This presentation premiered at WaterSmart Innovations

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Quantifying Water Conservation Potential in Phoenix, AZ

Industrial, Commercial, and Institutional (ICI) Sectors

Presentation Outline

- Observations and Research Goals
- Supply and Demand Context
- Areas of Focus (Sectors)
- Research Challenges
- Solutions
- What We Learned
- Recap and Conclusions

Observations

- Steady decline on a per capita basis for both Residential and Non-residential accounts
- More efficient plumbing fixtures/devices
- Transition to less water-intensive landscapes
- Changes in business practices and technologies

Research Goals

- Establish baseline demand for ICI sectors
- Identify major trends affecting water demand
- Identify key decision making processes
- Forecast future demand and wastewater generation
- Estimate future water demand reductions if efficiencies are accelerated WSD

Phoenix – Context (Water Portfolio)

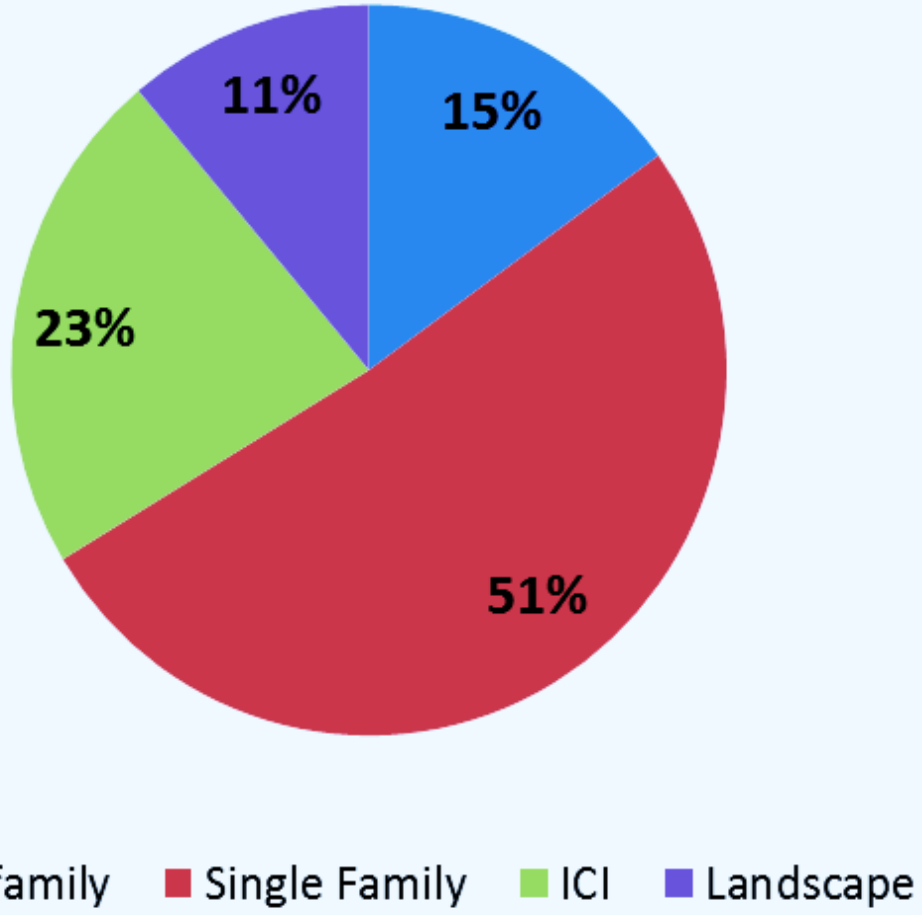
Colorado River (43%)

Groundwater (2%)

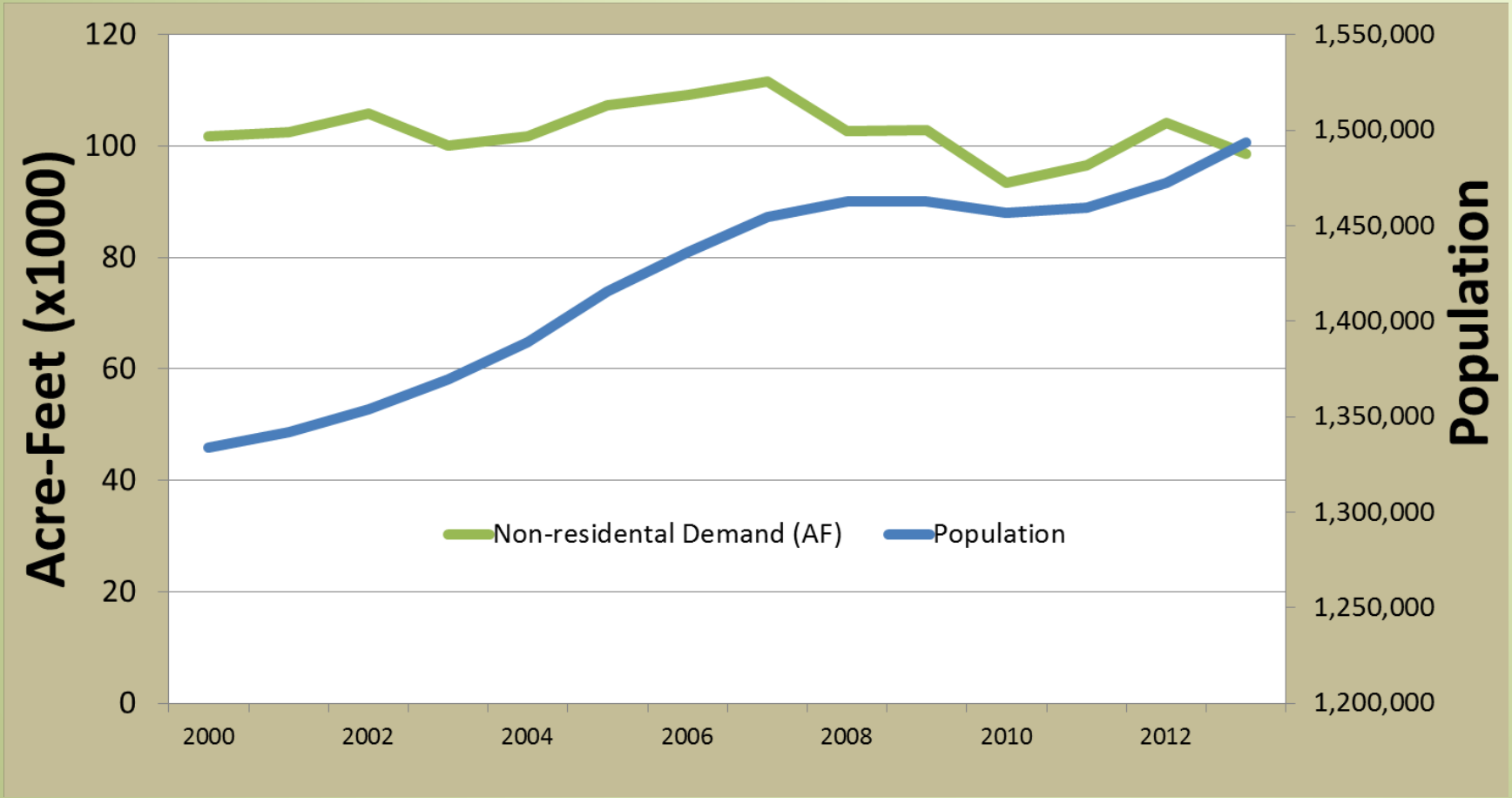
Salt/Verde Rivers (49%)

Reclaimed Wastewater (6%)

Water Consumption by Sector FY 12/13



Non-residential Water Demand



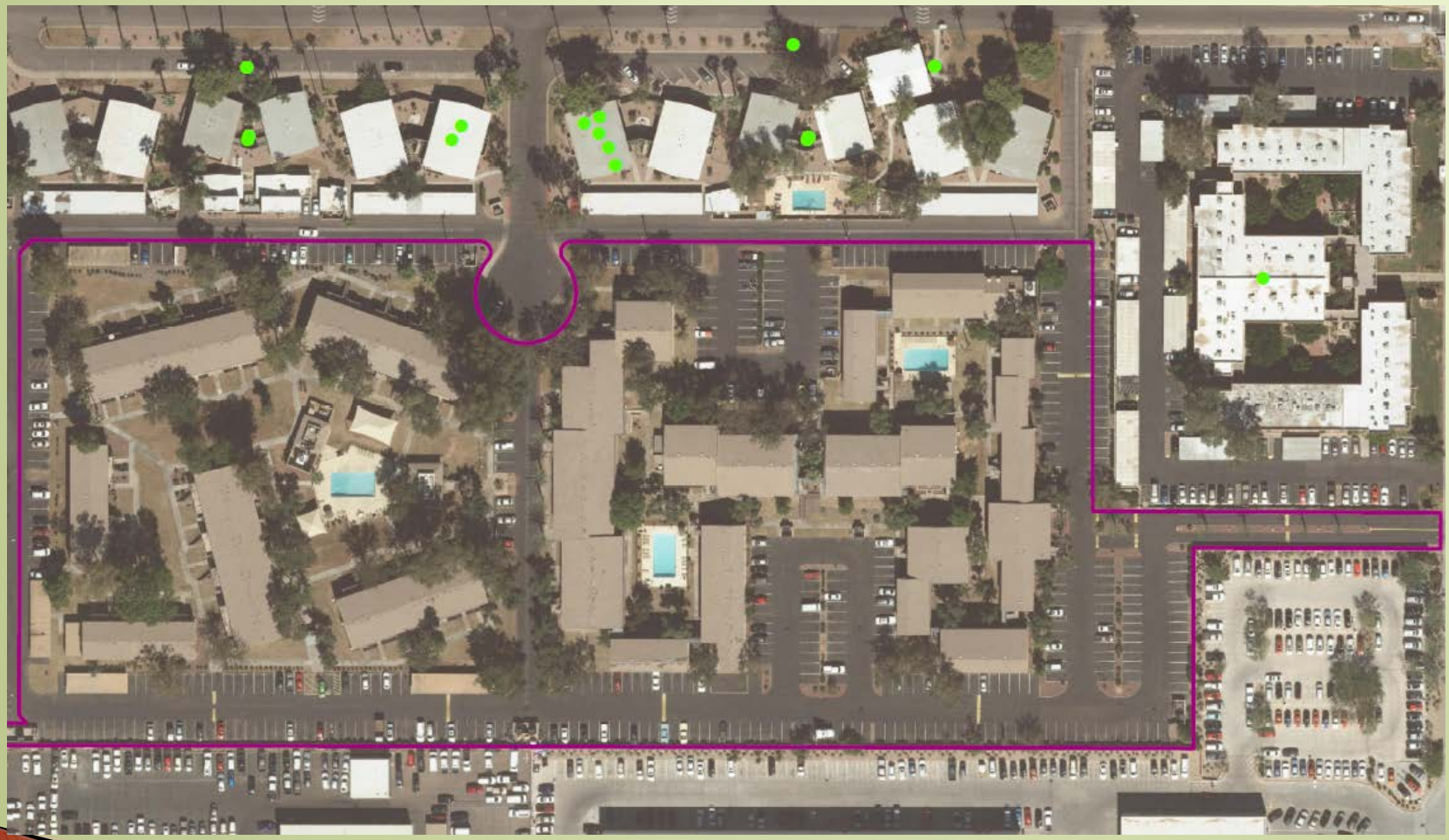
Focus Areas

- Office, Retail, and Warehouse
- Hotels, Motels, and Resorts
- Schools
  - Elementary, Middle, High Schools
- Hospitals

ICI Research Challenges

- ICI is complex: many sectors and sub-sectors with different end uses for water
- Many tools and data sources
  - Meter Data, Assessment Records, Audits, Interviews
- Meter to Property relationships:
  - One to One, One to Many, Many to Many

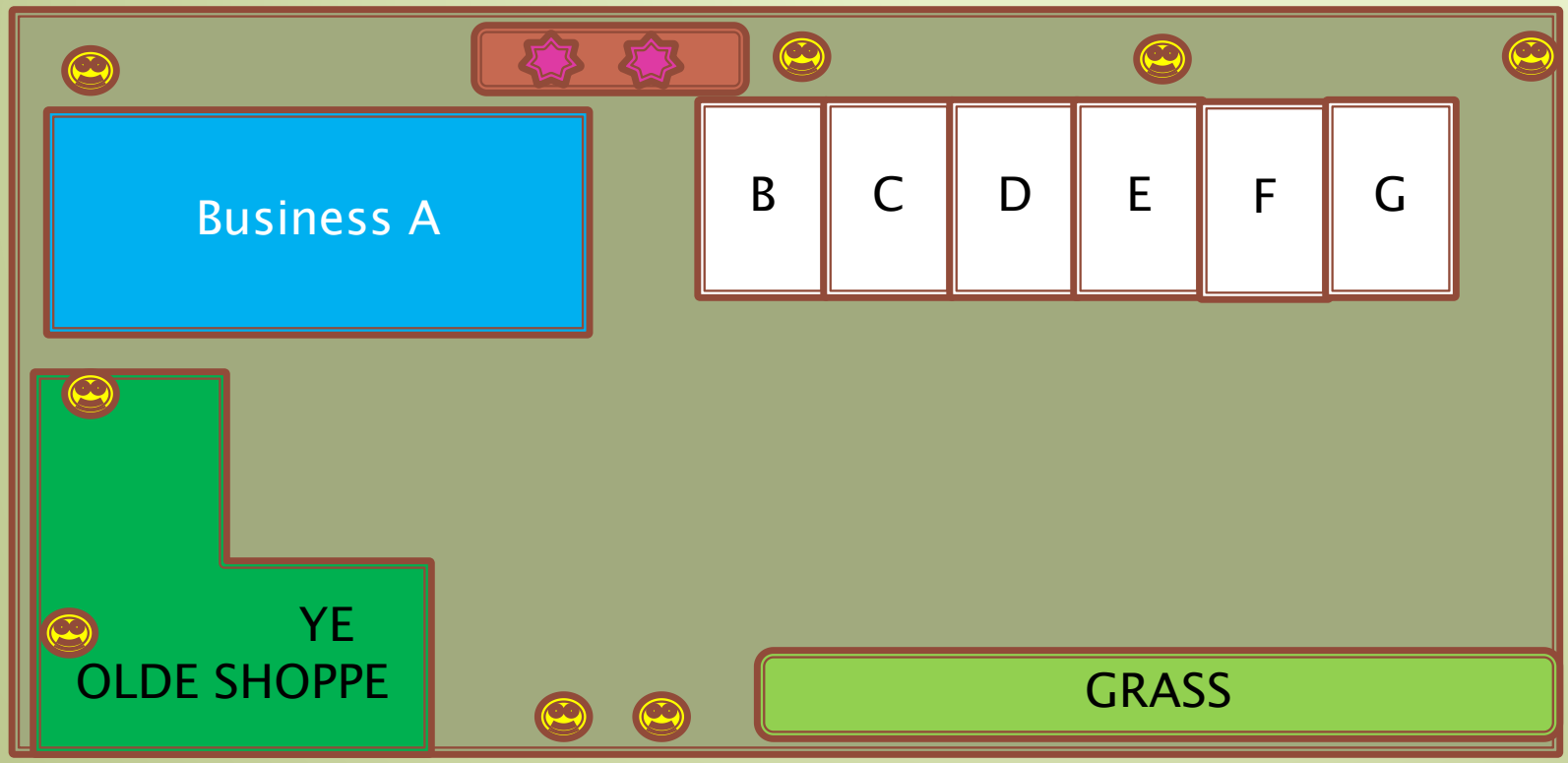
ICI Research Challenges



ICI Research Challenges

ICI Research Challenges (Office, Retail, Warehouse)

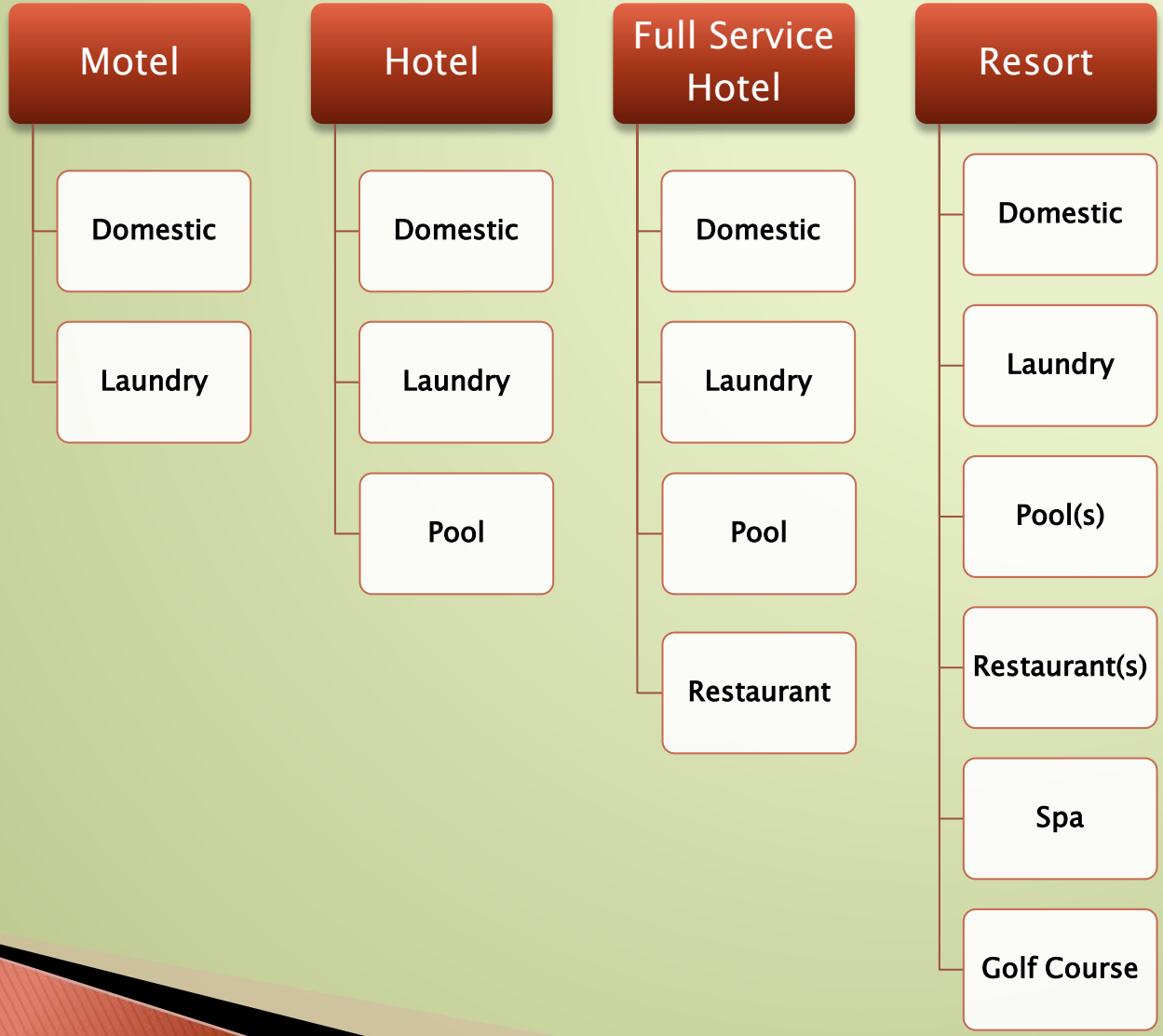
- Joining data from different sources is messy



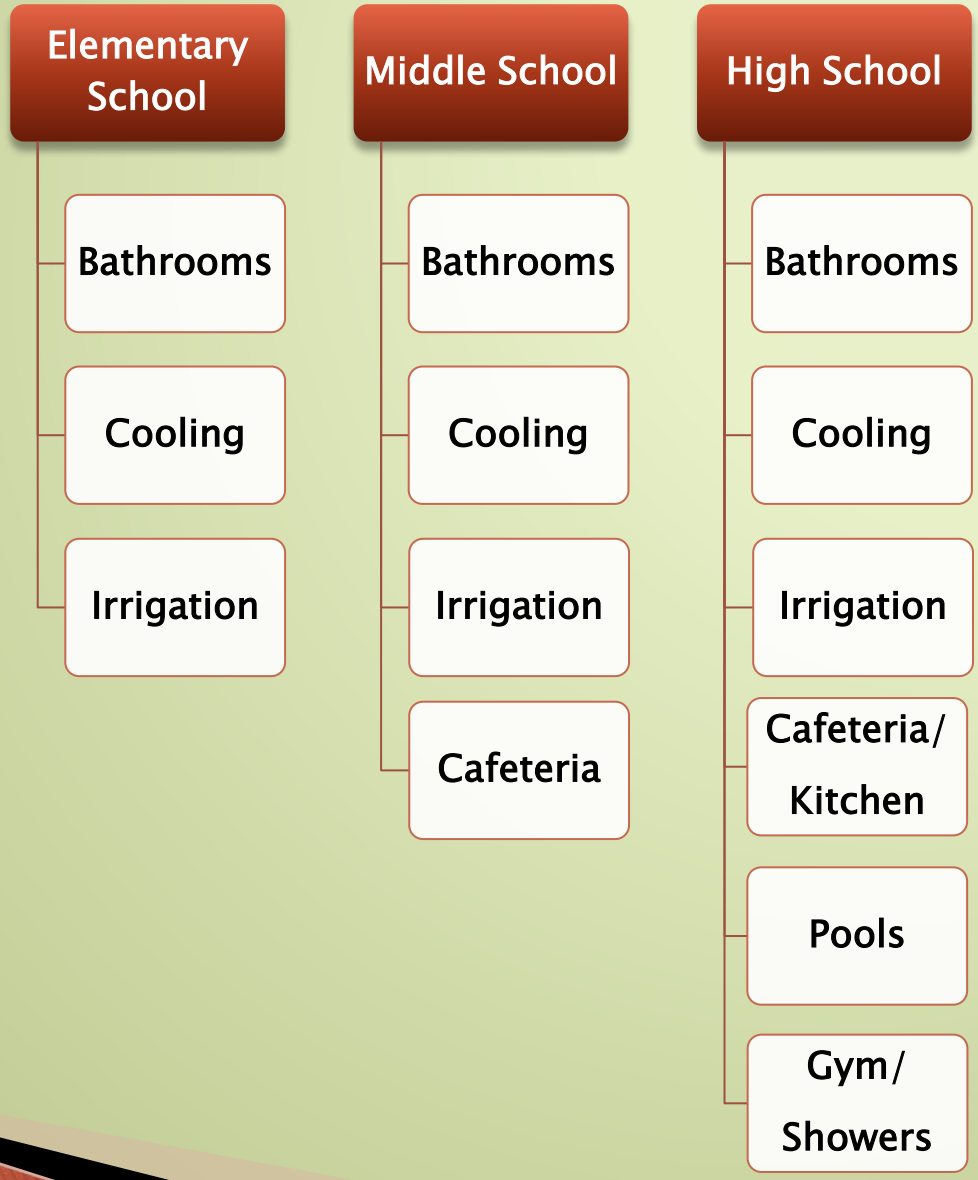
ICI Research Challenges

- Significant changes in:
  - Office, Warehouse, Retail Occupancy Rates (2000 – 2014)
  - Employment Rates (still not at 2007 levels)
  - Hotel Vacancy Rates
- Top down analytics are complicated by volatile economy and vacancy rates
- What did we do?

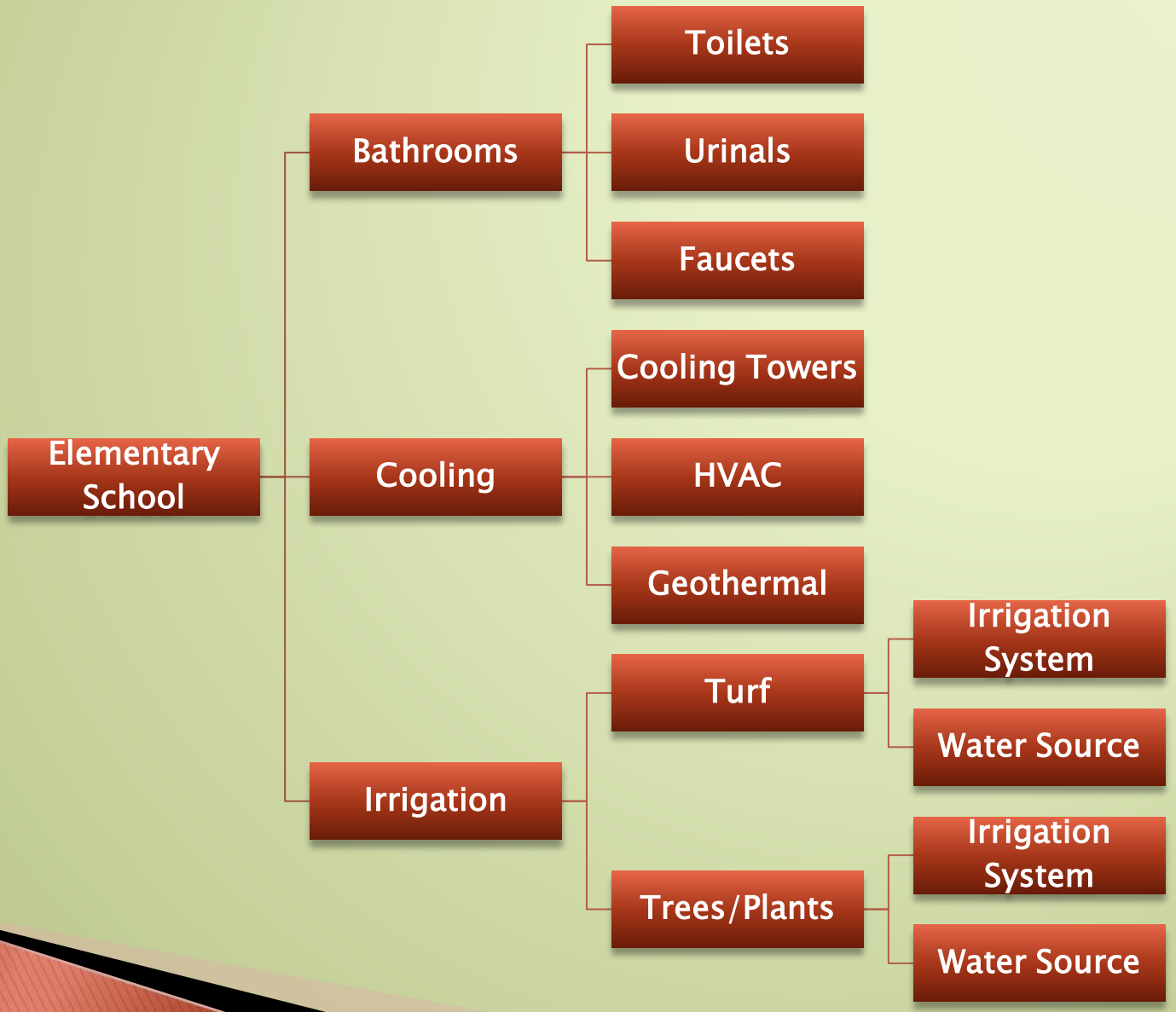
Building Block Approach: Hotels/Motels



Building Blocks: Schools



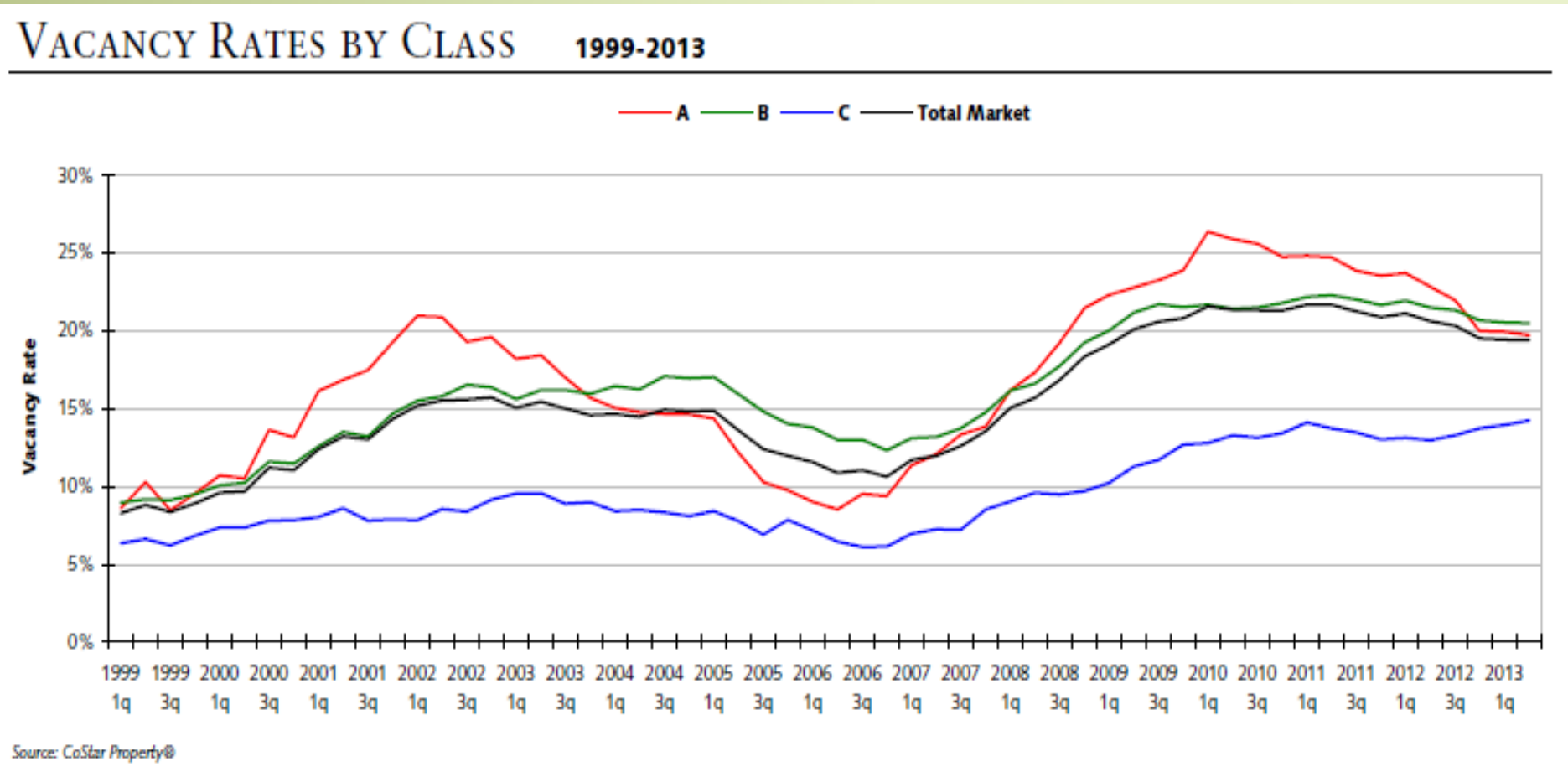
Building Blocks: Schools



What We Learned (Office, Retail, Warehouse)

- Decisions to upgrade are made at different levels
- Commercial fixtures are very gradually replaced once installed; about 1/3 still have 3.5 (+) gpf toilets
- Replacement rates <3% per year
- Property managers: irrigation efficiency is very low priority
- Lack of separate landscape meters
- Cooling towers are an obstacle

What We Learned (Office, Retail, Warehouse)



What We Learned (Hotels, Motel, Resorts)

- Key decision makers vary by property
- The ownership and management structures are very complex
- 50% built<1994 ⇛ old plumbing fixtures
  - 3.5(+) gpf toilets still in use
- Some reductions in laundry (towels, linens) with re-use programs

What We Learned (Schools)

- **Decisions for infrastructure changes are made by district; concentrated decision making**
- District Facility and Construction Managers are best point of contact
- Key person can provide overview of water use profile for district
- Schools more progressive than expected

What We Learned (Schools)

- Schools built ≥1994 have newer fixtures
- Some schools built <1994 have upgraded
- Irrigation Efficiencies
  - Artificial turf on sports fields; up-front cost a barrier (~$800K)
  - Irrigation technologies are in place in many properties

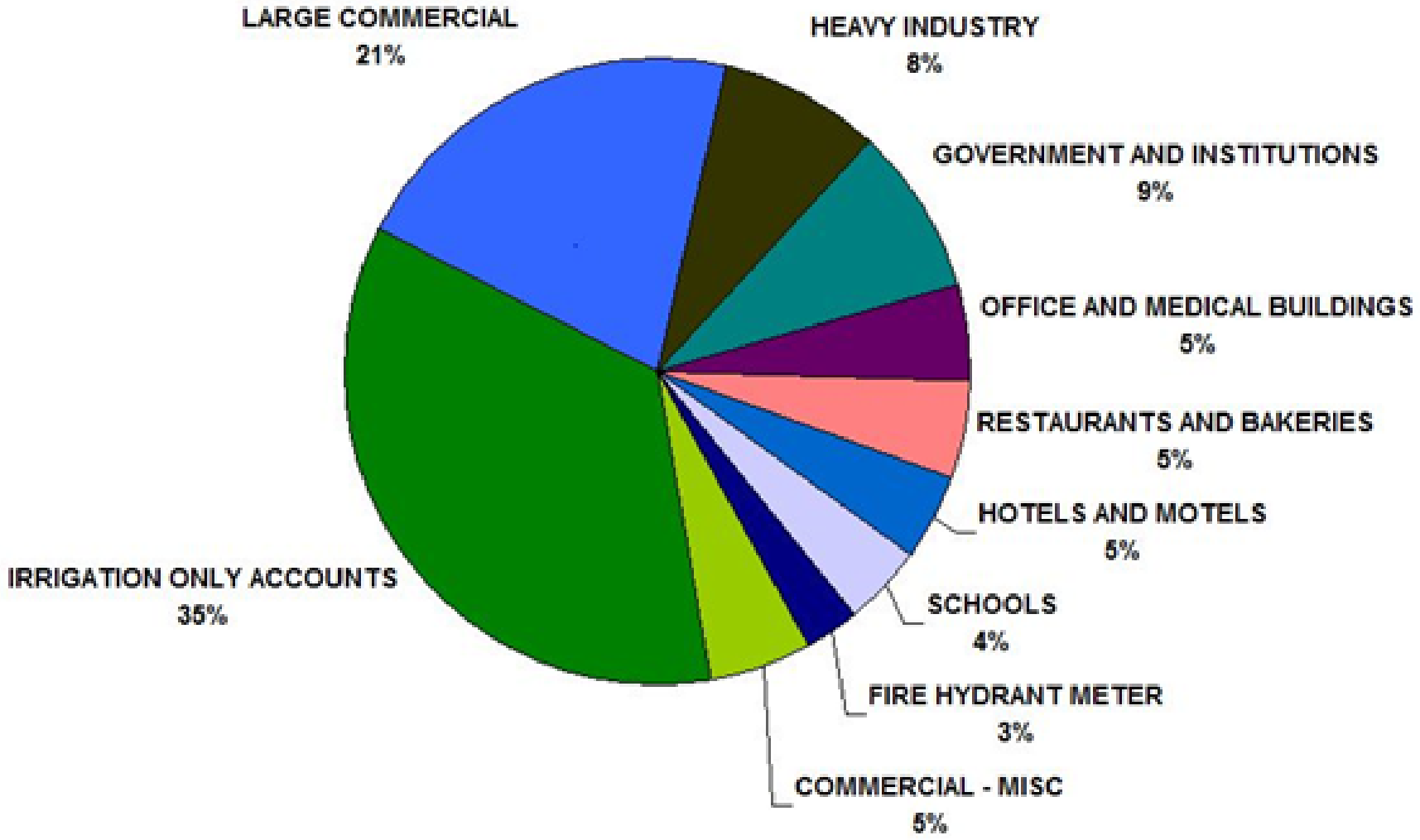
Estimating Potential Reductions (Example: High School)

- High school:2,600 students and 130 staff
- 3.5 gpf toilets and 1.5 gpf urinals
- 50/50 male: female
- Installing 1.28/0.125 gpf toilets/urinals saves ~ 10 AF/year
- **Replacement is occurring without incentives**

Recap

- Breakdown sectors into building blocks
  - End Uses (Devices, services, etc.)
- Find which blocks are likely to change
  - This is likely in schools with plumbing fixtures
  - Demand from cooling towers unlikely to change
- Future demands can be forecasted by aggregating these estimates by sector
- Need to understand replacement/adoption rates vary by sector

NON-RESIDENTIAL DEMAND BY SECTOR



Conclusions

- Finding the key person/level of organization that makes decisions is crucial
- Top down analysis inadequate to accurately define demand profiles; can be used to create samples for investigation and support conclusions by sector
- Future demand depends highly on adoption rates for technology, which vary by sector
- Baseline demands are influenced by year of construction, current vacancy rates

Conclusions

- Reductions are quantifiable
- Transitions are occurring without rebates or incentives in many sectors
- Although demands are falling more than 1%/year, there are still opportunities for efficiency gains
- Conservation measures can be directed toward sectors with the largest potential
- Changes can be accelerated
- Information critical if shortages occur and demand curtailment is desired

Questions

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