

Consolidated Management of Nitrate Treatment: Implementation, Demonstration, and Affordability Assessment

Treatment Costs and Affordability
2nd Workshop
October 17th 2018

Background

- Nitrate is a critical water quality concern
- The San Joaquin Valley (SJV) is a highly-productive agricultural region challenged by both nitrate and salinity
 - Most CA water systems in violation of the nitrate MCL are in the San Joaquin Valley
 - Nearly all of these systems are small water systems
 - Many are economically disadvantaged
- Mitigation alternatives can be costly
 - Grants available for upfront capital equipment costs
 - No grants available for ongoing operations & maintenance costs (O&M)

Nitrate Mitigation Alternatives

Non-Treatment Options

- Source destruction
- Source modification
- Blending
- Development of alternative sources
- Physical consolidation

Treatment Options

- Strong base anion exchange (SBA-IX)
- Reverse osmosis (RO)
- Electrodialysis/Electrodialysis reversal (ED/EDR)
- Biological denitrification (BD)

Nitrate Mitigation Alternatives

Non-Treatment Options

Consolidated Management of Treatment

- Not physical consolidation
- Reduce operating costs by sharing:
 - Operator
 - Chemical delivery
 - Waste disposal

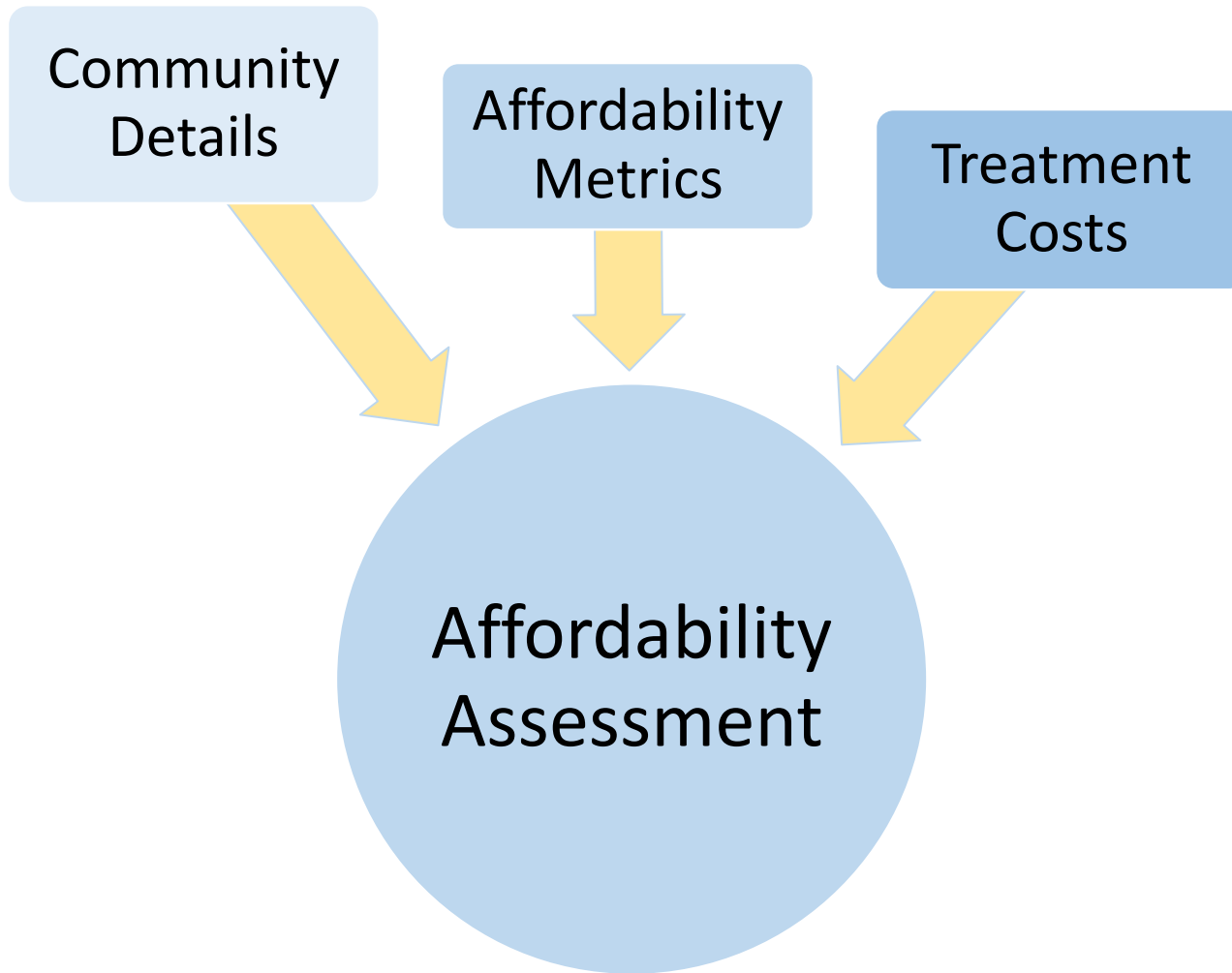
Electrolysis/ Electrodialysis Reversal (ED/EDR)

- Biological denitrification (BD)

Affordability Assessment - Objectives

- Estimating and comparing Triple Bottom Line lifecycle treatment costs with and without consolidated management
- Developing and applying a range of informative affordability metrics
- Evaluating a range of potential funding mechanisms for economically disadvantaged communities
- Formulating specific recommendations on addressing affordability on a statewide basis

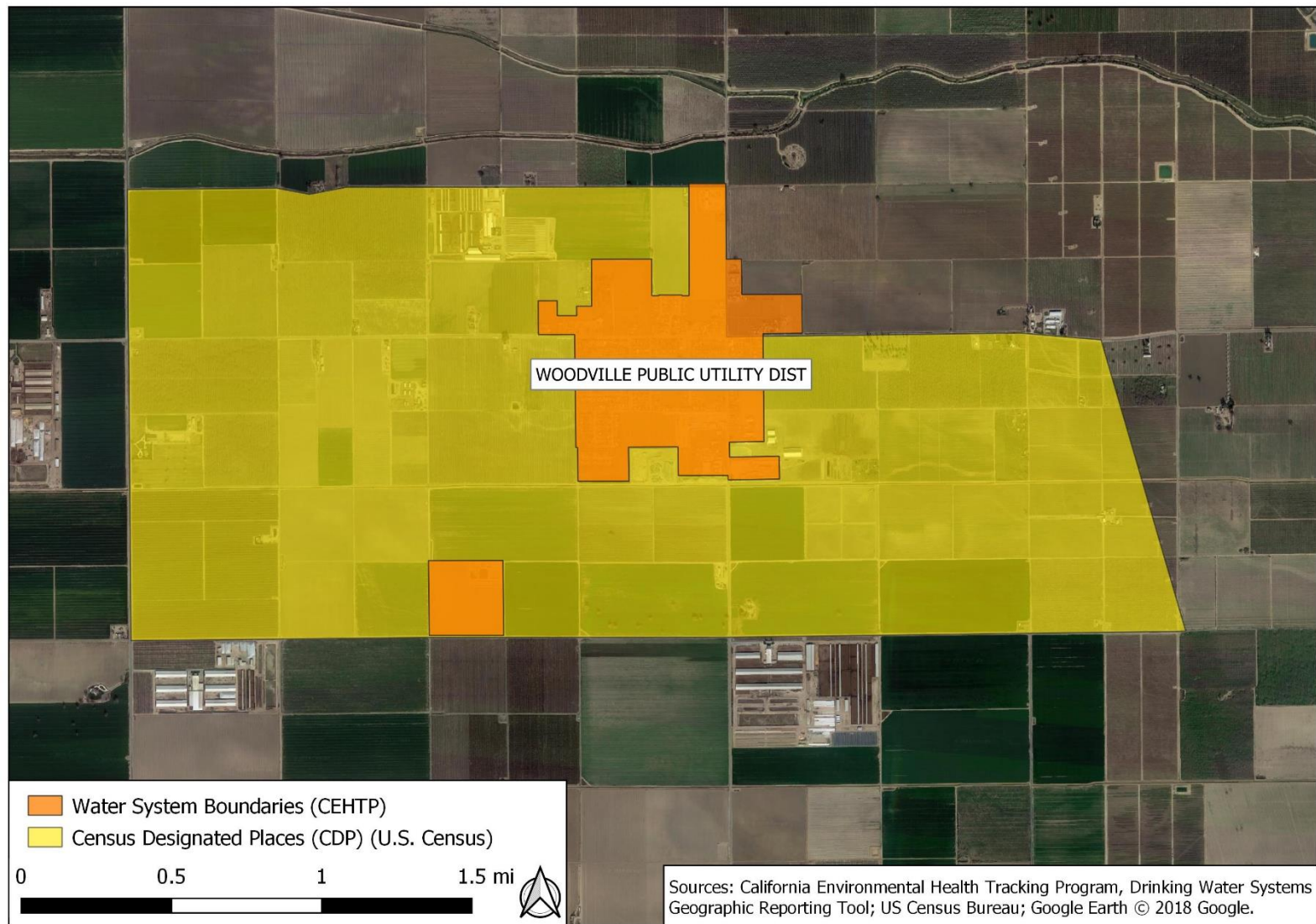
Affordability Considerations



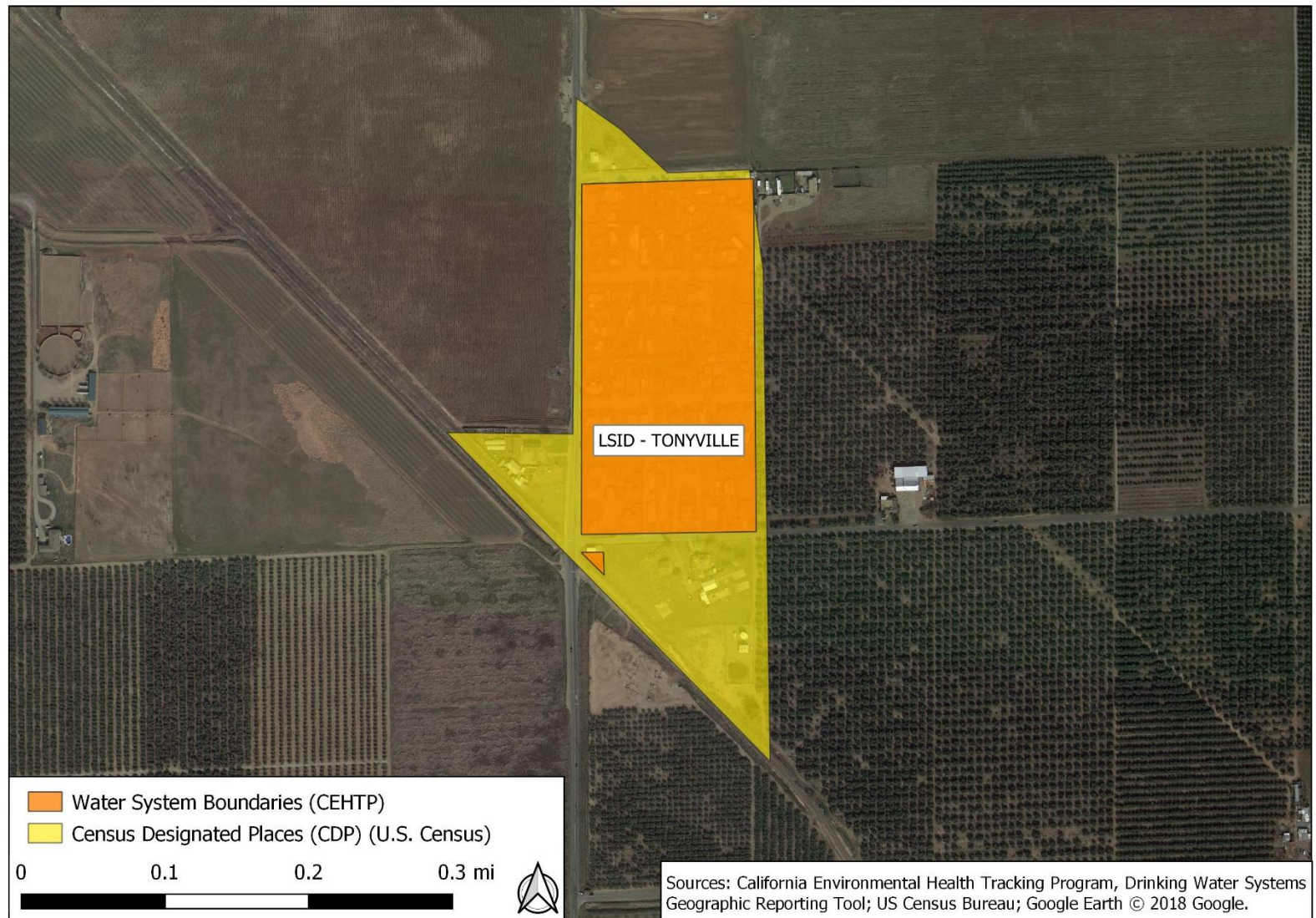
Community Details

Water System Information	Rio Bravo	Tonyville	Woodville
County	KERN	TULARE	TULARE
Population Served	887	500	1673
Connections	16	50	483
Census Data Basis	School district	Tonyville CDP	Woodville CDP
Region Population	4,906	816	1,748
MHI ACS 2016 5Yr	\$94,110	\$48,281	\$31,375
Income Range 20th Percentile	\$25,000 - \$34,999	\$15,000 - \$24,999	\$15,000 - \$24,999
Est. 20th Percentile Household Income (1)	N/A	\$24,556	\$16,393
Unemployment Rate	9.1% +/- 3.8	10.3% +/- 11.9	4.4% +/- 3.2
Poverty Rate (2)	6.5% +/- 4.7	29.5% +/- 31.1	41.8% +/- 10.3
Data Source for blue highlighted sections: ACS 2016 5 YR (2012 - 2016)			
1 Upper limit of lower quintile			
2 Percentage of families and people whose income in past 12 months is below poverty level (2016 5YR Estimate)			

Community Details



Community Details



Affordability Metrics

- Household level reasonable cost share for basic service
 - Degree of economic hardship
 - Non-discretionary household costs
- Hours at minimum wage to work for water
- SDAC (60% CA MHI) versus DAC (80% CA MHI)
- Percent of community below 200% federal poverty level

Affordability Metrics

- Affordability threshold
 - 1.5% versus 2.0% of income
 - Median Household Income (MHI) versus 20th percentile household income

Affordability Threshold	Organization
1.5%	CA State Water Resources Control Board
2% - 2.5%	US Environmental Protection Agency (USEPA)
3%	United Nations Development Program (UNDP)

Adapted from <http://pacinst.org/wp-content/uploads/2013/01/water-rates-affordability.pdf>

Treatment Costs

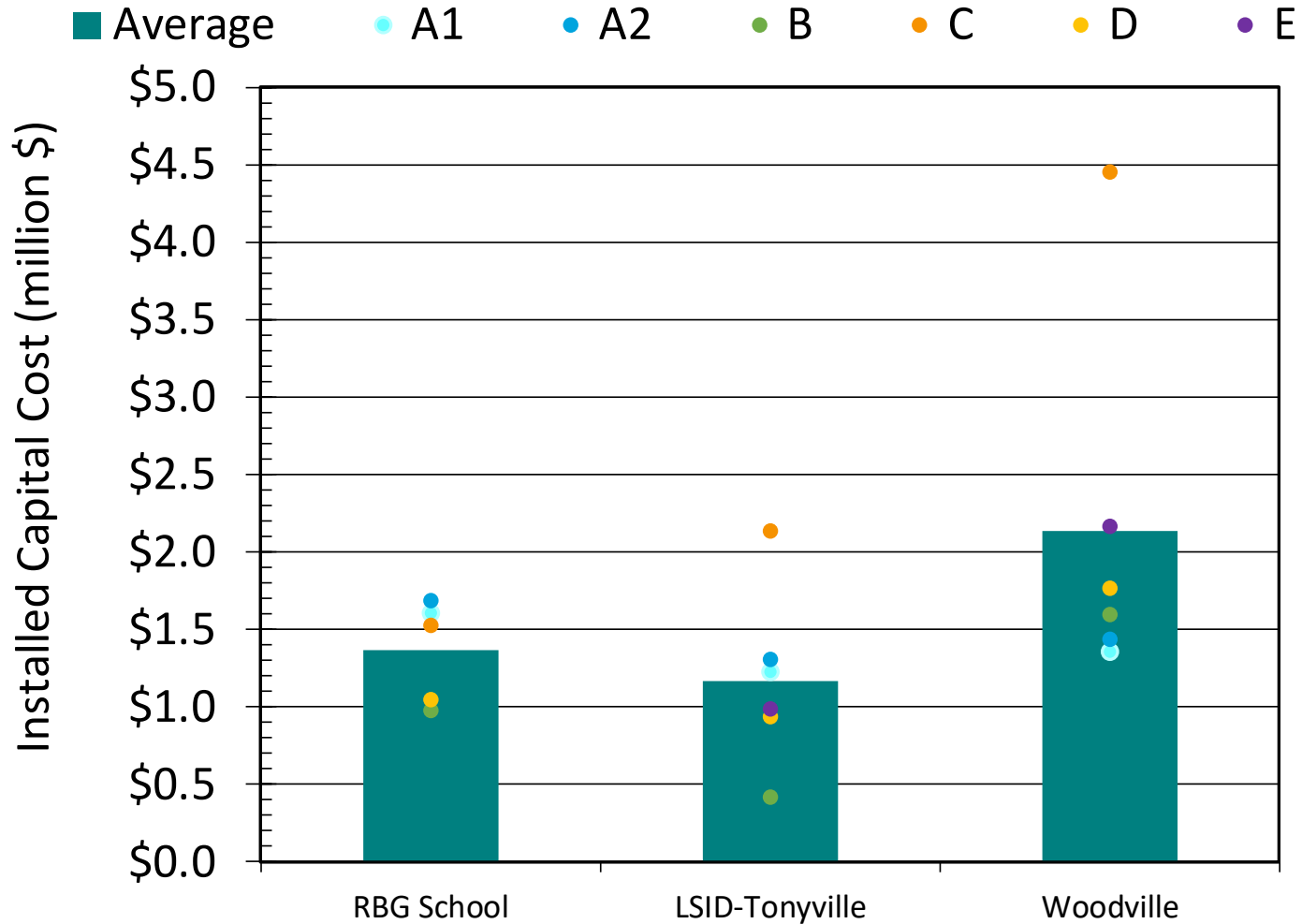
- Installed Capital Costs
 - Include
 - Equipment costs (with tax)
 - Installation, electrical and instrumentation & controls, building & general site civil, contingency, planning, engineering, legal, and admin.
 - Exclude
 - Specific costs for other site improvements (e.g., new booster pump, additional storage, etc.)
- O&M Costs
 - Include
 - Salt, disposal, media, labor, electricity (pumping)
 - Exclude
 - Component replacement, GAC-specific labor, nitrate resin replacement

Treatment Cost Assumptions

- Assumptions in the current cost analysis:
 - Arsenic (if > MCL) will be sufficiently removed by nitrate resin
 - Non-hazardous waste brine
 - Electricity @ \$0.26/kWh
 - Labor @ \$1,000 per system/month
 - Salt @ \$0.15/lb
 - Waste brine disposal @ \$0.30/gal waste
 - Design basis using maximum nitrate
 - Standard multipliers were used to estimate installed capital costs
 - Costs are subject to change and will be revised as costs are refined through the competitive bid process
 - For calculations of household water cost, proportional O&M costs for industrial/commercial connections were excluded.

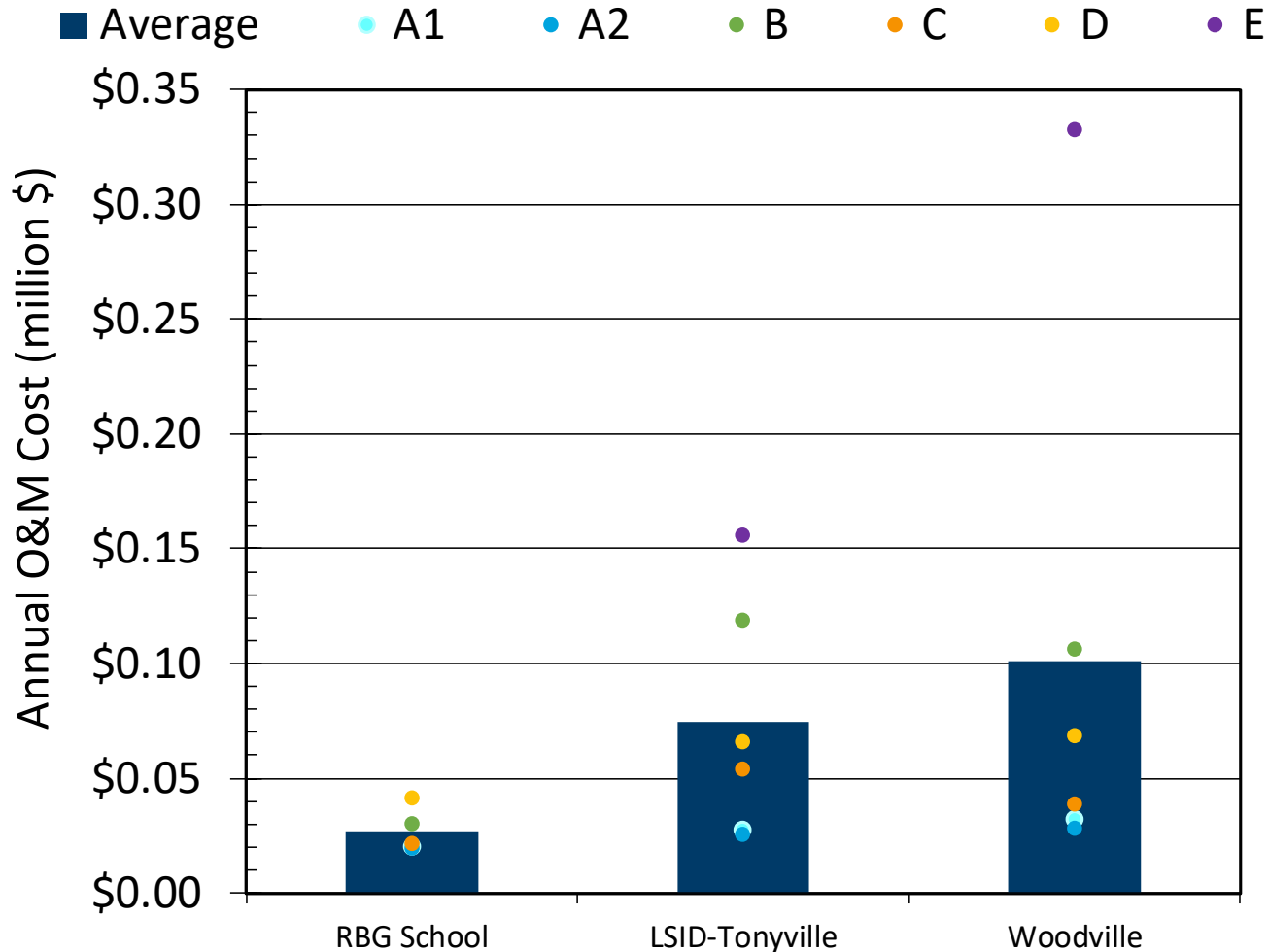
Treatment Costs

Installed Capital Costs



Treatment Costs

Annual O&M Costs



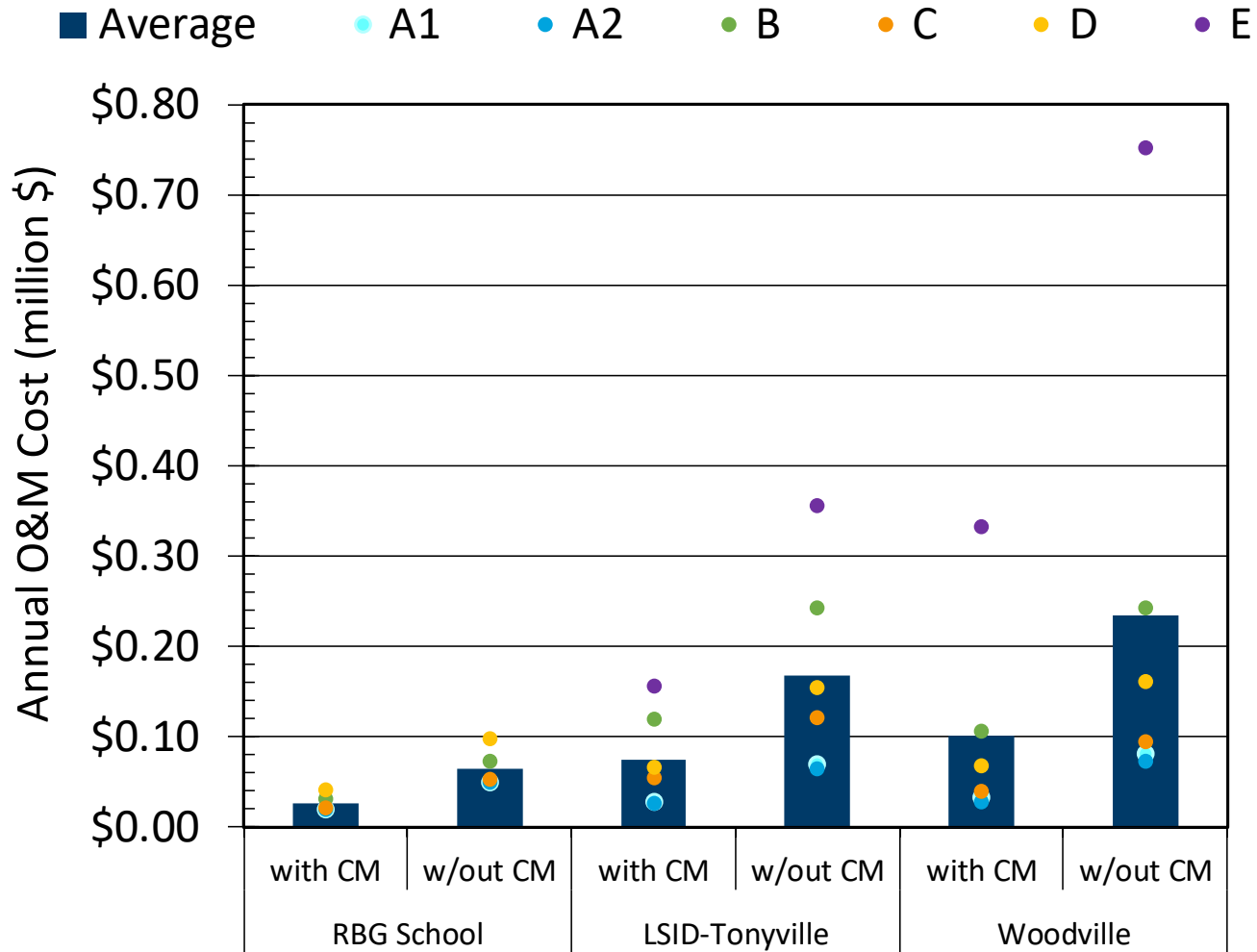
Treatment Cost Assumptions

- Assumptions for treatment with and without consolidated management (CM):

O&M Costs	With Consolidated Management Approach	Without Consolidated Management Approach
Salt \$/lb	\$0.15	\$0.27
Disposal \$/gal	\$0.30	\$0.68
Labor \$/yr	\$12,000	\$40,000

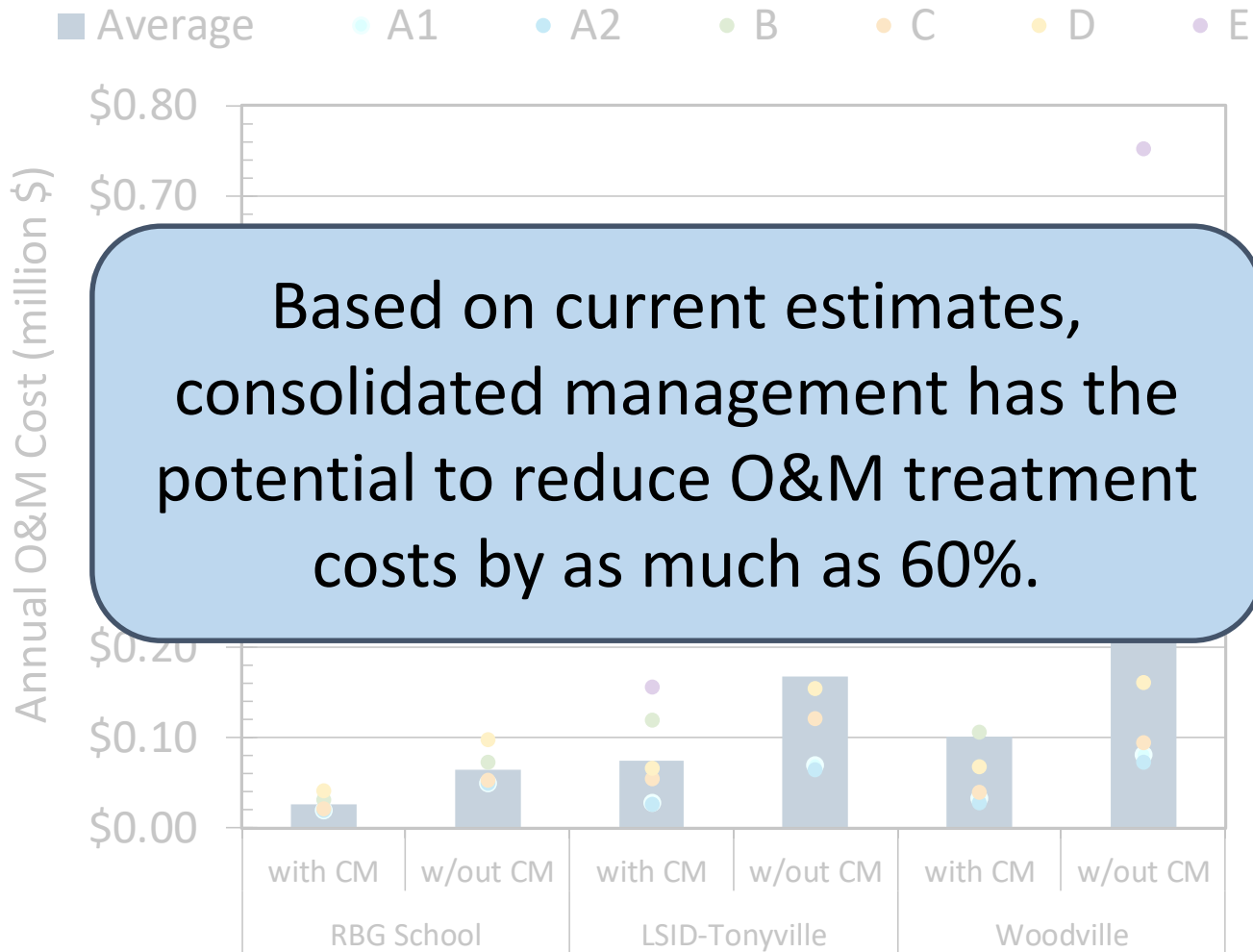
Treatment Costs

Annual O&M Costs



Treatment Costs

Annual O&M Costs



Treatment Costs & Affordability

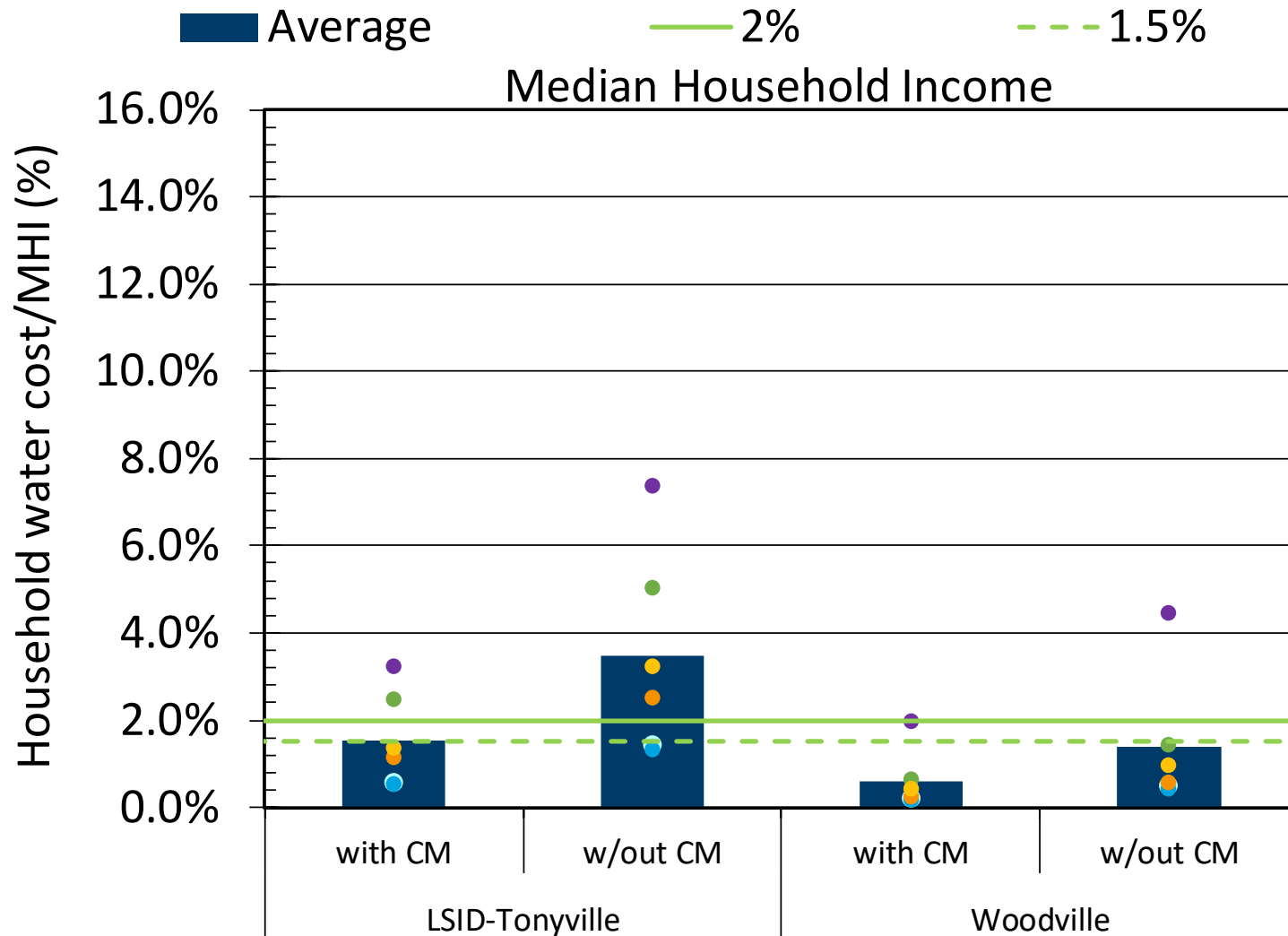
- So what does this mean in terms of affordability?
- Threshold of “What is Affordable?”
 - Median household income (MHI) versus 20th percentile household income
 - 2% threshold versus 1.5% threshold
- Cost of water
 - Annual treatment costs/number of households= annual household water cost
 - Annual household water cost/annual income = %
 - How does this % compare to the affordability threshold?
 - Costs for added treatment PLUS current bill
 - Inclusion of Capital costs (covered by grant)

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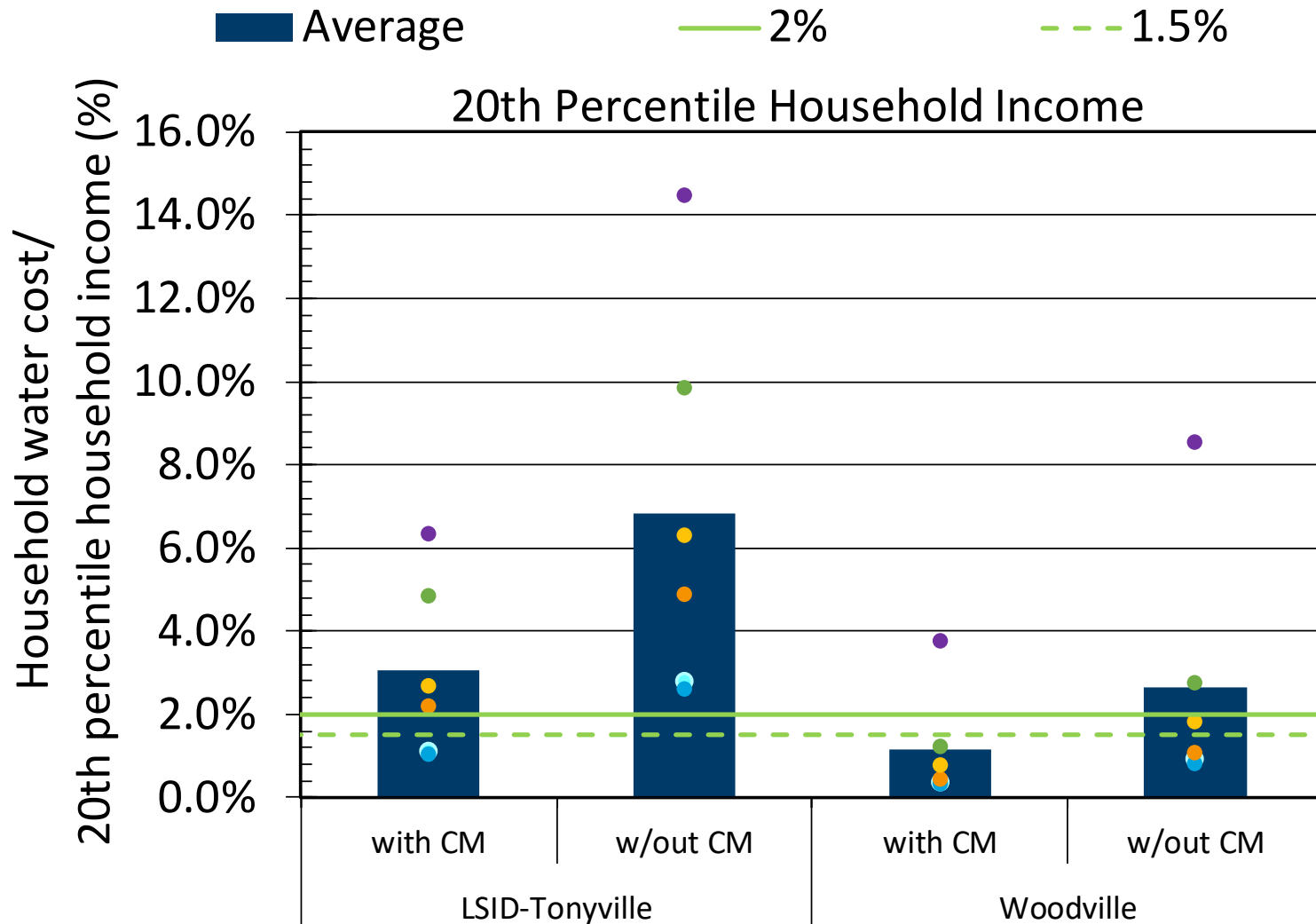
Treatment Costs & Affordability

O&M Costs, new treatment only



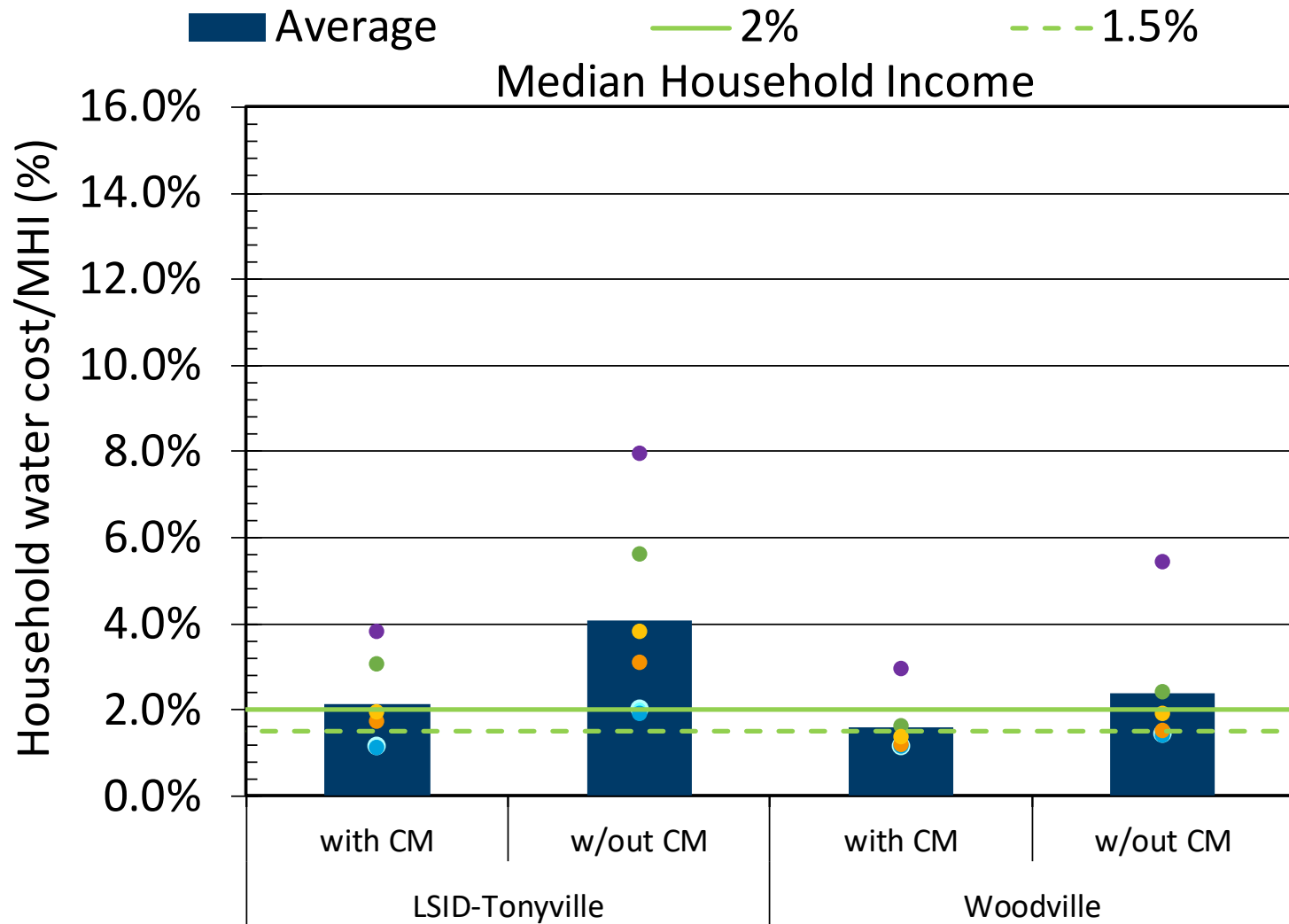
Treatment Costs & Affordability

O&M Costs, new treatment only



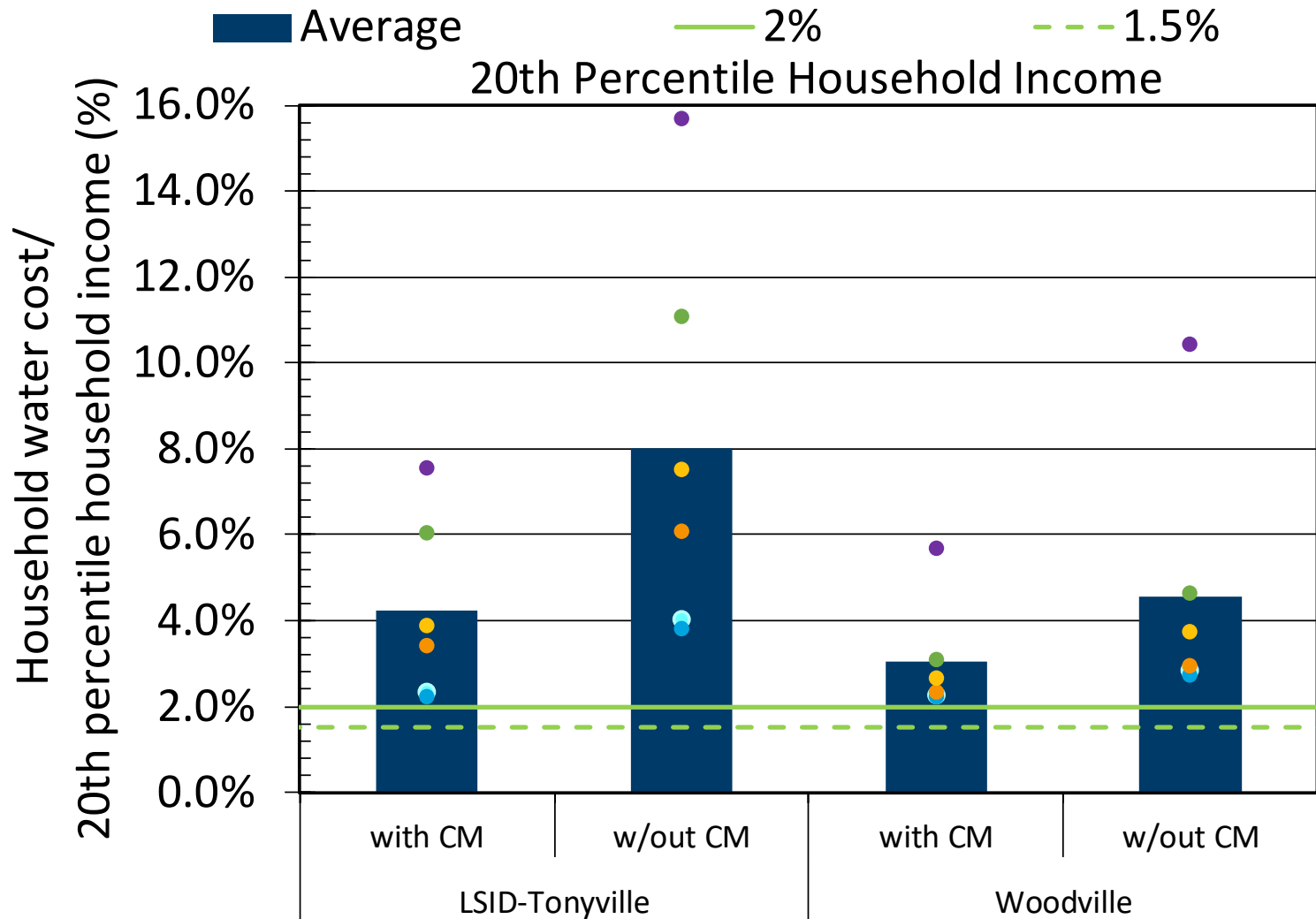
Treatment Costs & Affordability

O&M Costs with current bill



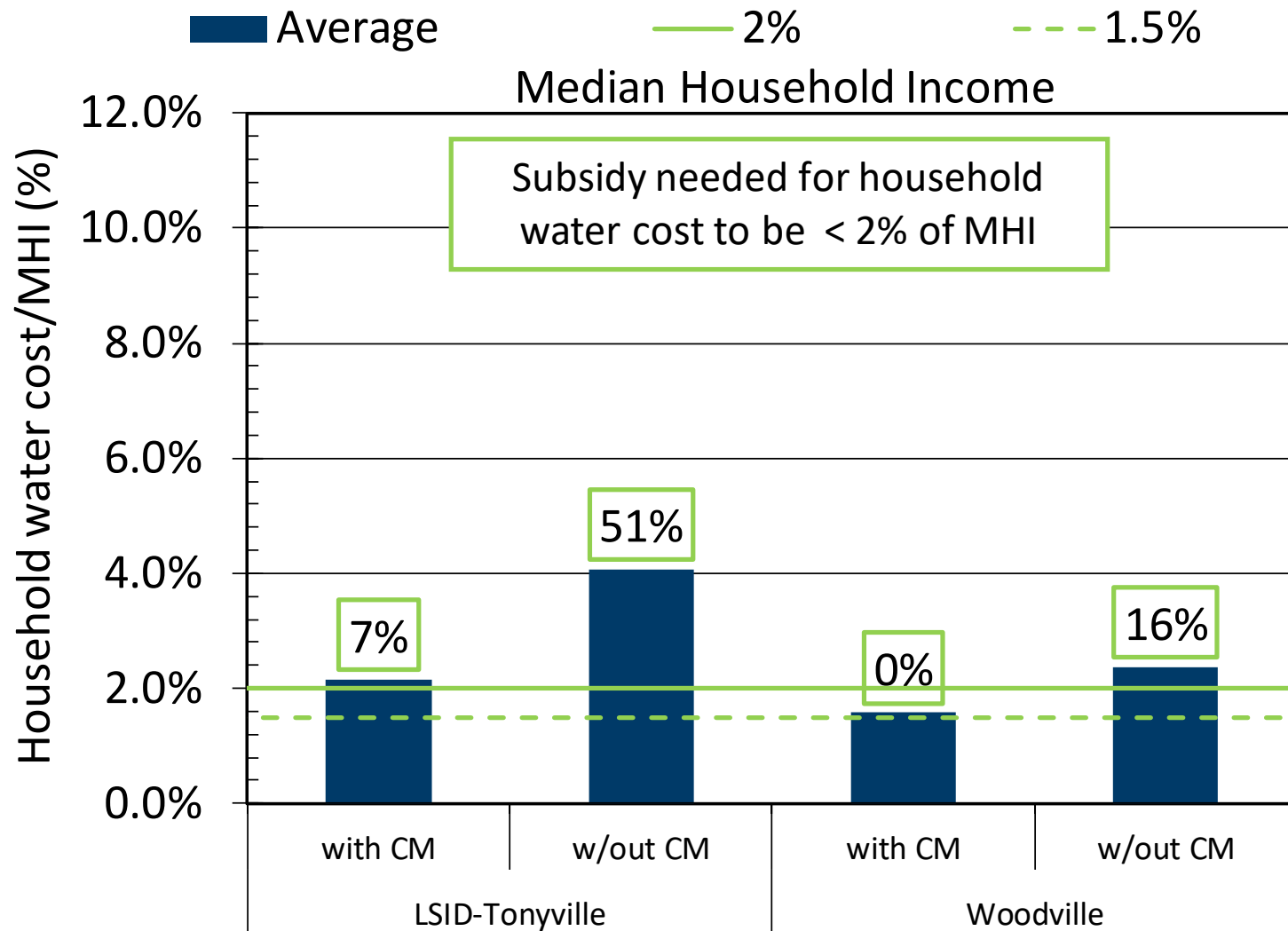
Treatment Costs & Affordability

O&M Costs with current bill



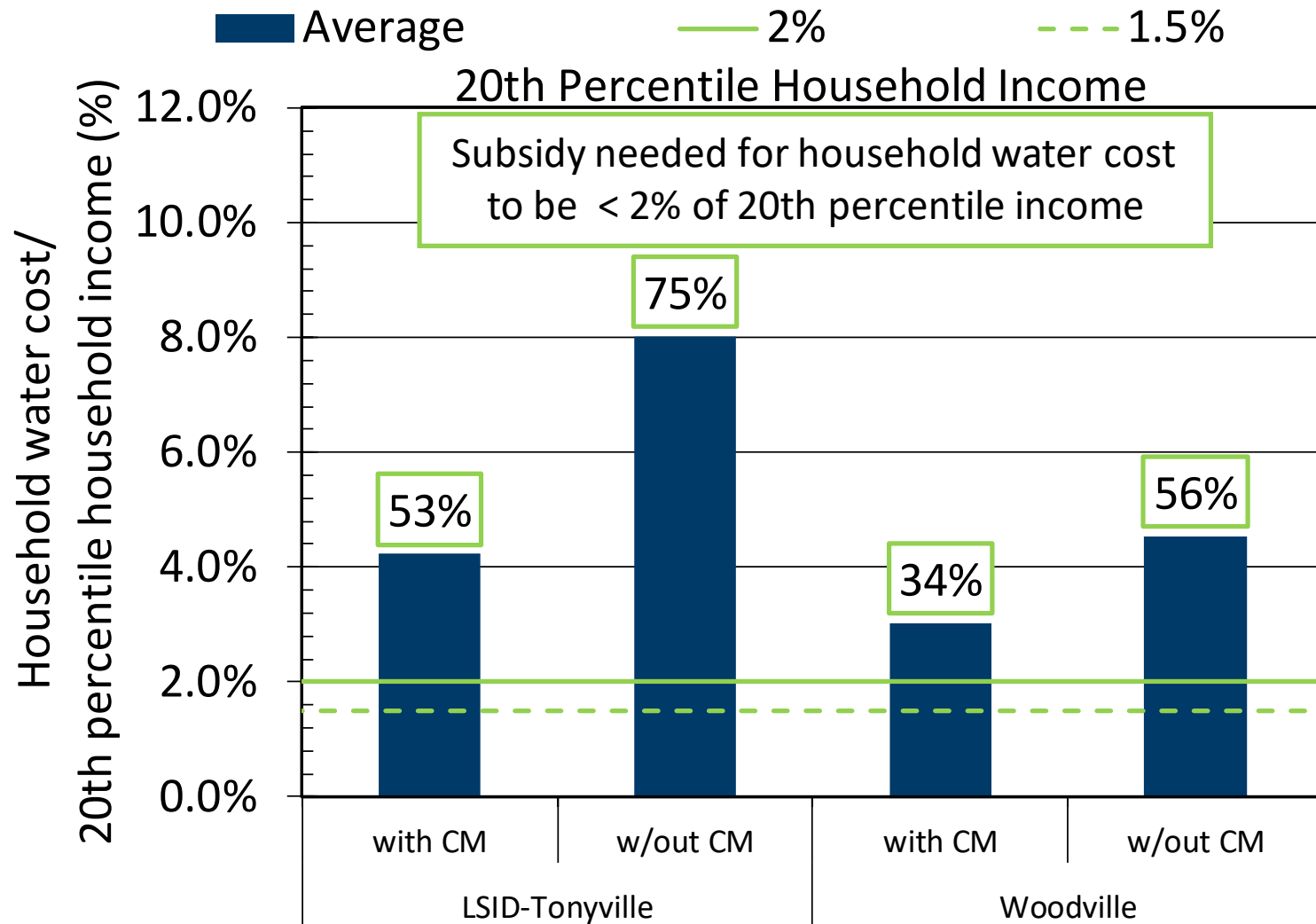
Treatment Costs & Affordability

O&M Costs with current bill



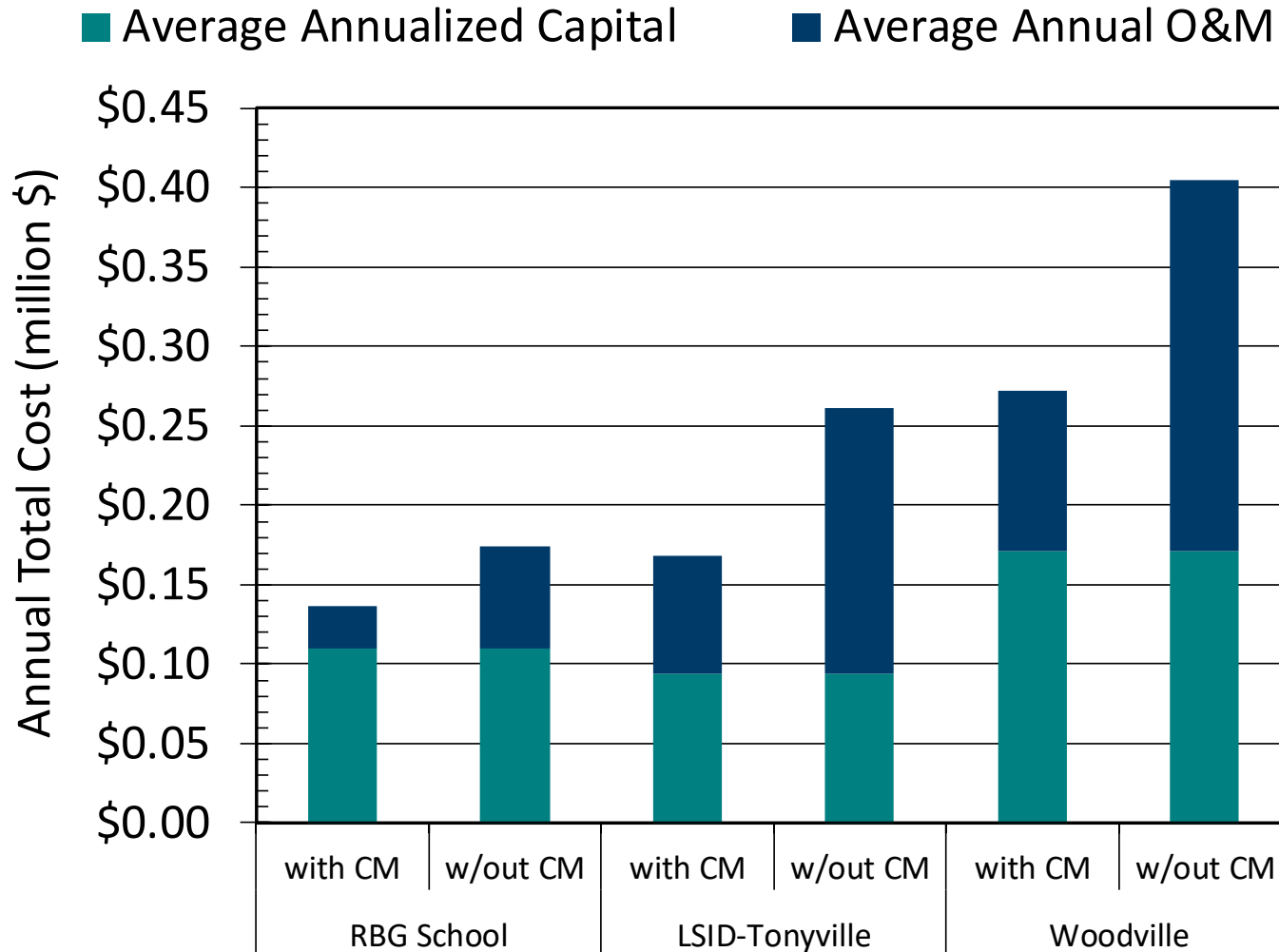
Treatment Costs & Affordability

O&M Costs with current bill



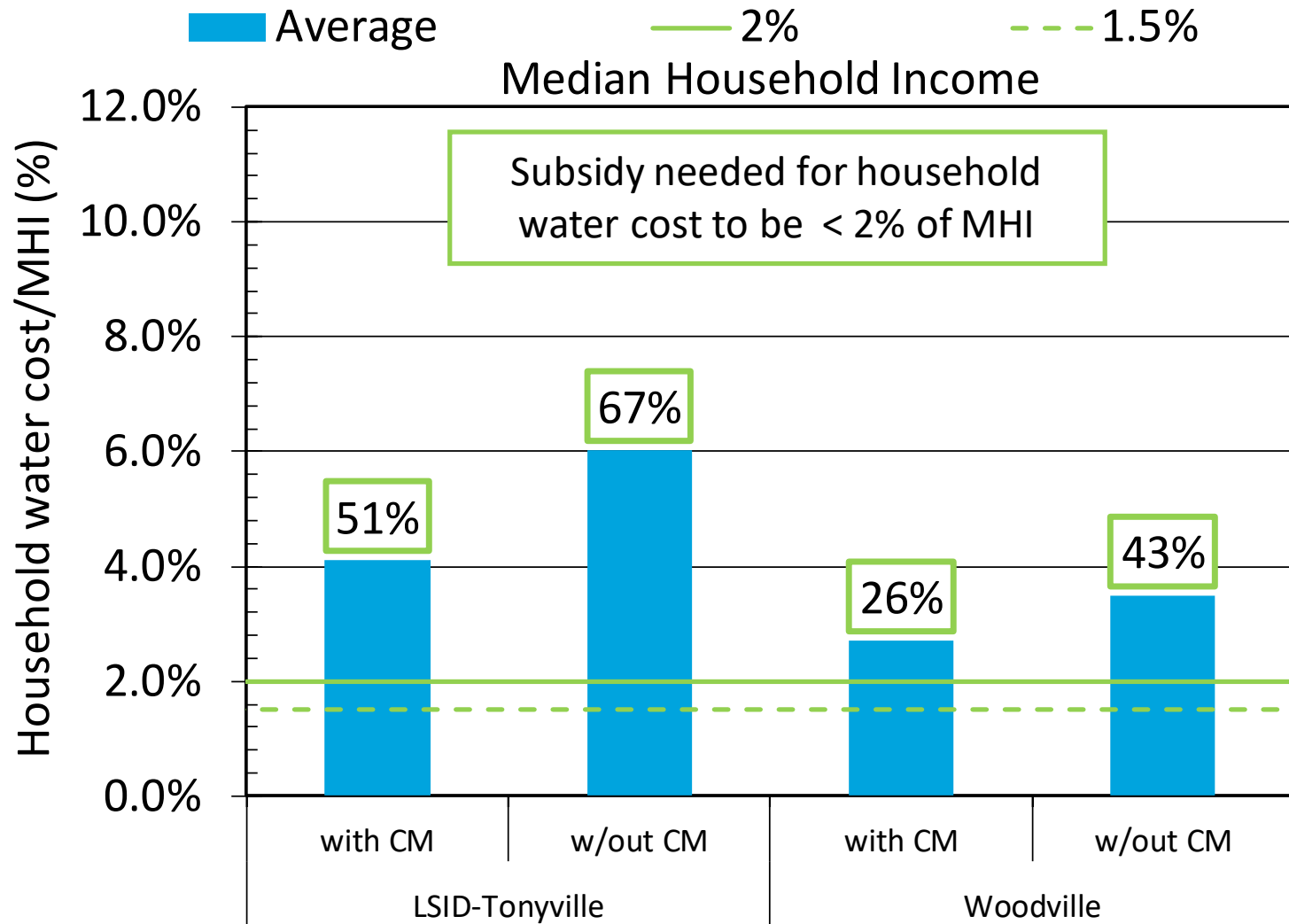
Treatment Costs & Affordability

Annual Capital* and O&M Costs



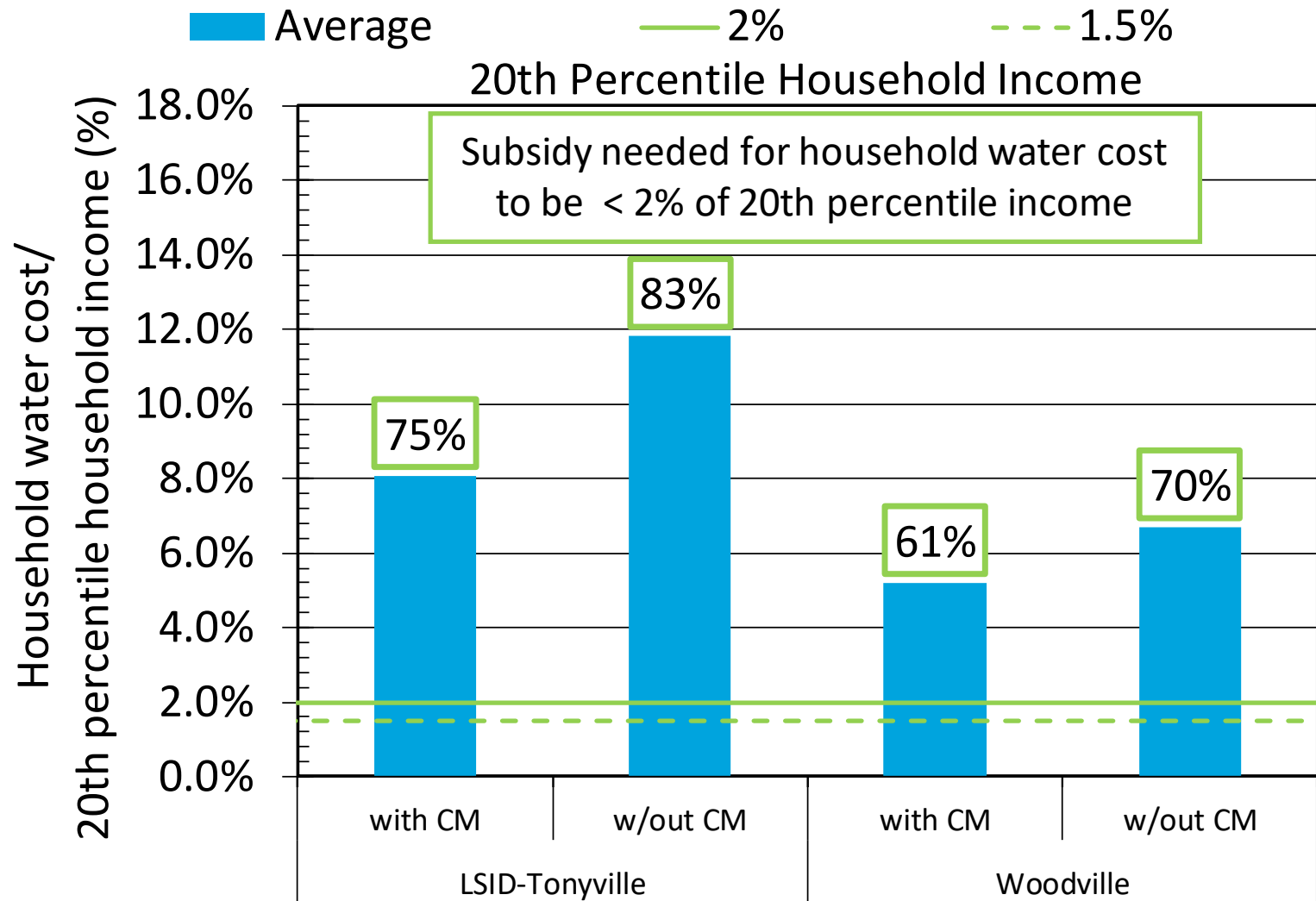
Treatment Costs & Affordability

Capital* and O&M Costs with current bill



Treatment Costs & Affordability

Capital* and O&M Costs with current bill



Affordability

- Need to address affordability concerns, especially for lower income households

Next → **Funding Options**