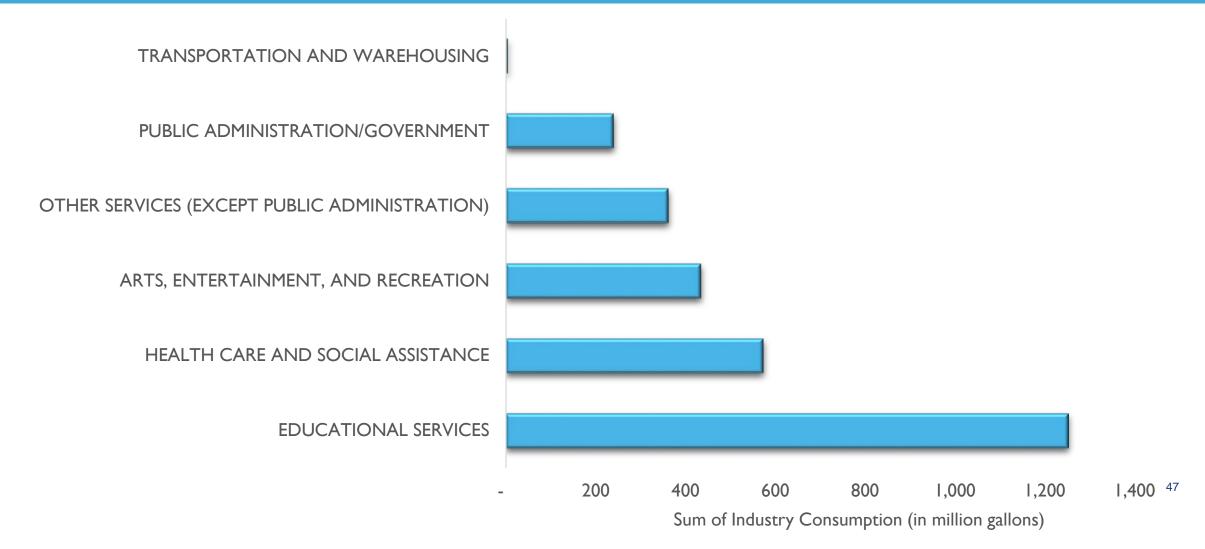


THE FINDINGS

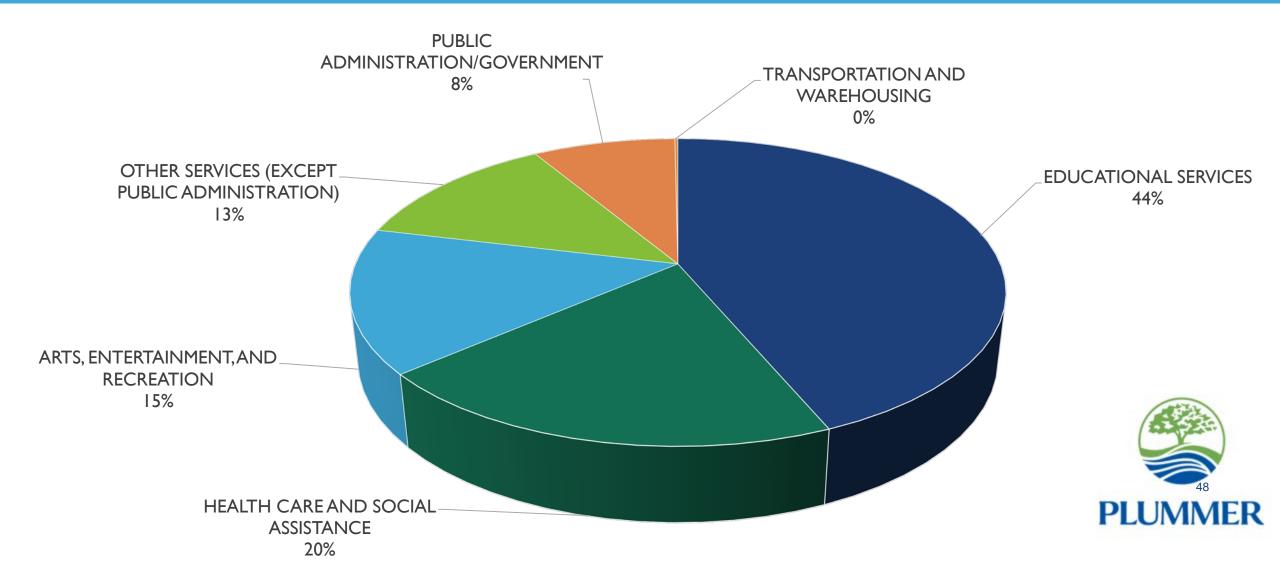




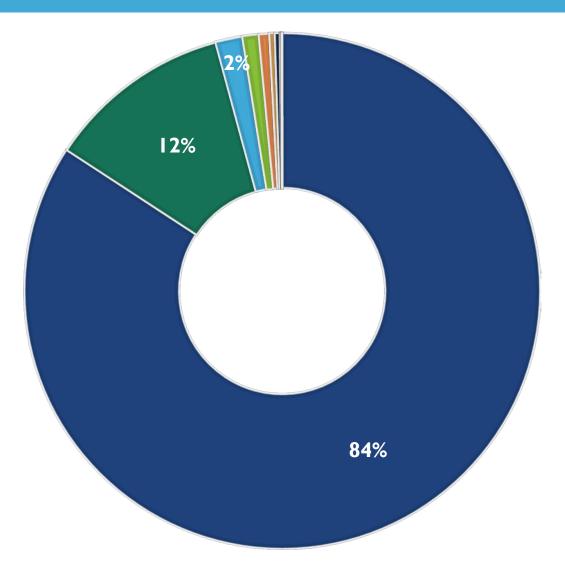
INSTITUTIONAL WATER USE BY BUSINESS TYPE



INSTITUTIONAL WATER USE BREAKDOWN

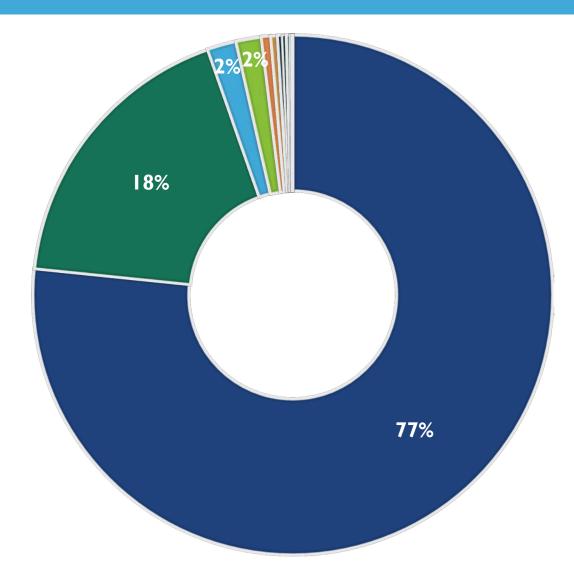


INSTITUTIONAL EDUCATIONAL SERVICES WATER USE



ELEMENTARY AND SECONDARY SCHOOLS ■ JUNIOR COLLEGES OTHER TECHNICAL AND TRADE SCHOOLS COLLEGES, UNIVERSITIES, AND PROFESSIONAL SCHOOLS **ALL OTHER MISCELLANEOUS SCHOOLS AND INSTRUCTION SPORTS AND RECREATION INSTRUCTION** ■ FINE ARTS SCHOOLS ■ EDUCATIONAL SUPPORT SERVICES AUTOMOBILE DRIVING SCHOOLS COSMETOLOGY AND BARBER SCHOOLS **FLIGHT TRAINING EXAM PREPARATION AND TUTORING** PLUMMER

INSTITUTIONAL – ARTS, ENTERTAINMENT, & RECREATION WATER USE



■ NATURE PARKS AND OTHER SIMILAR INSTITUTIONS

■ GOLF COURSES AND COUNTRY CLUBS

SPORTS TEAMS AND CLUBS

 PROMOTERS OF PERFORMING ARTS, SPORTS, AND SIMILAR EVENTS WITH FACILITIES
 HISTORICAL SITES

ZOOS AND BOTANICAL GARDENS

RACETRACKS

 PROMOTERS OF PERFORMING ARTS, SPORTS, AND SIMILAR EVENTS WITHOUT FACILITIES
 OTHER SPECTATOR SPORTS

DANCE COMPANIES

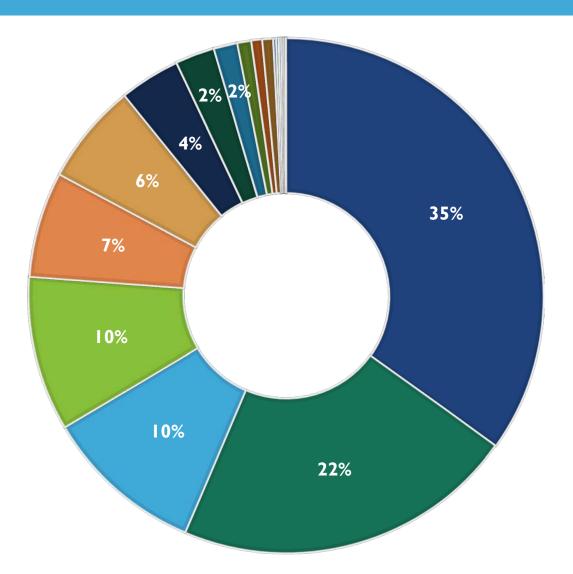
MUSEUMS

MUSICAL GROUPS AND ARTISTS

OTHER PERFORMING ARTS COMPANIES



INSTITUTIONAL – PUBLIC ADMINISTRATION/GOVERNMENT WATER USE



■ CORRECTIONAL INSTITUTIONS

 REGULATION AND ADMINISTRATION OF TRANSPORTATION PROGRAMS
 POLICE PROTECTION

FIRE PROTECTION

ADMINISTRATION OF PUBLIC HEALTH PROGRAMS

EXECUTIVE OFFICES

■ ADMINISTRATION OF EDUCATION PROGRAMS

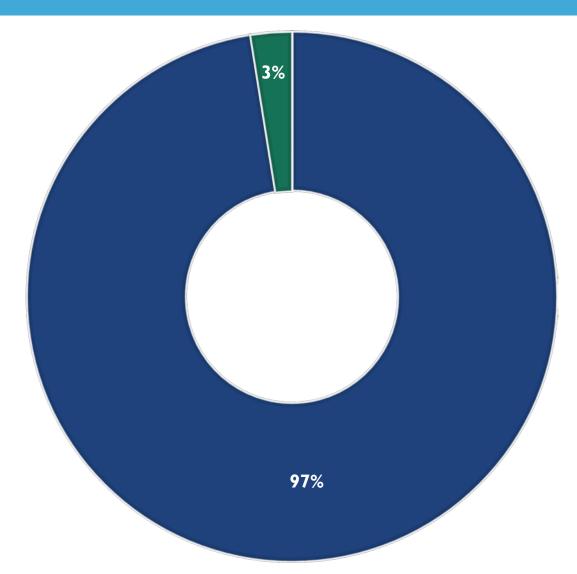
LEGISLATIVE BODIES

 ADMINISTRATION OF HUMAN RESOURCE PROGRAMS (EXCEPT EDUCATION, PUBLIC HEALTH, AND VETERANS' AFFAIRS PROGRAMS)
 OTHER GENERAL GOVERNMENT SUPPORT

PUBLIC ADMINISTRATION

■ OTHER JUSTICE, PUBLIC ORDER, AND SAFETY ACTIVITIES

INSTITUTIONAL – HEALTH CARE & SOCIAL ASSISTANCE WATER USE

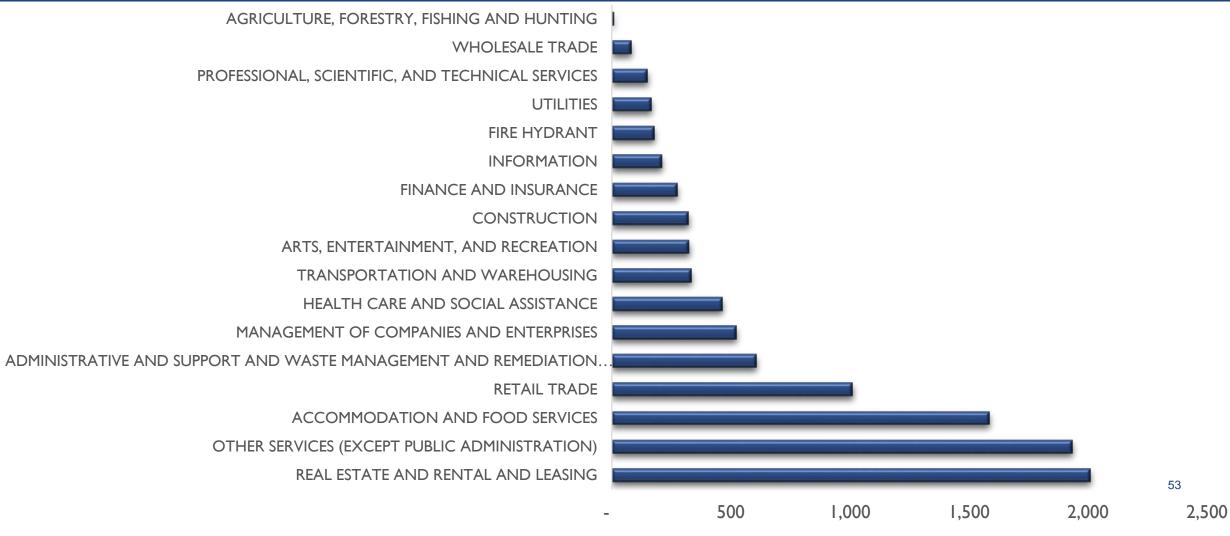


GENERAL MEDICAL AND SURGICAL HOSPITALS

SPECIALTY (EXCEPT PSYCHIATRIC AND SUBSTANCE ABUSE) HOSPITALS

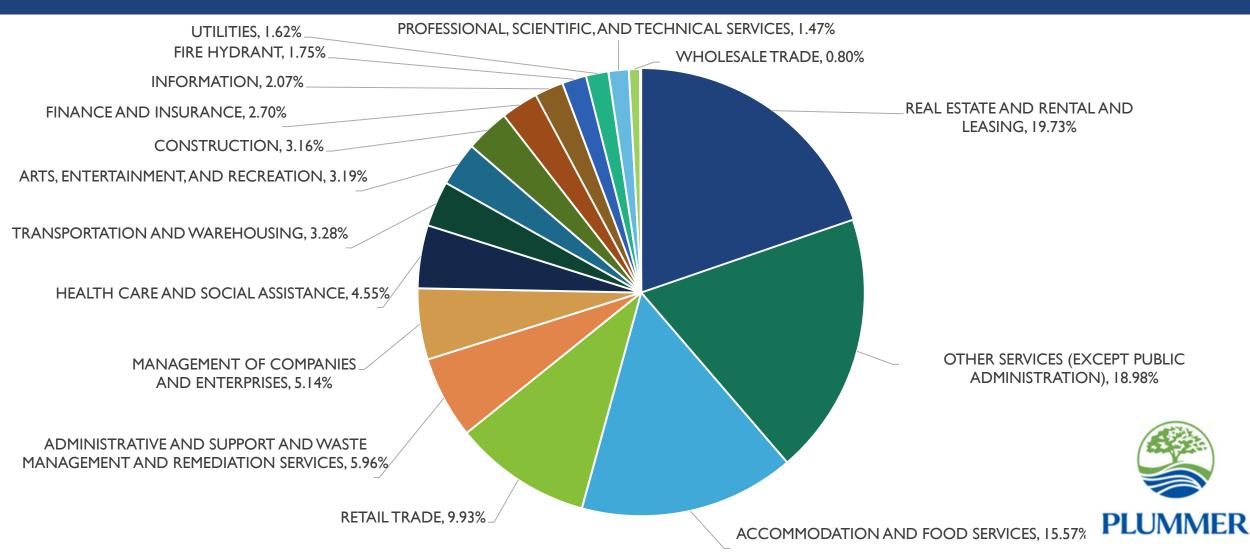


COMMERCIAL WATER USE BY BUSINESS TYPE

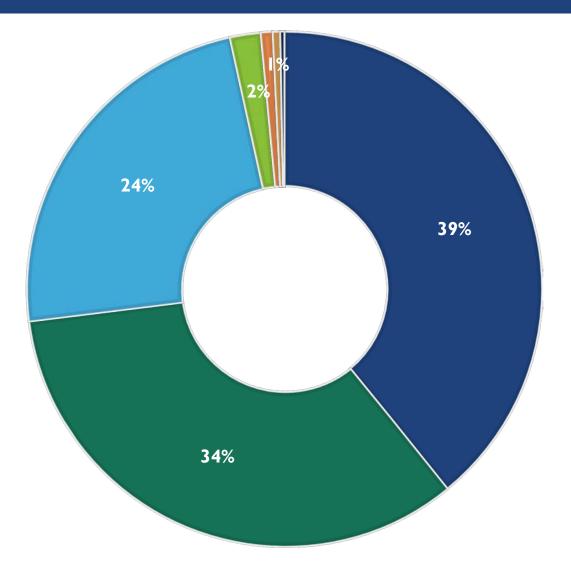


Sum of Industry Consumption (in million gallons)

COMMERCIAL WATER CONSUMPTION



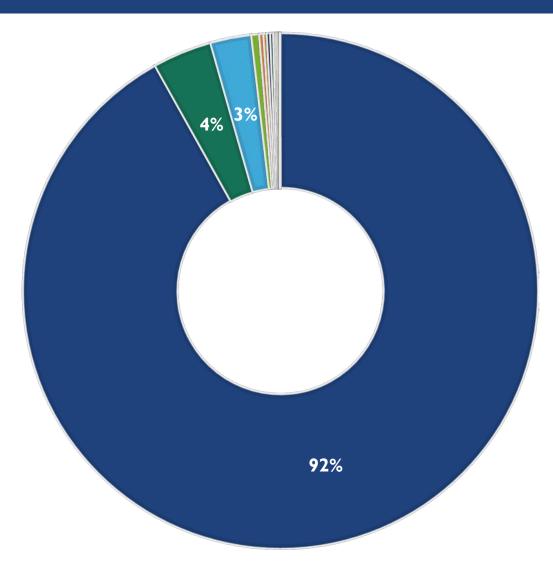
COMMERCIAL – ACCOMMODATION & FOOD SERVICE



HOTELS (EXCEPT CASINO HOTELS) AND MOTELS ■ FULL-SERVICE RESTAURANTS ■ LIMITED-SERVICE RESTAURANTS CAFETERIAS, GRILL BUFFETS, AND BUFFETS SNACK AND NONALCOHOLIC BEVERAGE BARS DRINKING PLACES (ALCOHOLIC BEVERAGES) ■ CATERERS RV (RECREATIONAL VEHICLE) PARKS AND CAMPGROUNDS

MOBILE FOOD SERVICES

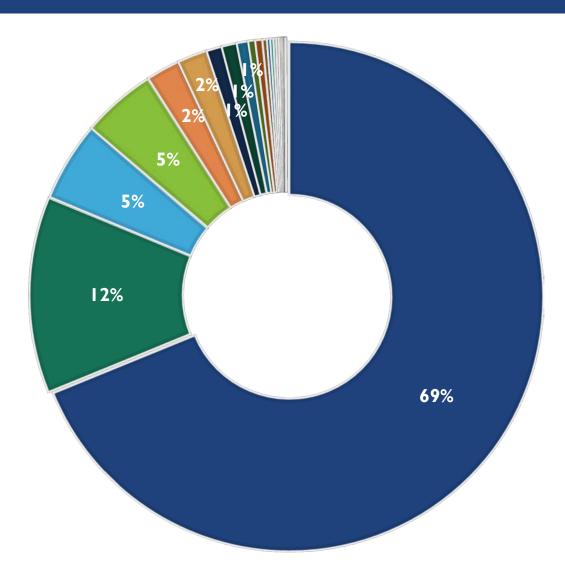
COMMERCIAL – REAL ESTATE & RENTAL & LEASING



■ LESSORS OF NONRESIDENTIAL BUILDINGS (EXCEPT MINIWAREHOUSES)

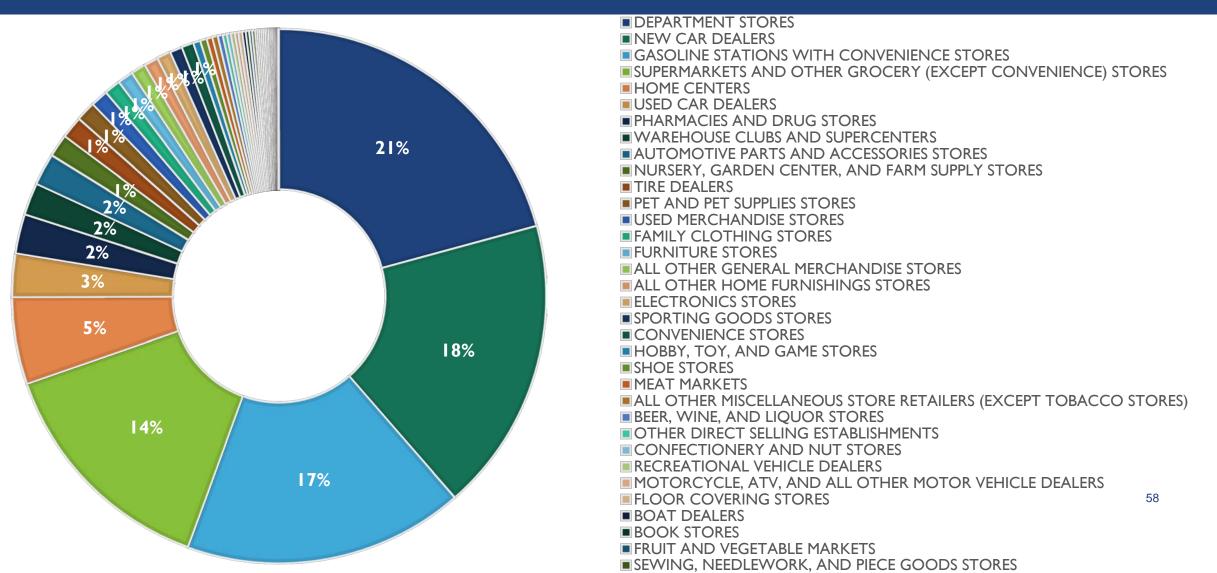
- LESSORS OF OTHER REAL ESTATE PROPERTY
- LESSORS OF MINIWAREHOUSES AND SELF-STORAGE UNITS
- TRUCK, UTILITY TRAILER, AND RV (RECREATIONAL VEHICLE) RENTAL AND LEASING
- OFFICES OF REAL ESTATE AGENTS AND BROKERS
- OTHER COMMERCIAL AND INDUSTRIAL MACHINERY AND EQUIPMENT RENTAL AND LEASING
- CONSTRUCTION, MINING, AND FORESTRY MACHINERY AND EQUIPMENT RENTAL AND LEASING
- NÔNRESIDENTIAL PROPERTY MANAGERS
- OFFICES OF REAL ESTATE APPRAISERS
- PASSENGER CAR RENTAL
- VIDEO TAPE AND DISC RENTAL
- **RESIDENTIAL PROPERTY MANAGERS**
- OFFICE MACHINERY AND EQUIPMENT RENTAL AND LEASING 56
- CONSUMER ELECTRONICS AND APPLIANCES RENTAL

COMMERCIAL – OTHER SERVICES

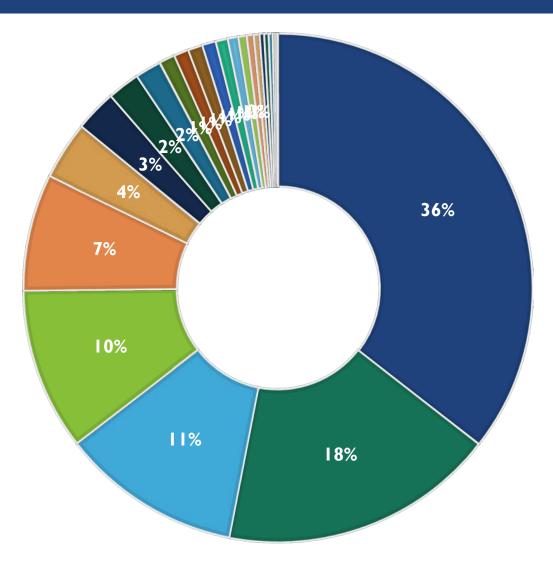


- OTHER SIMILAR ORGANIZATIONS (EXCEPT BUSINESS, PROFESSIONAL, LABOR, AND POLITICAL ORGANIZATIONS)
 CAR WASHES
- LINEN SUPPLY
- COIN-OPERATED LAUNDRIES AND DRYCLEANERS
- DRYCLEANING AND LAUNDRY SERVICES (EXCEPT COIN-OPERATED)
- **GENERAL AUTOMOTIVE REPAIR**
- AUTOMOTIVE BODY, PAINT, AND INTERIOR REPAIR AND MAINTENANCE
 DET CARE (EXCEPT VETERINIARY) SERVICES
- PET CARE (EXCEPT VETERINARY) SERVICES
- BEAUTY SALONS
- CIVIC AND SOCIAL ORGANIZATIONS
- AUTOMOTIVE OIL CHANGE AND LUBRICATION SHOPS
- **CEMETERIES AND CREMATORIES**
- CONSUMER ELECTRONICS REPAIR AND MAINTENANCE
- NAIL SALONS

COMMERCIAL – RETAIL TRADE

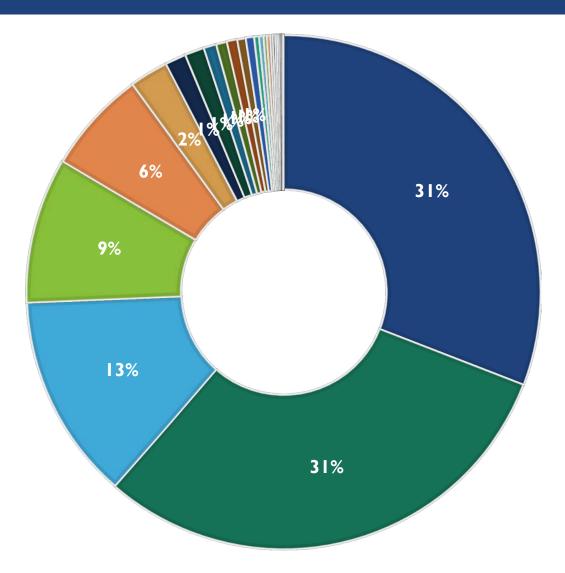


COMMERCIAL – CONSTRUCTION



COMMERCIAL AND INSTITUTIONAL BUILDING CONSTRUCTION DRYWALL AND INSULATION CONTRACTORS NEW MULTIFAMILY HOUSING CONSTRUCTION (EXCEPT FOR-SALE BUILDERS) **NEW SINGLE-FAMILY HOUSING CONSTRUCTION (EXCEPT FOR-SALE BUILDERS)** LAND SUBDIVISION **RESIDENTIAL REMODELERS** ■ ALL OTHER SPECIALTY TRADE CONTRACTORS NEW HOUSING FOR-SALE BUILDERS PLUMBING, HEATING, AND AIR-CONDITIONING CONTRACTORS ROOFING CONTRACTORS FLOORING CONTRACTORS OTHER HEAVY AND CIVIL ENGINEERING CONSTRUCTION MASONRY CONTRACTORS ELECTRICAL CONTRACTORS AND OTHER WIRING INSTALLATION CONTRACTORS FINISH CARPENTRY CONTRACTORS HIGHWAY, STREET, AND BRIDGE CONSTRUCTION POURED CONCRETE FOUNDATION AND STRUCTURE CONTRACTORS. WATER AND SEWER LINE AND RELATED STRUCTURES CONSTRUCTION OTHER BUILDING FINISHING CONTRACTORS GLASS AND GLAZING CONTRACTORS STRUCTURAL STEEL AND PRECAST CONCRETE CONTRACTORS ■ SITE PREPARATION CONTRACTORS PAINTING AND WALL COVERING CONTRACTORS COMMERCIAL AND INSTITUTIONAL BUILDING CONSTRUCTION **SIDING CONTRACTORS** FRAMING CONTRACTORS 59 TILE AND TERRAZZO CONTRACTORS **INDUSTRIAL BUILDING CONSTRUCTION** OTHER BUILDING EQUIPMENT CONTRACTORS

COMMERCIAL – HEALTH CARE AND SOCIAL ASSISTANCE



CHILD DAY CARE SERVICES

■ OFFICES OF PHYSICIANS (EXCEPT MENTAL HEALTH SPECIALISTS)

KIDNEY DIALYSIS CENTERS

OFFICES OF DENTISTS

FREESTANDING AMBULATORY SURGICAL AND EMERGENCY CENTERS

OTHER INDIVIDUAL AND FAMILY SERVICES

OFFICES OF OPTOMETRISTS

TEMPORARY SHELTERS

SERVICES FOR THE ELDERLY AND PERSONS WITH DISABILITIES

MEDICAL LABORATORIES

CHILD AND YOUTH SERVICES

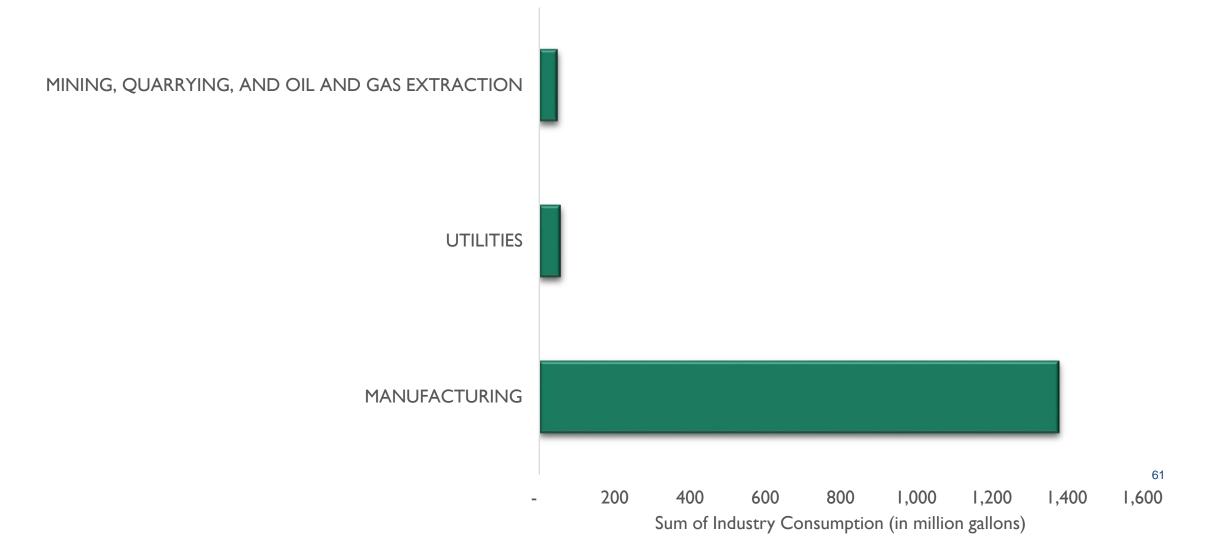
OFFICES OF CHIROPRACTORS

■ ALL OTHER MISCELLANEOUS AMBULATORY HEALTH CARE SERVICES

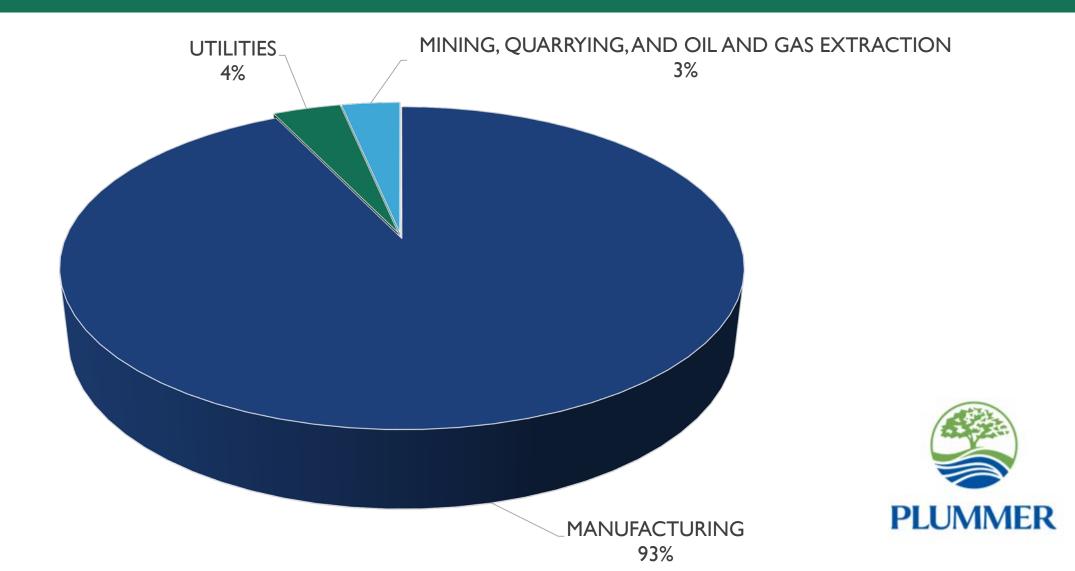
 OFFICES OF PHYSICAL, OCCUPATIONAL AND SPEECH THERAPISTS, AND AUDIOLOGISTS
 OUTPATIENT MENTAL HEALTH AND SUBSTANCE ABUSE CENTER⁶⁰

OFFICES OF ALL OTHER MISCELLANEOUS HEALTH PRACTITIONERS

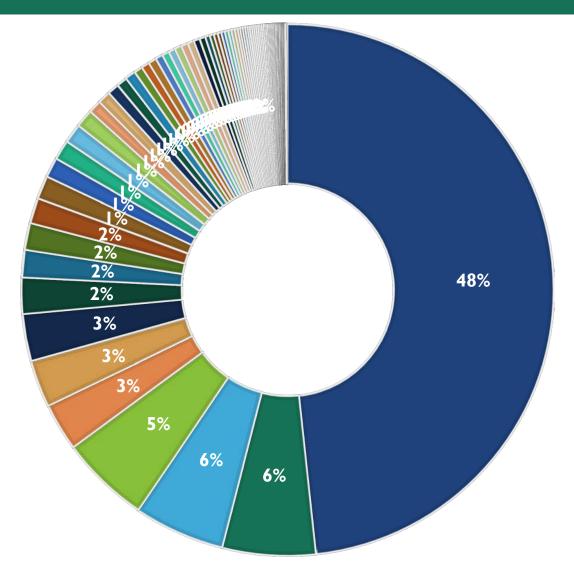
INDUSTRIAL WATER USE BY BUSINESS TYPE



INDUSTRIAL WATER CONSUMPTION



INDUSTRIAL – MANUFACTURING



SOFT DRINK MANUFACTURING

GUIDED MISSILE AND SPACE VEHICLE MANUFACTURING

READY-MIX CONCRETE MANUFACTURING

FROZEN SPECIALTY FOOD MANUFACTURING

SEMICONDUCTOR AND RELATED DEVICE MANUFACTURING

CORRUGATED AND SOLID FIBER BOX MANUFACTURING

ICE CREAM AND FROZEN DESSERT MANUFACTURING

■ COMMERCIAL PRINTING (EXCEPT SCREEN AND BOOKS)

■ OTHER FABRICATED WIRE PRODUCT MANUFACTURING

SEMICONDUCTOR MACHINERY MANUFACTURING

ALL OTHER PLASTICS PRODUCT MANUFACTURING

ALL OTHER MISCELLANEOUS CHEMICAL PRODUCT AND PREPARATION MANUFACTURING

CUT STONE AND STONE PRODUCT MANUFACTURING

COMMERCIAL BAKERIES

ADHESIVE MANUFACTURING

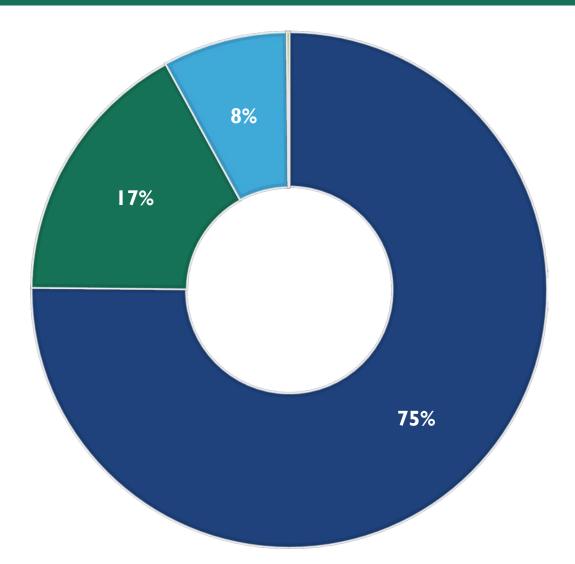
OTHER MOTOR VEHICLE PARTS MANUFACTURING

OTHER ELECTRONIC COMPONENT MANUFACTURING

63

ALL OTHER MISCELLANEOUS FABRICATED METAL PRODUCT MANUFACTURING

INDUSTRIAL – MINING, QUARRYING, OIL + GAS EXTRACTION



CRUSHED AND BROKEN LIMESTONE MINING AND QUARRYING

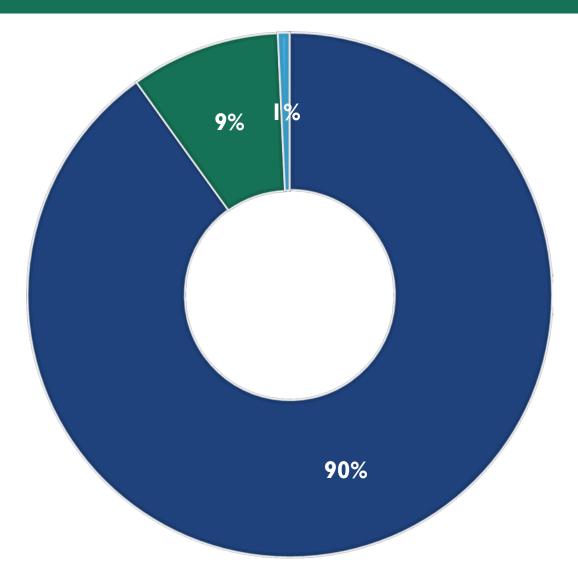
CRUSHED AND BROKEN GRANITE MINING AND QUARRYING

SUPPORT ACTIVITIES FOR OIL AND GAS OPERATIONS

OTHER CHEMICAL AND FERTILIZER MINERAL MINING



INDUSTRIAL – UTILITIES



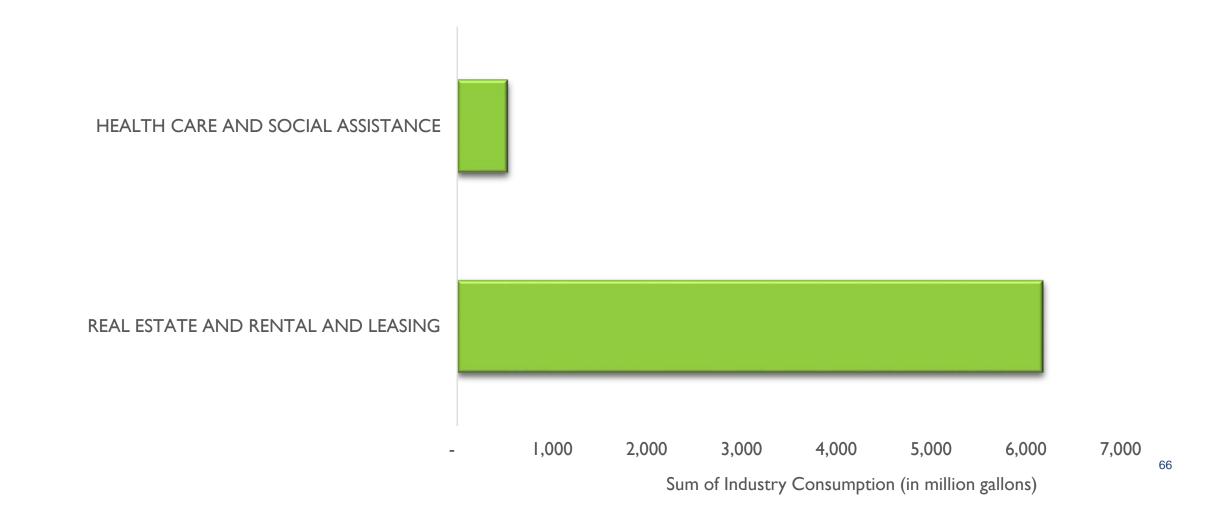
■ NATURAL GAS DISTRIBUTION

■ ELECTRIC POWER DISTRIBUTION

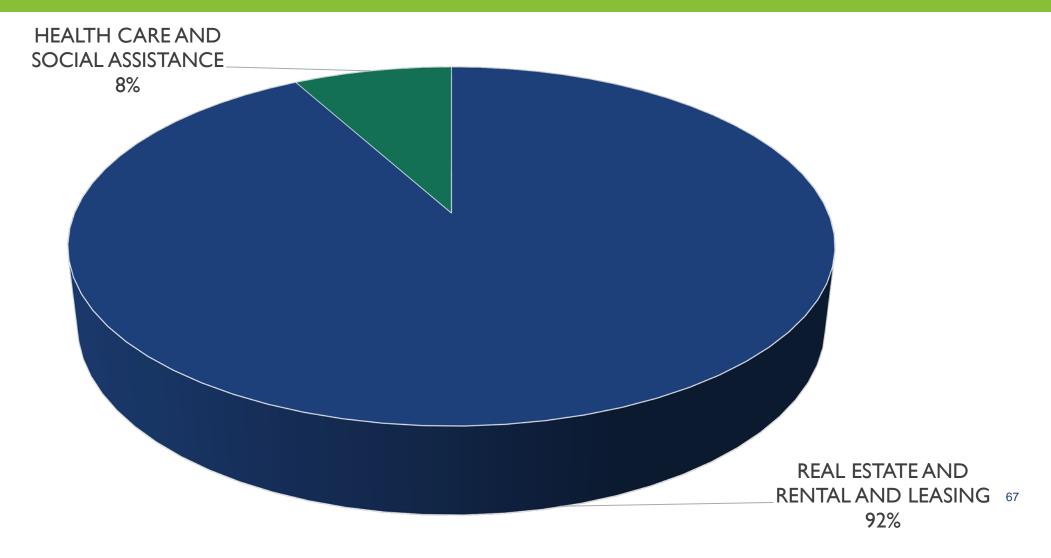
■ OTHER ELECTRIC POWER GENERATION



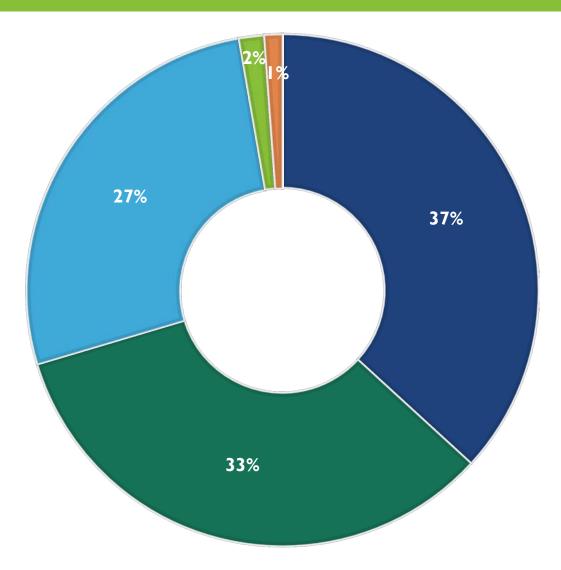
MULTIFAMILY WATER USE BY BUSINESS TYPE



MULTIFAMILY – WATER USE BREAKDOWN



MULTIFAMILY – HEALTHCARE AND SOCIAL ASSISTANCE



■ NURSING CARE FACILITIES (SKILLED NURSING FACILITIES)

■ ASSISTED LIVING FACILITIES FOR THE ELDERLY

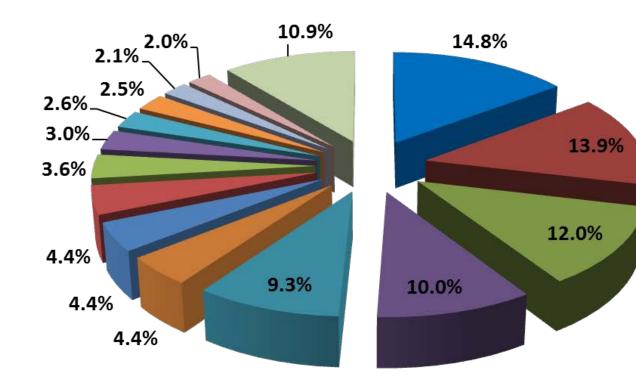
CONTINUING CARE RETIREMENT COMMUNITIES

RESIDENTIAL MENTAL HEALTH AND SUBSTANCE ABUSE FACILITIES

OTHER RESIDENTIAL CARE FACILITIES



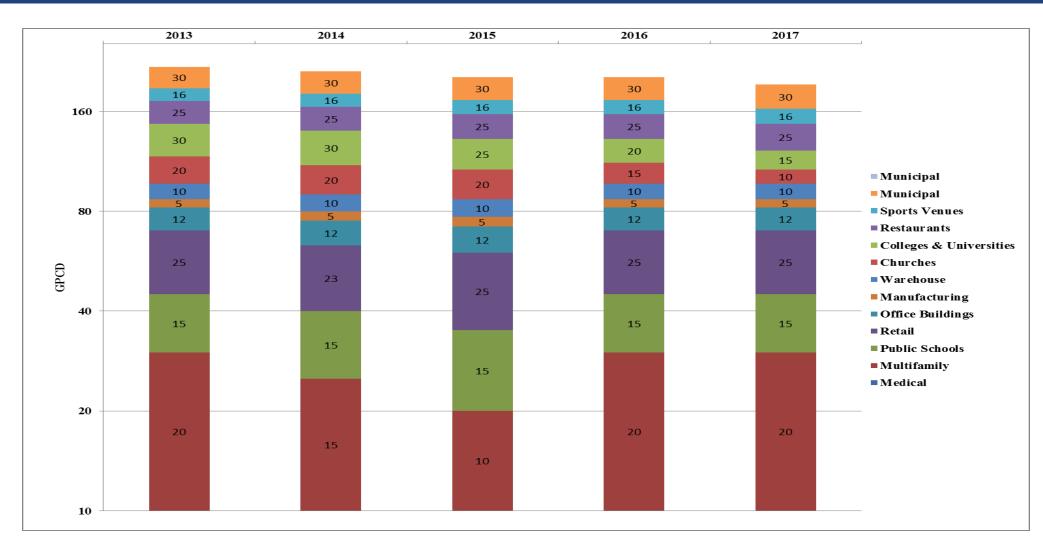
ICI WATER SECTORS AND CATEGORIZE END USERS – ICI BY PERCENT OF TOTAL WATER USE



- Restaurants/Bars
- Manufacturing
- 🔳 Hotel
- Retail
- Medical
- Assisted Living Facility
- Multifamily
- Carwash
- Utility
- Dairy
- Church
- Laundry
- Mobile Home Park
- Office
- All Other



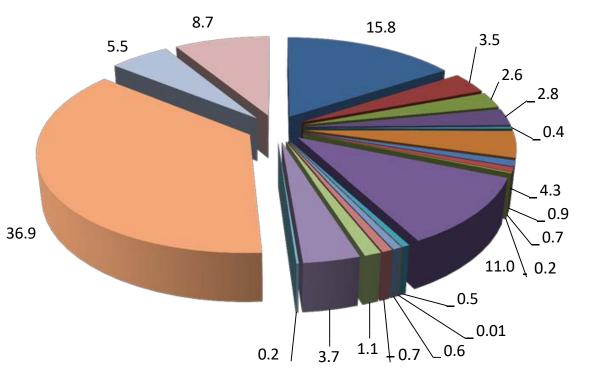
CALCULATED PER CAPITA CONSUMPTION BASED ON ICI WATER USE





ESTABLISH BASE USE ESTIMATES BY PROCESS OR END USE

MEDICAL CENTER







BENCHMARKING





EVALUATE NORMALIZED CONSUMPTION

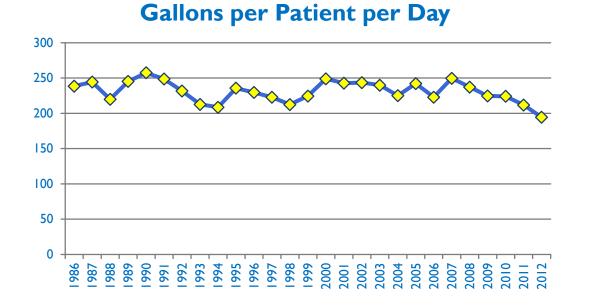
- Gallons per Square Foot of Occupied Space
- Gallons per Day
- Gallons per Employee
- Gallons per Customer
- Gallons per Meal
- Gallons per Ton Hour
- Gallons per Bed
- Gallons per Patient
- Gallons per Square Foot of Landscape
- Gallons per Gallon



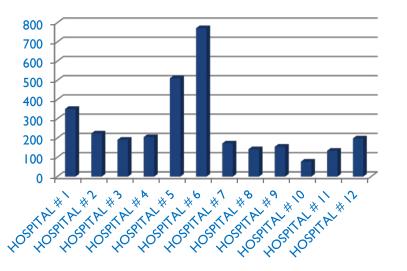


HOSPITALS

HOSPITALS



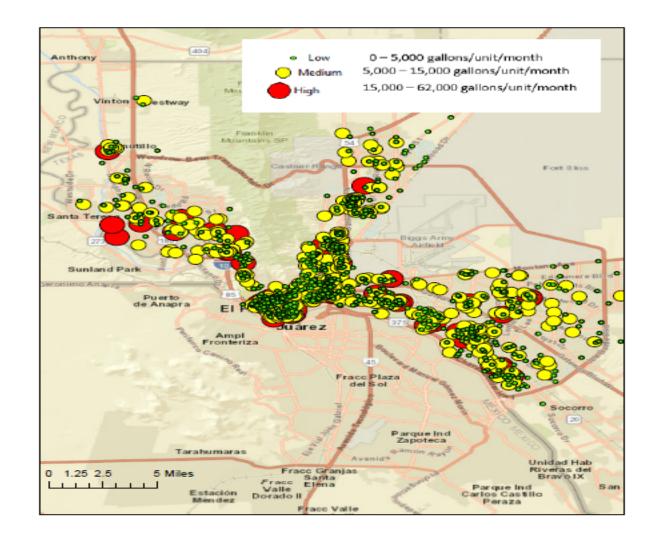
Gallons per Patient per Day



■ 2012 Gallons per Patient per Day



MULTIFAMILY EXAMPLE





QUESTIONS

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IDENTIFYING, CODING AND CLASSIFYING INDUSTRIAL, COMMERCIAL AND INSTITUTIONAL WATER USERS

WATERSMART INNOVATIONS 2019

Eddie Wilcut, Water and Energy Efficiency Services Practice Leader Alan Plummer Associates, Inc.



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