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Increasing the Informational Value of Demand Side Planning Analyses

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Tampa Bay Water

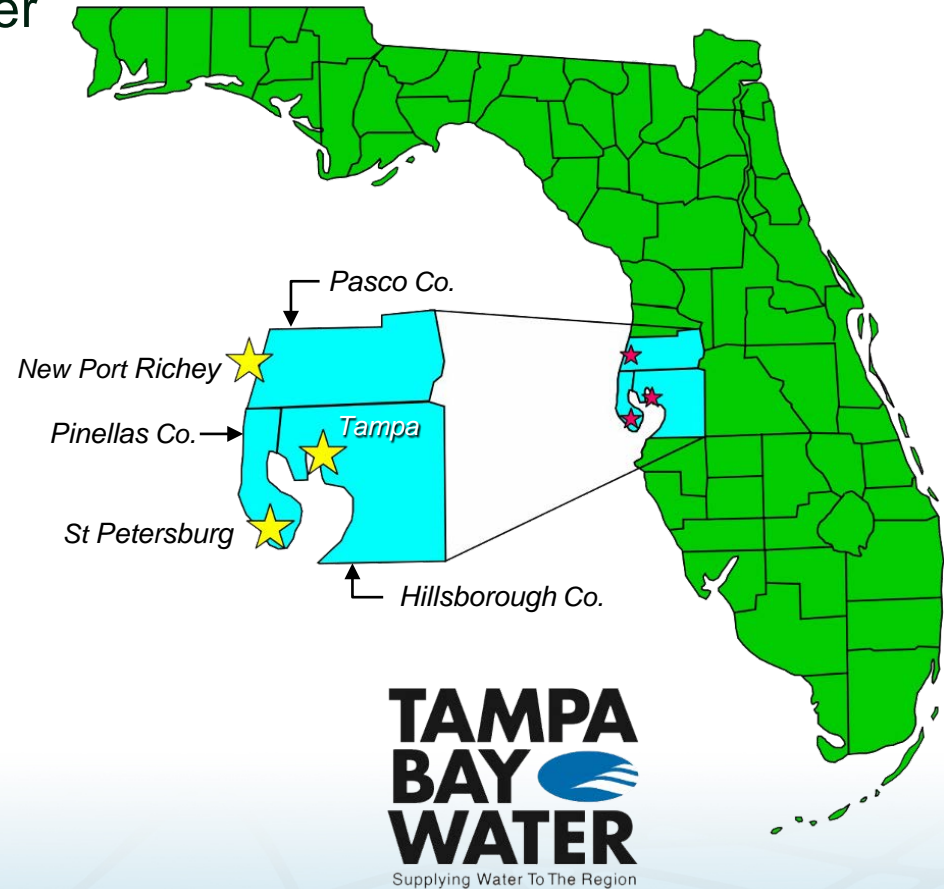
HAZEN AND SAWYER
Environmental Engineers & Scientists

Overview

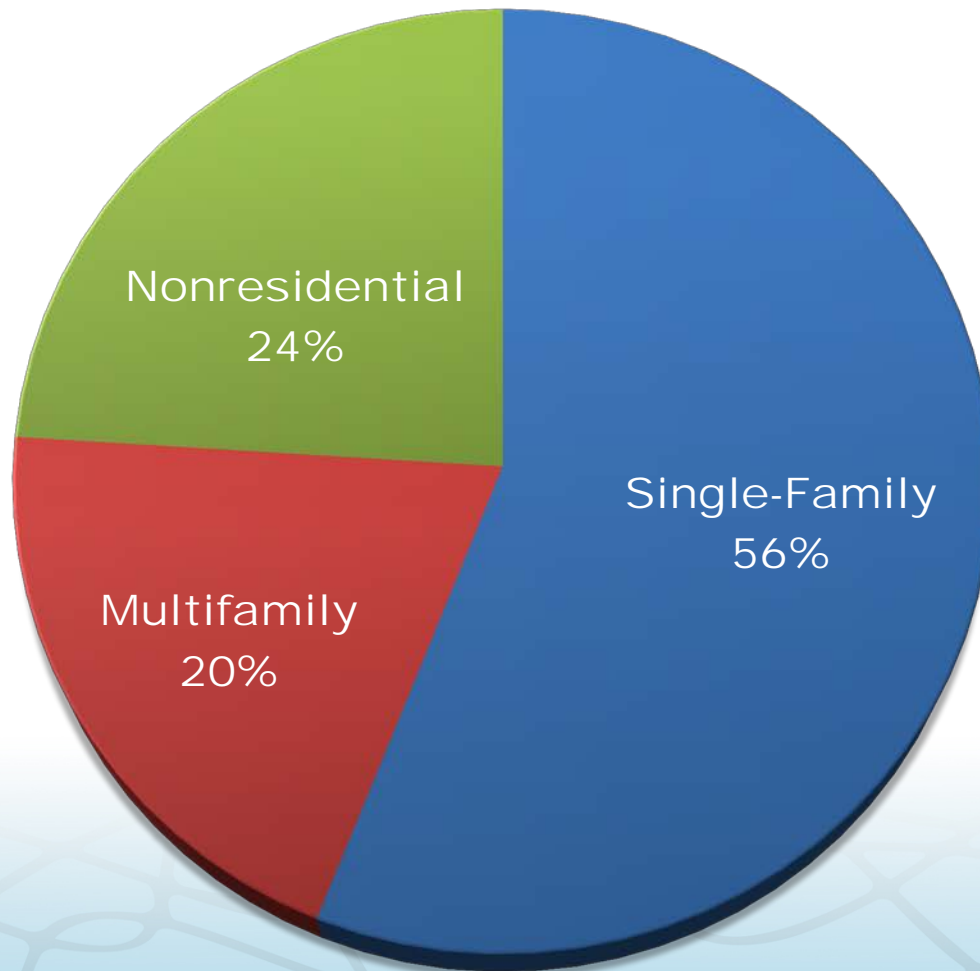
- Define objectives of Tampa Bay Water Demand Management Plan
- Summarize informational needs
- Review information management approach
 - Data availability and limitations
 - Database design and integration
- Discuss selected analyses and water use characterizations
- Offer some lessons learned and a look forward

Tampa Bay Water

- Regional water wholesaler
- 6 Member Governments
- Baseline demand forecasted to increase
 - 2011: ~ 230 mgd
 - 2035: ~275 mgd

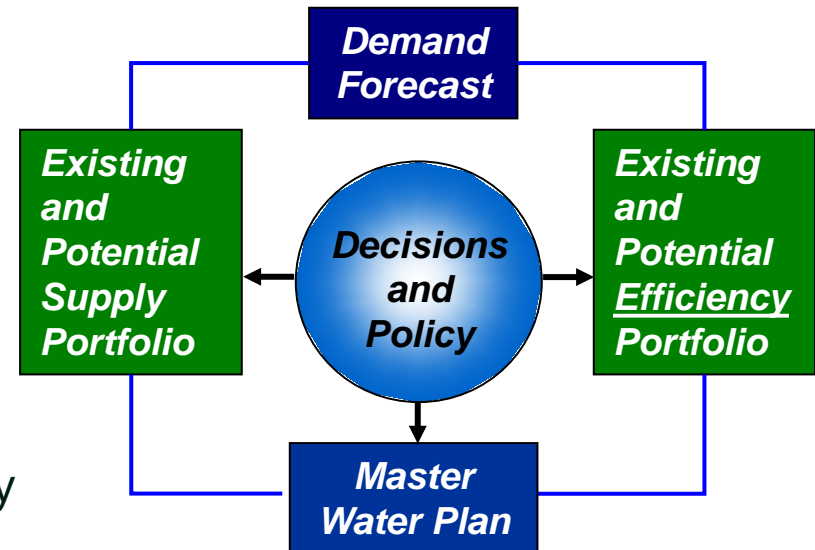


Regional Water Use



Purpose of Demand Management Plan

- Identify and evaluate regional water conservation potential
 - Opportunities to defer the need for capital investment
- Integrate demand management into supply planning process
 - Compare efficiency and supply projects using the same criteria, including cost

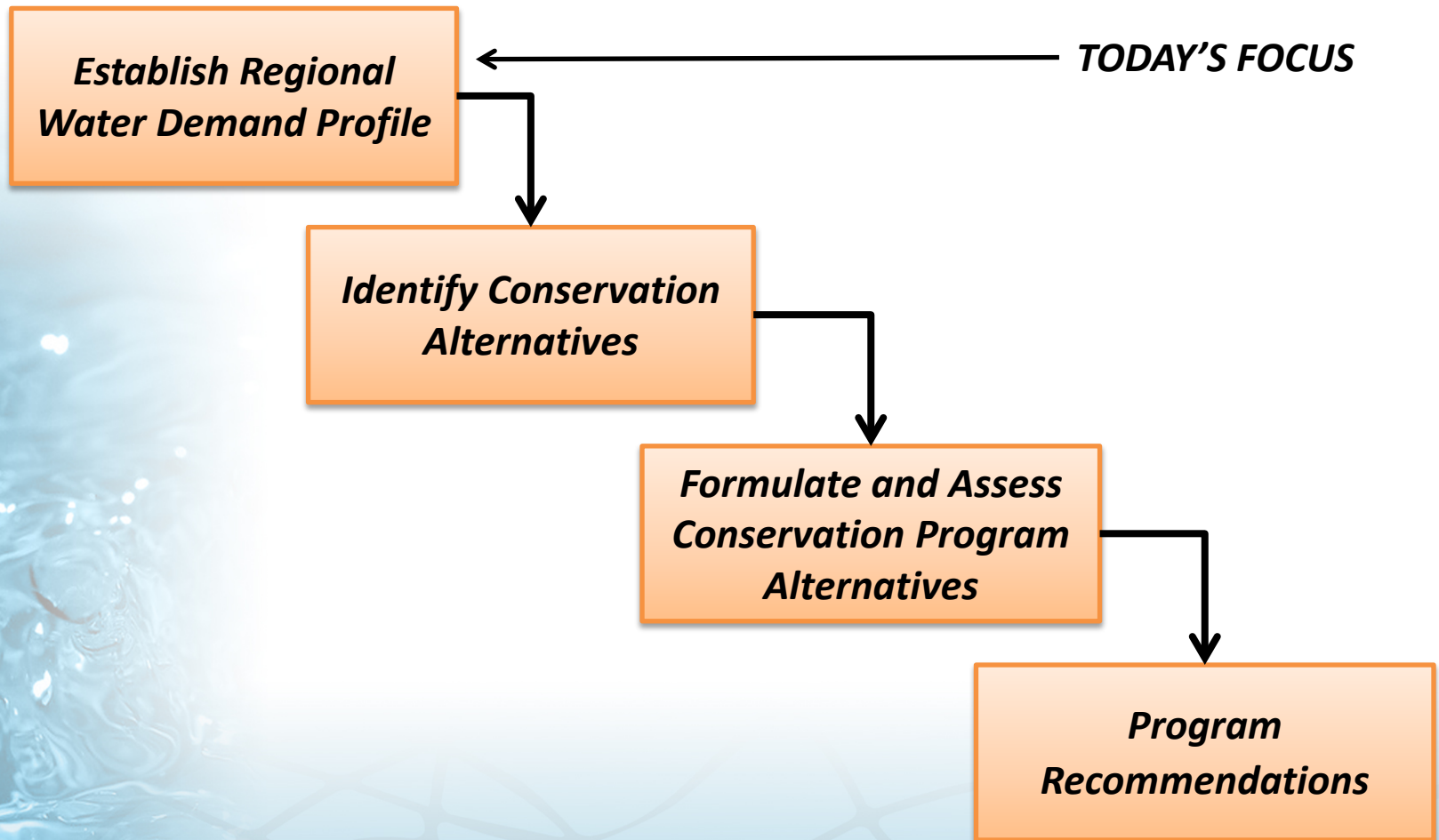


Regional Demand Management Benefits

- Conserved water = economic benefits
 - 1 mgd saved = \$15-20M capital cost deferment
 - 1 year deferral of \$100M capital project saves \$5 million in interest
- Avoided energy and chemical operating costs



Key Project Components



Informational Needs

- Understanding demand dynamics
 - How does water use vary and why?
 - Dimensions of demand dynamics
 - Sectoral (user types)
 - Meteorological /Temporal (monthly, seasonal, annual)
 - Geographic /Socioeconomic / Demographic
 - Purpose of use (Indoor / Outdoor)
 - Conservation
- Economic benefits / costs of demand management
- Market for water efficient technology



Information Management

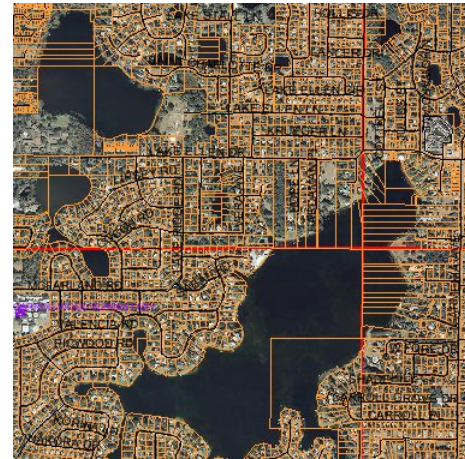
Data Sources

■ Utility billing system

- Account level, monthly

■ Property Appraiser

- Residential units
- Property use codes
- Property value / Year built
- Fixtures / extra features (baths, pools, fountains)
- Area – parcel, heated, gross, extra features



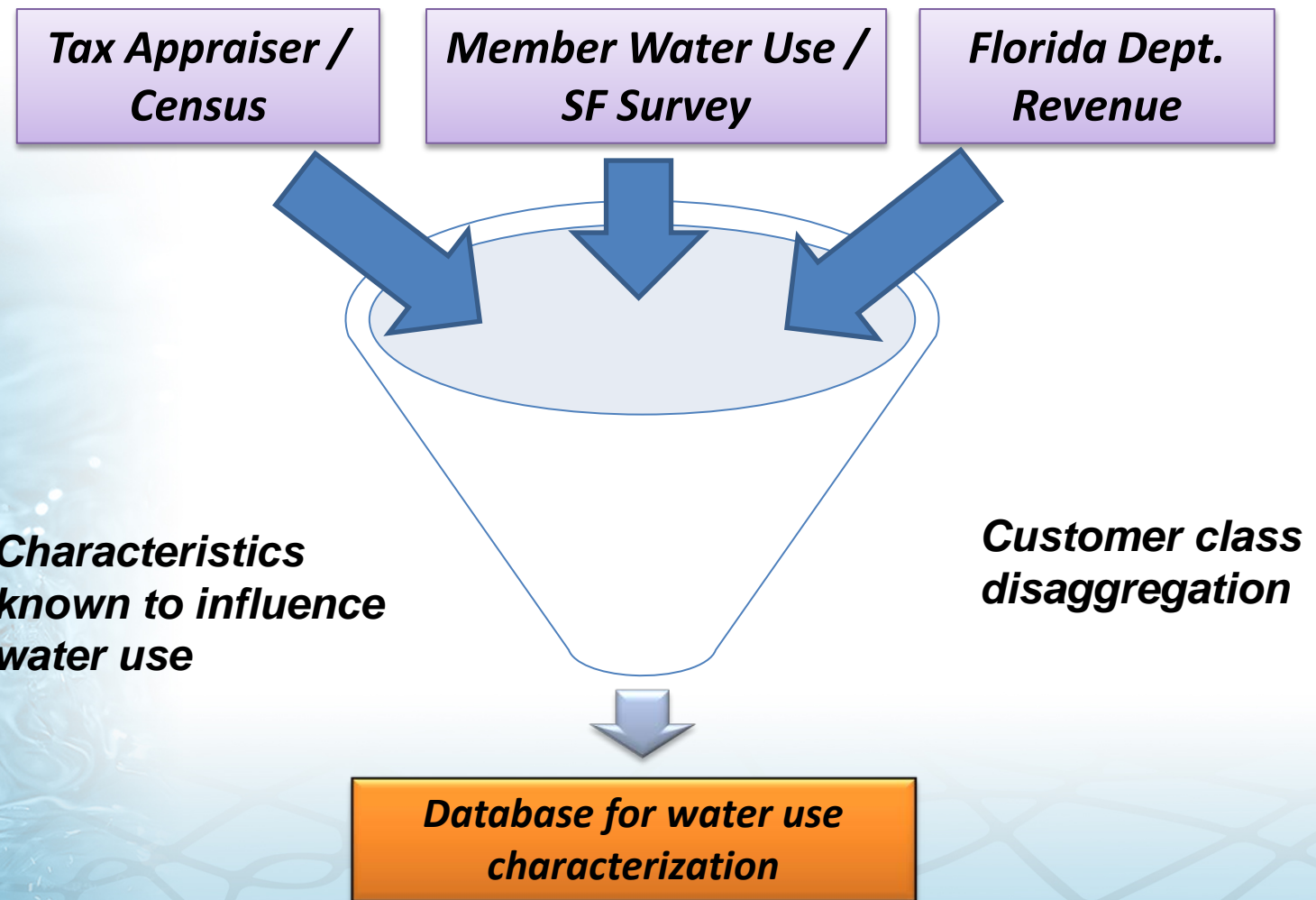
■ Single-Family survey

- Telephone questionnaire - 45 questions , 1300 participants

■ Census / State Departments

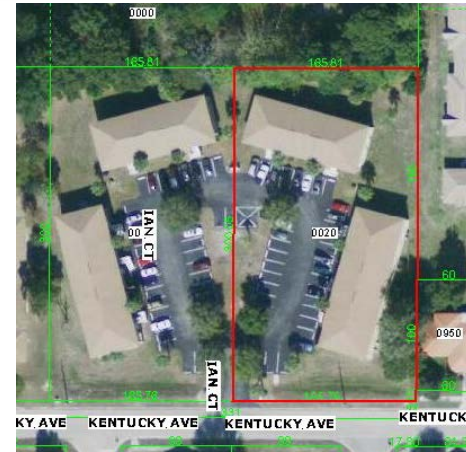
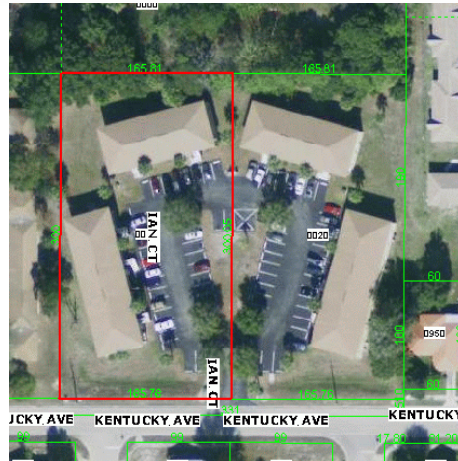
- Population, housing, employment, income, pph
- Hotel rooms / restaurant seating / students

Data Collection and Information Management

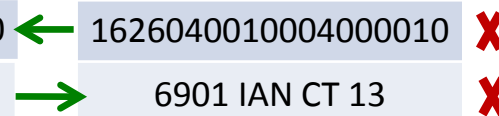


Multifamily Database Integration Issue

***Two Parcels,
One Account***



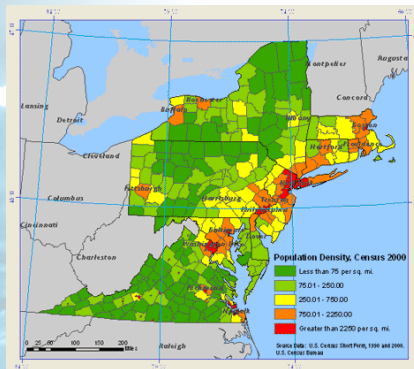
Attribute	Utility Account	Parcel 1	Parcel 2
PIN	1626040010004000010	1626040010004000010	1626040010004000020
Address	6901 IAN CT 13	6901 IAN CT 13	6921 IAN CT 11
Units	18	18	18
Neighborhood	NA	5MF113A	5MF113A
Value	NA	543,310	541,837
Heated Area (sq ft)	NA	19,460	19,460
Land Area (sq ft)	NA	49,721	49,731



Multifamily Location Grouping Summary

Attribute	Without Grouping	With Grouping
PIN	1626040010004000010	1626040010004000010 1626040010004000020
Consumption (Gal)	40,750	40,750
Units	18	36
GPUD	261	130
Heated Area (sq ft)	19,460	38,920
Land Area (sq ft)	49,721	99,452
Just Value	543,310	1,085,147

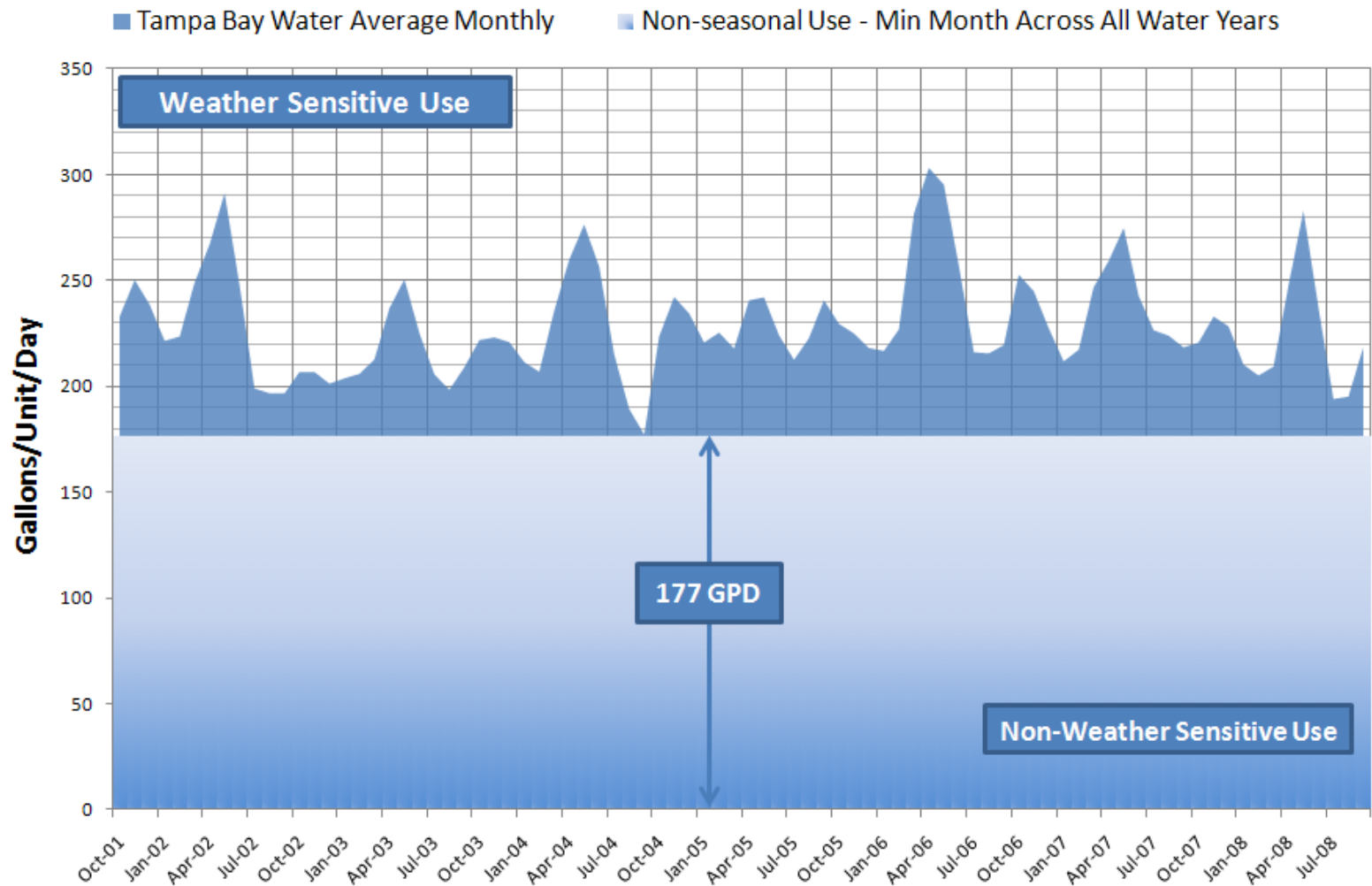
What information does this provide?





Uses of billing and property data

Differentiating Indoor Use from Total Use

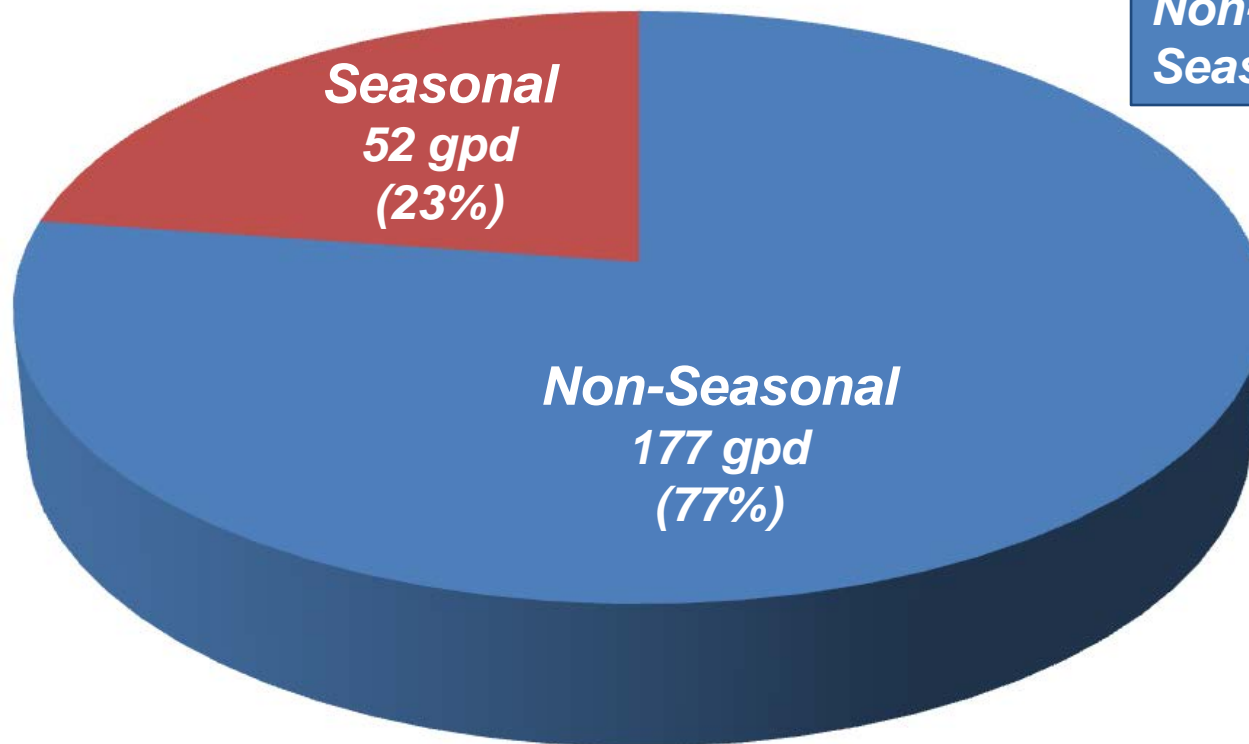


Annual Average Single Family Use

***Tampa Bay Water Wide = 229 gpd
(7-year annual average per unit use)***

Gallons/Capita/Day

<i>Total:</i>	<i>88</i>
<i>Non-seasonal:</i>	<i>68</i>
<i>Seasonal:</i>	<i>20</i>



Factors Affecting Single Family Water Use

- **Household size**
- **Property characteristics**
 - Value
 - Year built
 - Area (sq. ft.)
 - Irrigable area (sq. ft.)
- **End uses**
 - Lawn irrigation
 - Pools
 - Efficiency of indoor plumbing
- **Access to alternative water sources**
 - Reclaimed water
 - Shallow wells



Regression Analysis

- Monthly Consumption, dependent variable
- 25 independent variables (explanatory)

Socioeconomic Variables

- Marginal price of water & sewer
- Gross area of building
- Just value of property
- Fraction of green space area
- Number of bathrooms

Indicator Variables

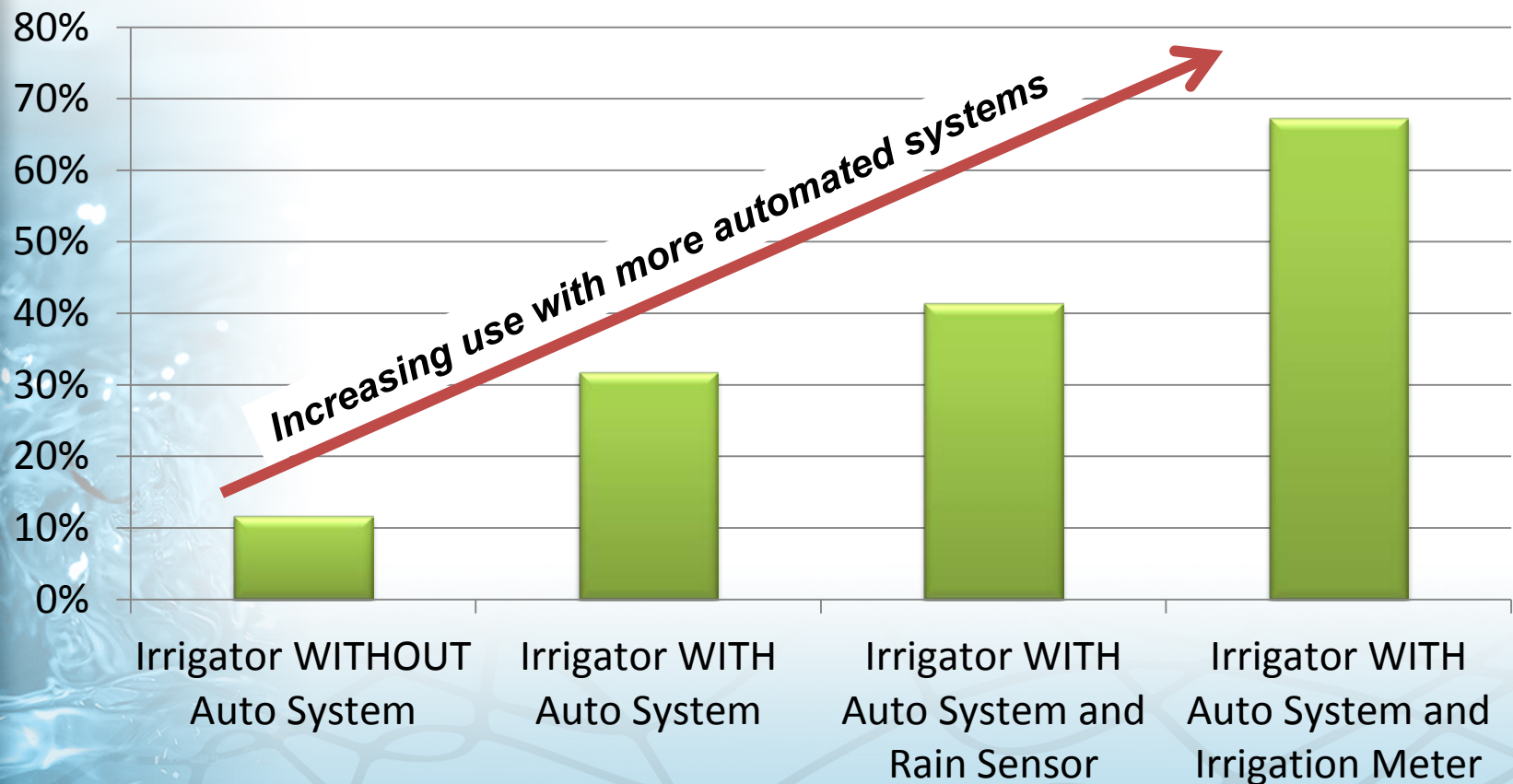
- Monthly
- Pool
- Irrigation meter
- Reclaimed water
- Pre/Post intervention

Weather Variables

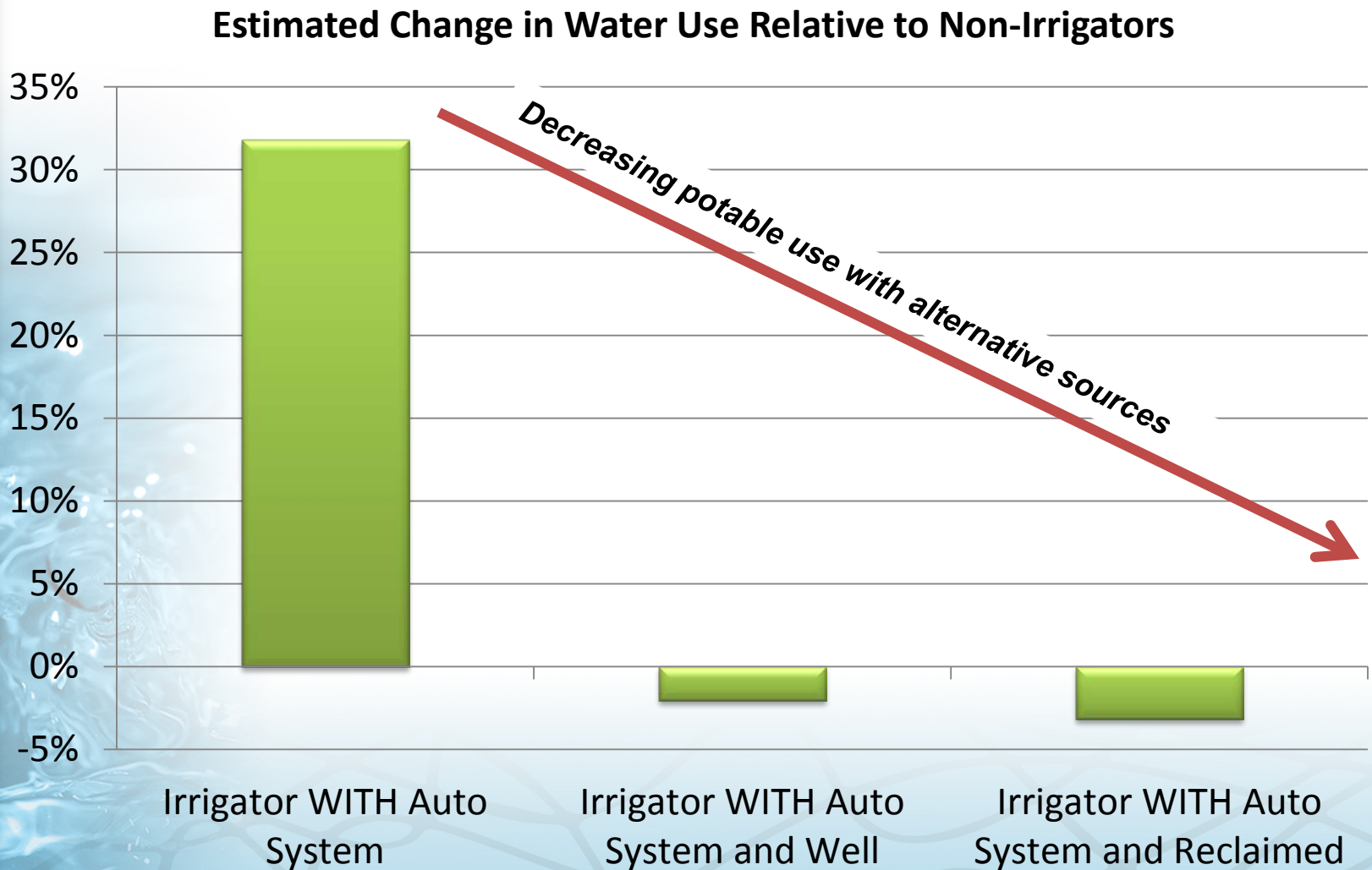
- Total monthly precipitation (inches)
- Long-term normal precipitation
- Maximum temperature
- Long-term normal temperature

Automatic Irrigators Use More Water

Impact of Lawn Irrigation on
Average Single-Family Monthly Water Use

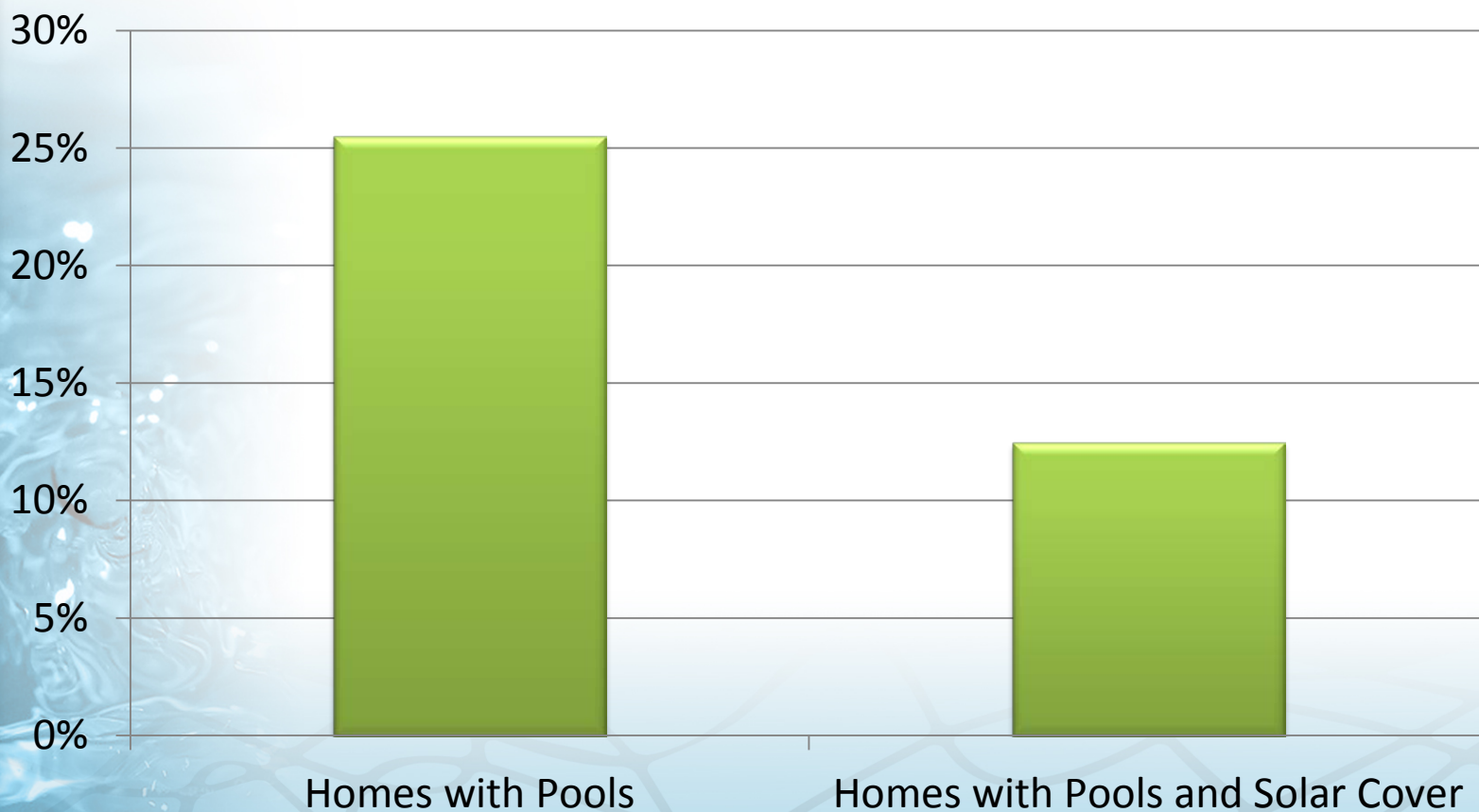


Alternative Sources Lower Potable Water Use for Irrigation



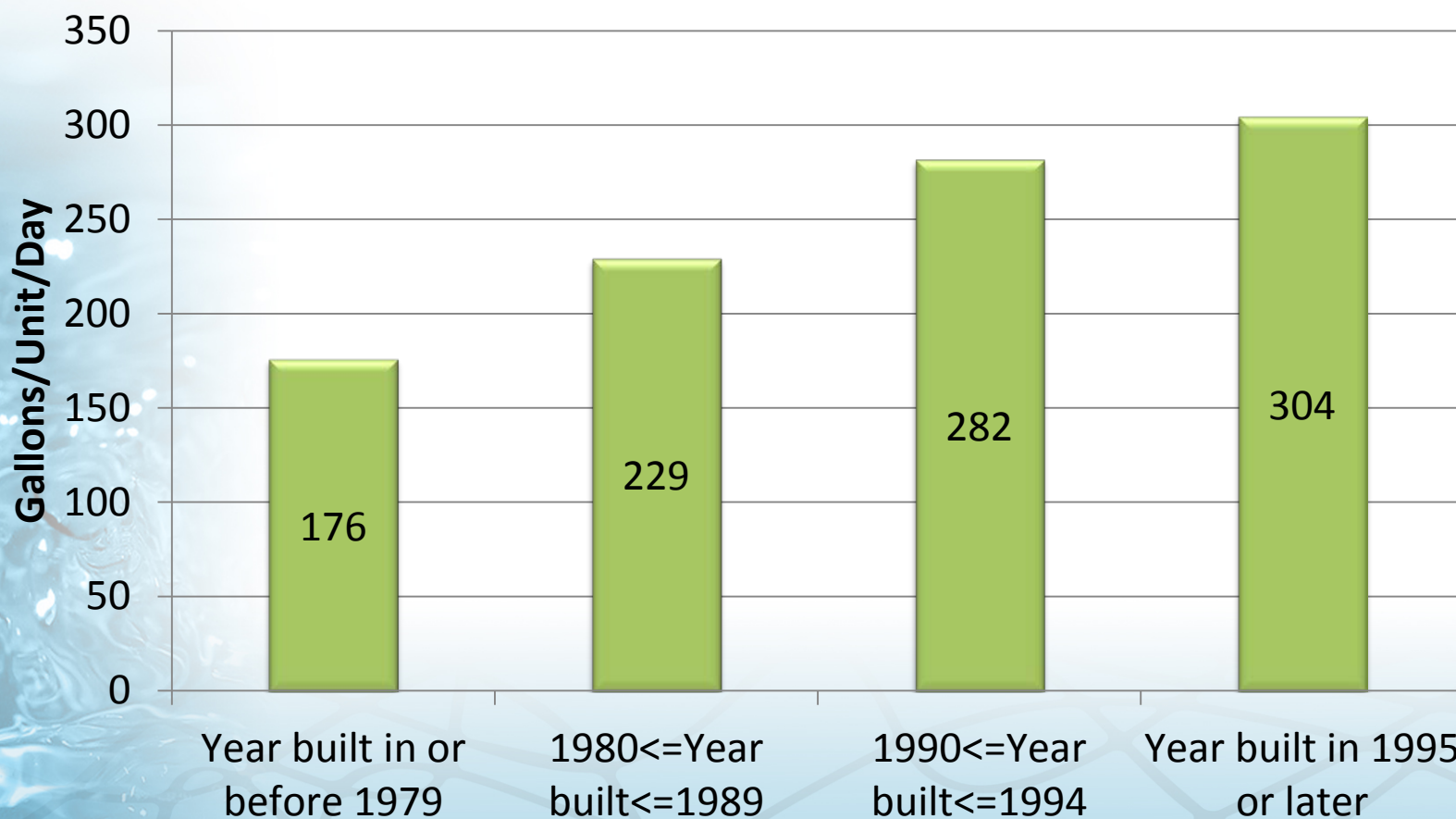
Pools and Solar Cover Impacts on Water Use

Impact of Pools and Solar Covers on Single Family Water Use

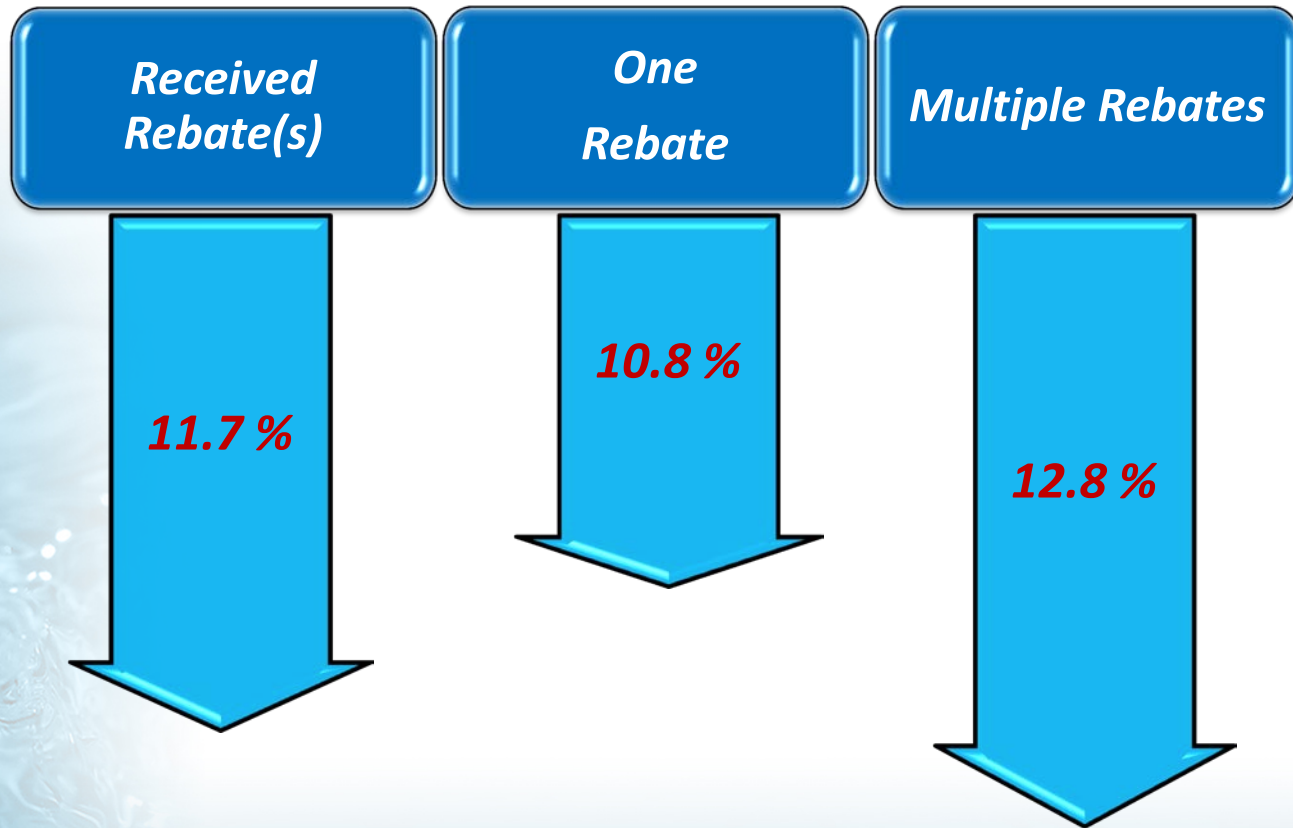


New Homes Use More Water (average)

**Tampa Bay Water
WY08 Water Use by Year Built Cohorts**



Ultra Low Flow Toilet Rebate programs reduce water use



Outdoor programs are saving water

*Irrigation System
Evaluation*

15.7 %

Florida Friendly Yard

15.04 %

Disaggregated Multifamily Average Water Use

Member	MF	Townhome	Condo/ Coop	MF less than 10 units	MF more than 10 units
NPR	97		64	84	103
PAS	60	53	50	112	58
NWH	90	98	80	104	88
SCH	94	60	69	116	95
COT	122	124	93	133	121
PIN	92	99	69	100	94
STP	105	58	91	97	110
TBW	109	104	90	111	112

Diverse Non-residential Sector

- Tampa Bay Water Wide
 - 24% of total demand
 - 89 property use types identified
- Today's Focus:
 - Hotels, Motels
 - Education
 - Restaurants
 - Office Buildings



Key nonresidential subsectors in region

Top 10 Use Types

- **Hotels, motels**
- Government
- Heavy Manufacturing
- Health Care
- **Education**
- Retirement
- Retail Stores
- **Restaurants / Fast Food**
- Light Manufacturing
- **Office Buildings**

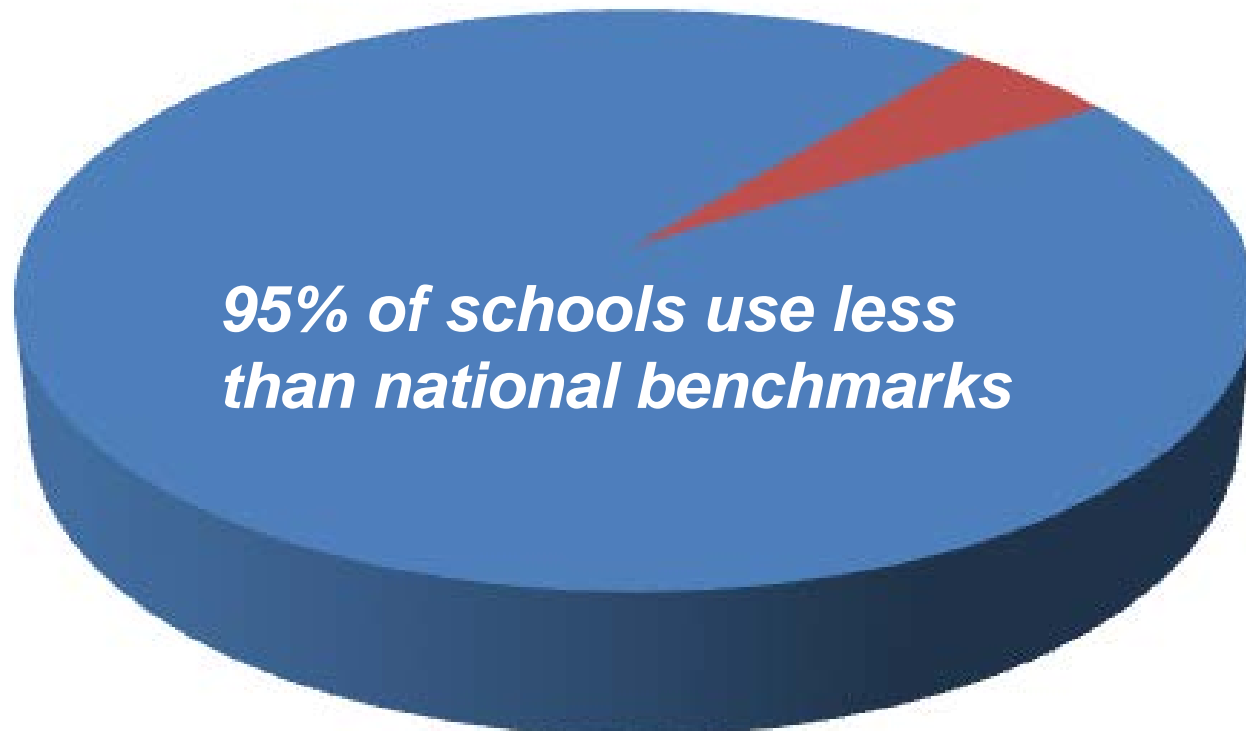
Ranking based on procedure that balances unit usage rates with prevalence in market / region

Water efficiency benchmarks available:
Commercial and Institutional End Uses of Water Study
(Water Research Foundation)

Water use trends indicate efficiency potential

	Hotels/Motels	Office Buildings	Restaurants
National Benchmarks	1/2 of customers use more	1/3 of customers use more	1/2 of customers use more
High Users	9% of customers use 50% of total water use	5% of customers use 60% of total water use	8% of customers use 32% of total water use
Other findings	Seasonal factors: Irrigation, Cooling, Spring Break	Seasonal factors: Cooling	Fast food restaurants may have most efficiency potential

Schools in the region seem to be water efficient



Lessons learned

- Many attributes which explain water use variance available
 - Improved sectoral disaggregation
 - Increased metrics
 - Greater accuracy in rate of use estimates
- Data limitations - not always a liability!
 - Design database that is accessible and reliable
 - Track metric data over time if possible
 - QA/QC is a must
- Keep analyzing and comparing numbers, but seek data and analyses that reveal why water use varies

Thank you!

Questions?

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