Energy and Water Calculator

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Build It Green
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Build It Green

- A non-profit with mission to achieve healthy& resource efficient homes
  - Establish and promote an attainable and credible green building program
  - Train professionals in green building
  - Work with local governments to create green building policy

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- Review tool and end uses
- Summary of Water calculations
  - GHG, energy use, volume of water
- Demonstration of 2-3 unit types

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Energy and Water Calculator

- Create a tool
  - To support Zero Net Energy and Low Carbon Home for GreenPoint Rated- a green building certification program
  - Utility allowances
- Comprehensive end uses
- Create baseline for hot water use & savings opportunities
  - Evolve shower stop, Hands Free faucets
  - Structured plumbing design & on demand recirculation

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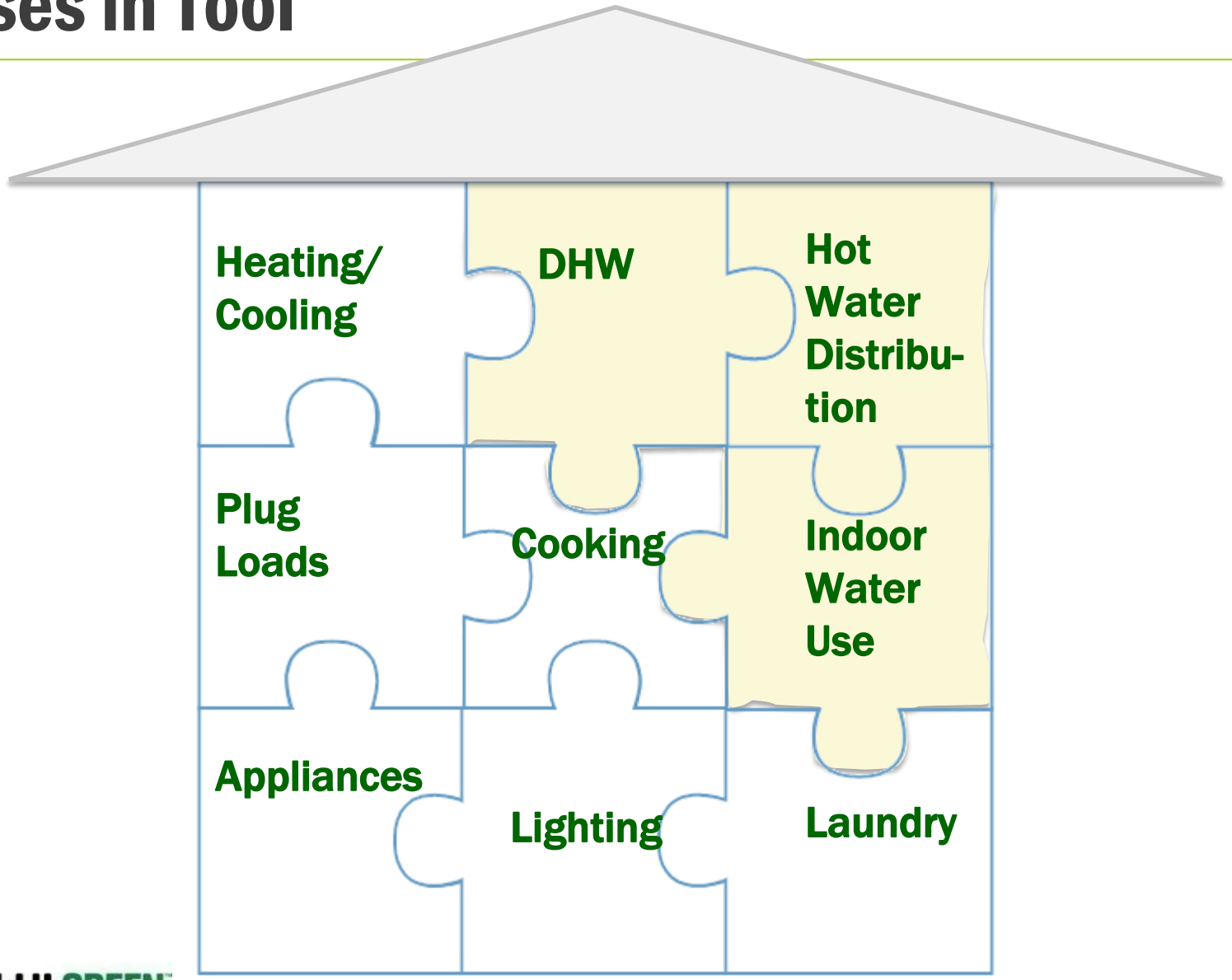
End Uses in Tool



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Calculating impacts of Water use

GHGs

- CA metric

Energy Use

- National
- CA Baseline

Volume

- National
- CA Baseline

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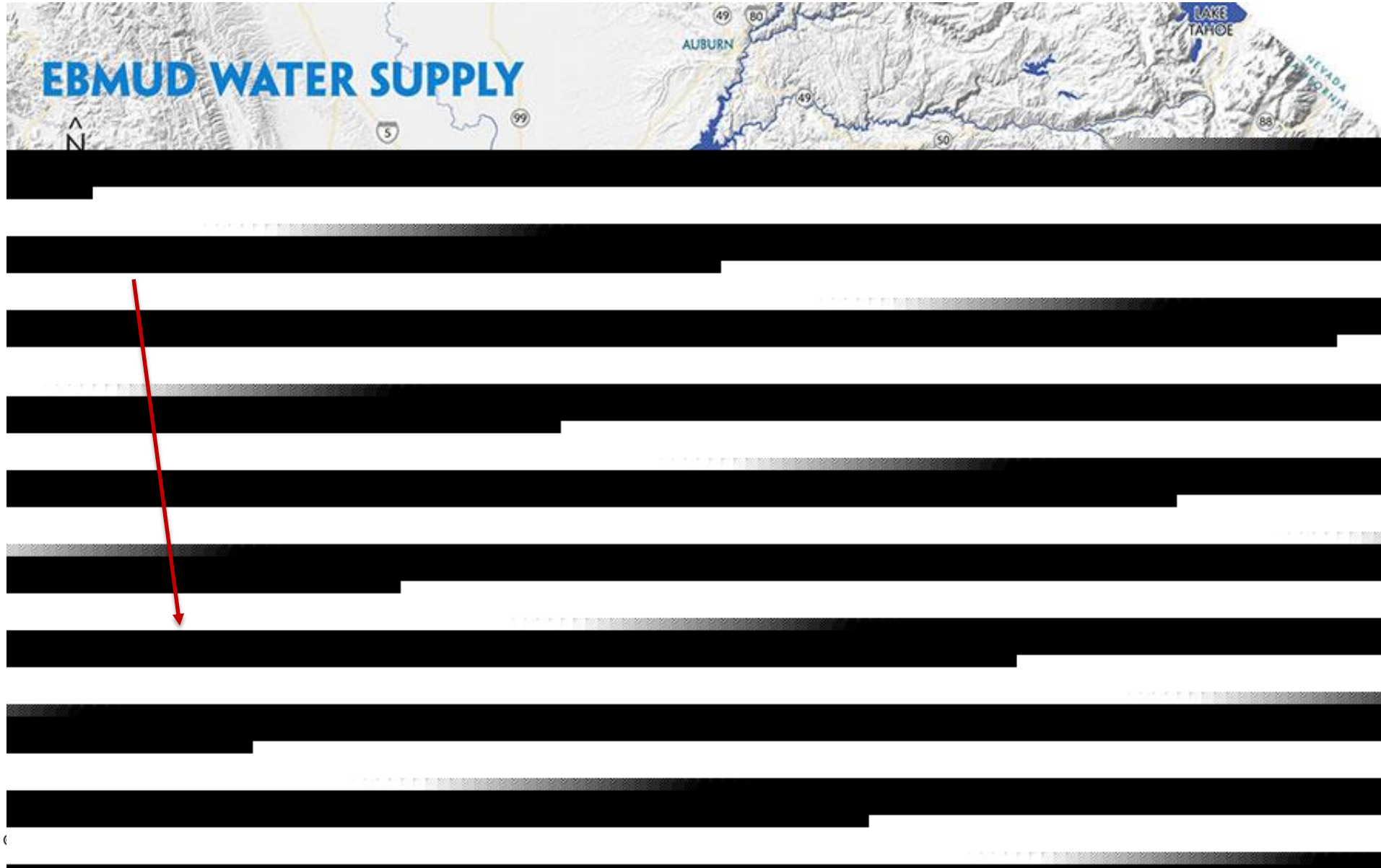
Sphere of Influence for GHGs



What is included in Sphere?

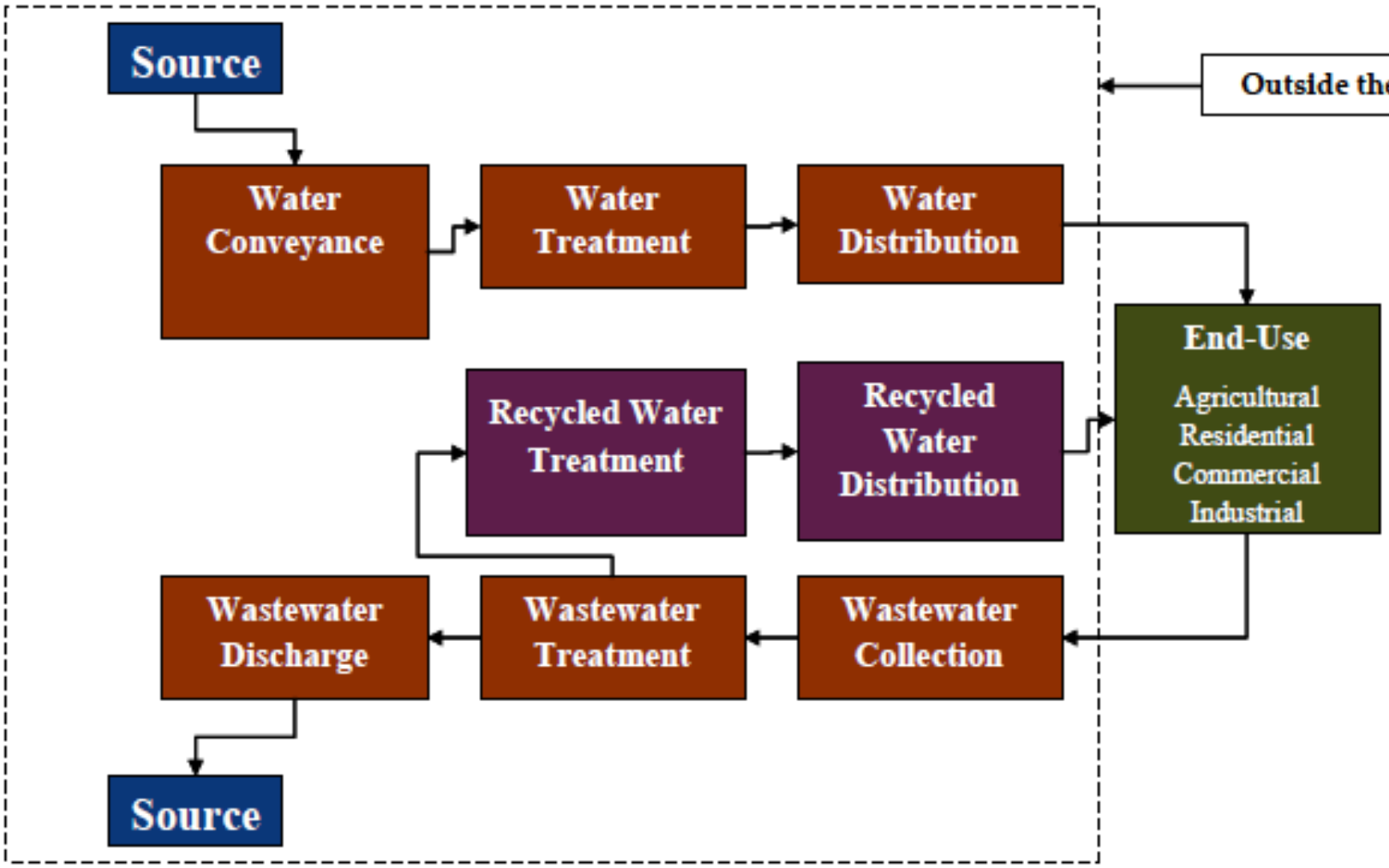


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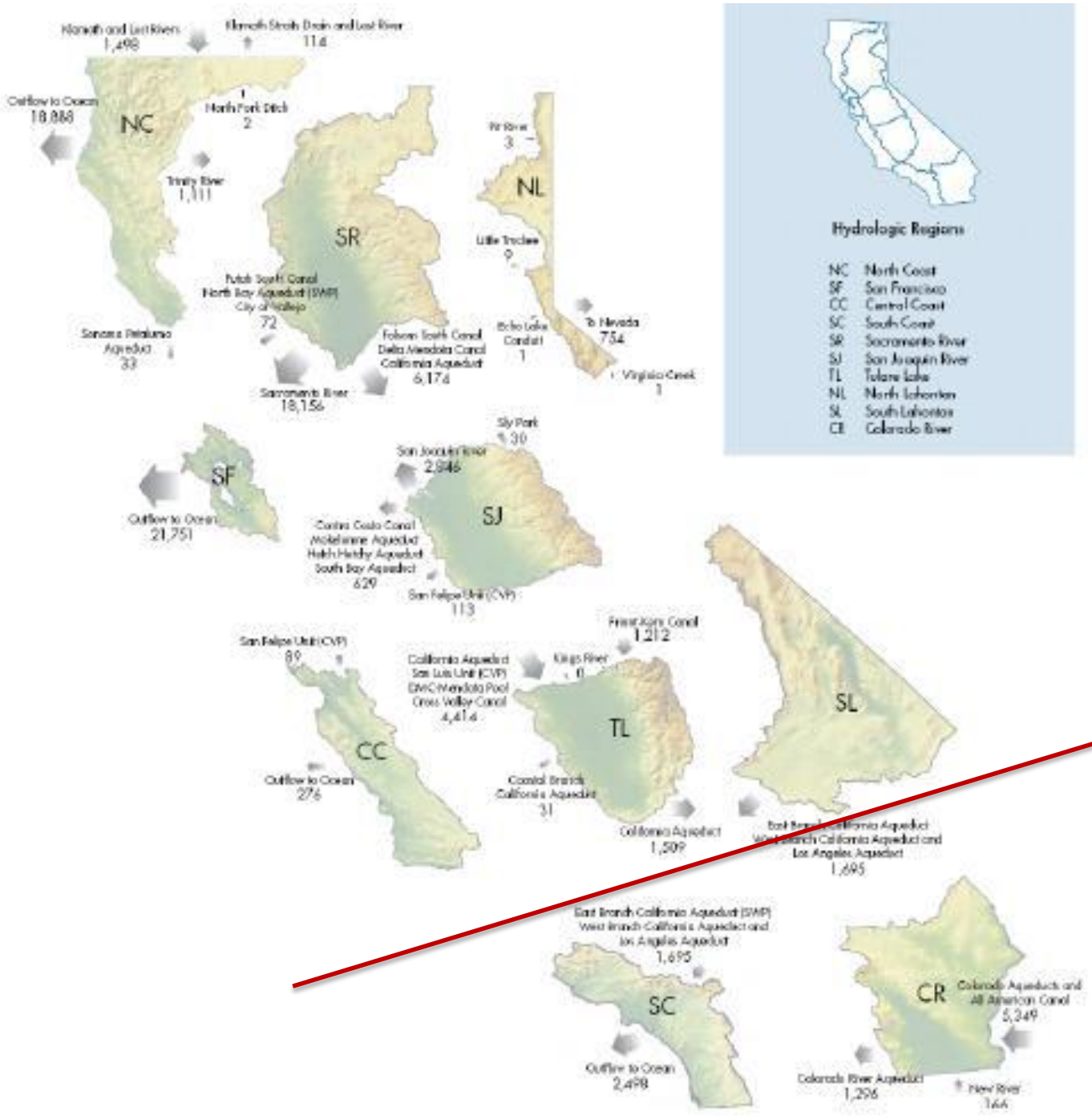
Image from CEC-500-2006-118

- Hydrologic Zones in CA

  10 Regions vs. previously 2 regions



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The Accounting

Location	Gallons of Water	Metric Tons of CO2e
Oakland	1,831,020	.51
Los Angeles	1,831,020	2.03

- 20 units – 1 and 2 bedroom
- Variables in pumping due to distribution, conveyance, and treatment 4 times the difference in CO2e

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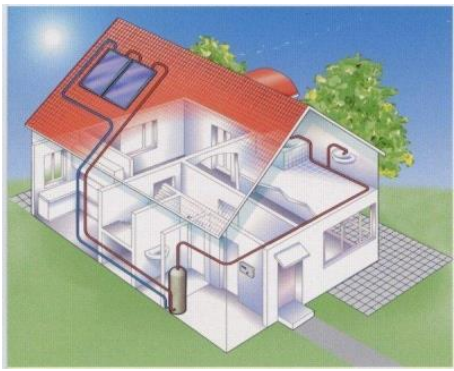
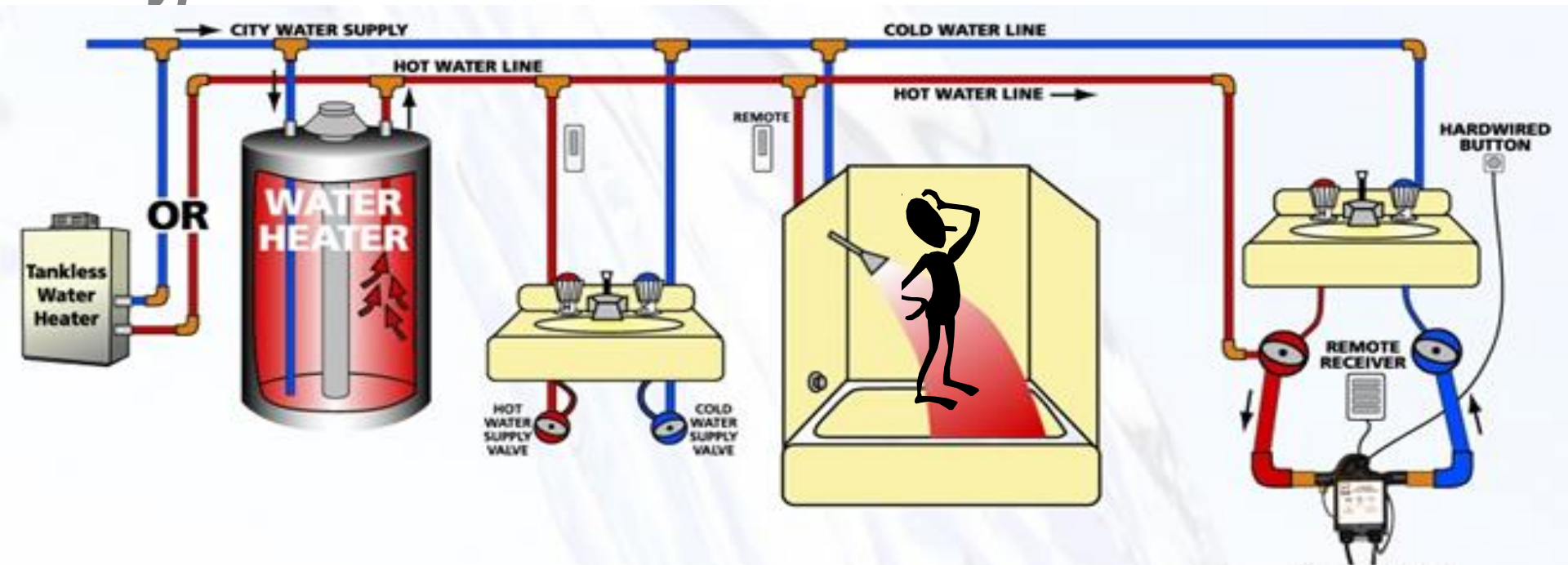
Sphere of influence on Energy Use for Hot Water

- *Water heater*
- *Distribution system – structural waste*
- *Behavioral waste*
- *Type of Fixture*

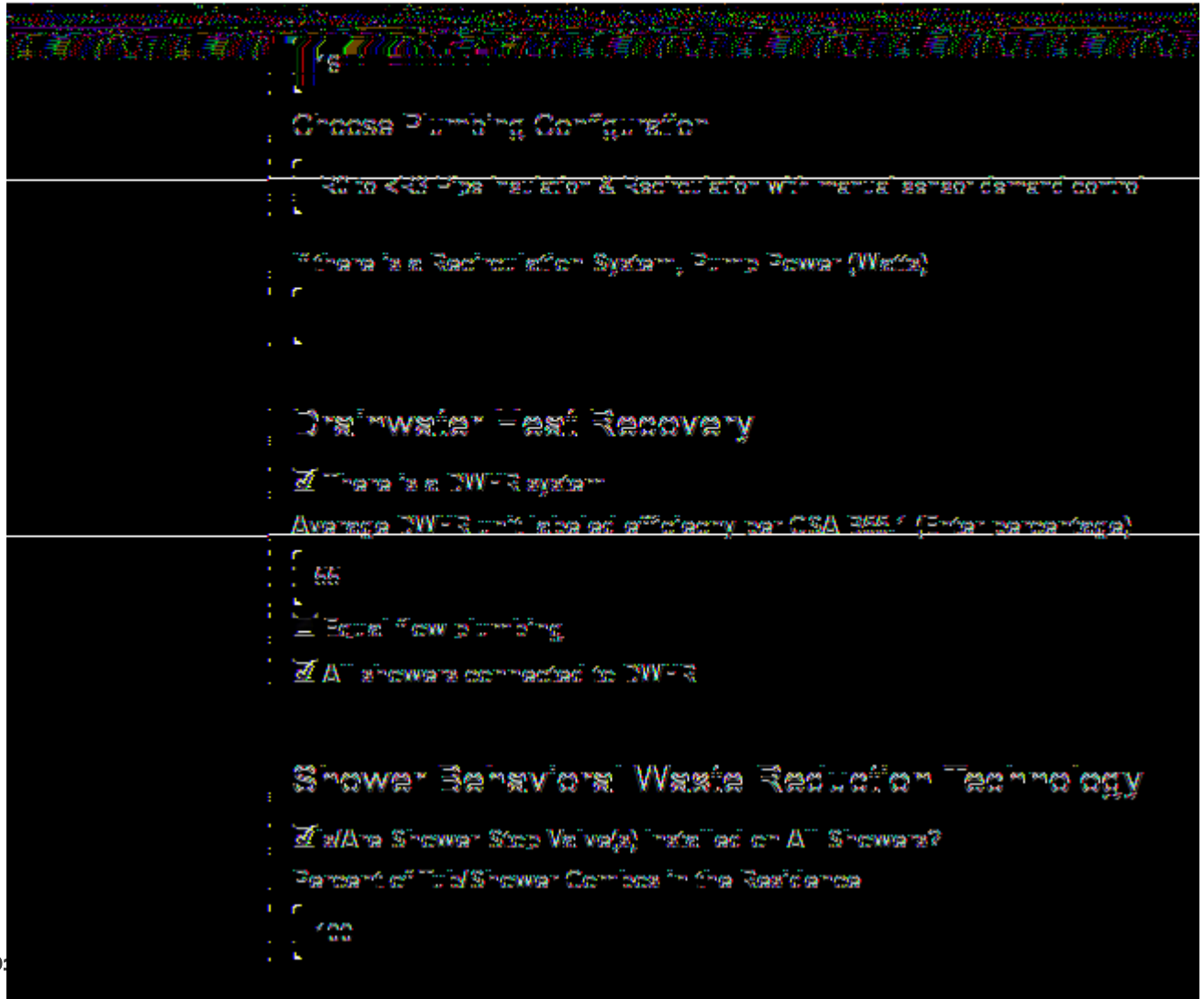




Opportunities for Domestic Water Use Savings

Efficient Hot Water Distirbution

Option 2 - Measured Volume



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The Accounting on Energy Use

- *Water heater*
- *Distribution system – structural waste*
- *Behavioral waste*
- *Type of fixture*
- *Use based on occupancy*
- *Providing additional information for optional water heaters*

4 Bedroom Multifamily home

Configuration	Gallons of Hot Water	kBTU
No Optimization – National	66,656	22,969
Optimization*	50,877	9,273

*On-demand recirculation, DWHR, efficient showers & faucets

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The Sphere of Influence on Volume

- *Distribution system – structural waste*
- *Behavioral waste*
- *Type of fixture*
- *Use based on Occupancy*

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The Accounting of Volume

- *Water volume for single user and use non linear equation for additional persons in residence*
- *Different equations for different building types*

Configuration	1 Bedroom		4 Bedroom	
	Gallons of Water	Assumed Occupancy	Gallons of Water	Assumed Occupancy
Single Family	69,256	2.18	166,647	3.4
Multifamily	55,723	1.94	151,734	2.85
Multifamily- 100% below poverty level	74,135	2.26	214,897	3.4

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Multifamily – National

Proposed/ Actual Residence for all units per type	1 Bed	2 bed	total for project	Improvement over CA baseline	Improvement over National baseline
domestic hot water use (gallons/ year)	186,844.09	277,590.65	464,434.74	20%	23%
domestic hot water use (gallons/ day)	511.90	760.52	1,272.42	20%	75%
total indoor water use (gallons/ year)	544,119.76	808,388.21	1,352,507.97	12%	26%
total indoor water use (gallons/ day)	1,490.74	2,214.76	3,705.50	12%	26%

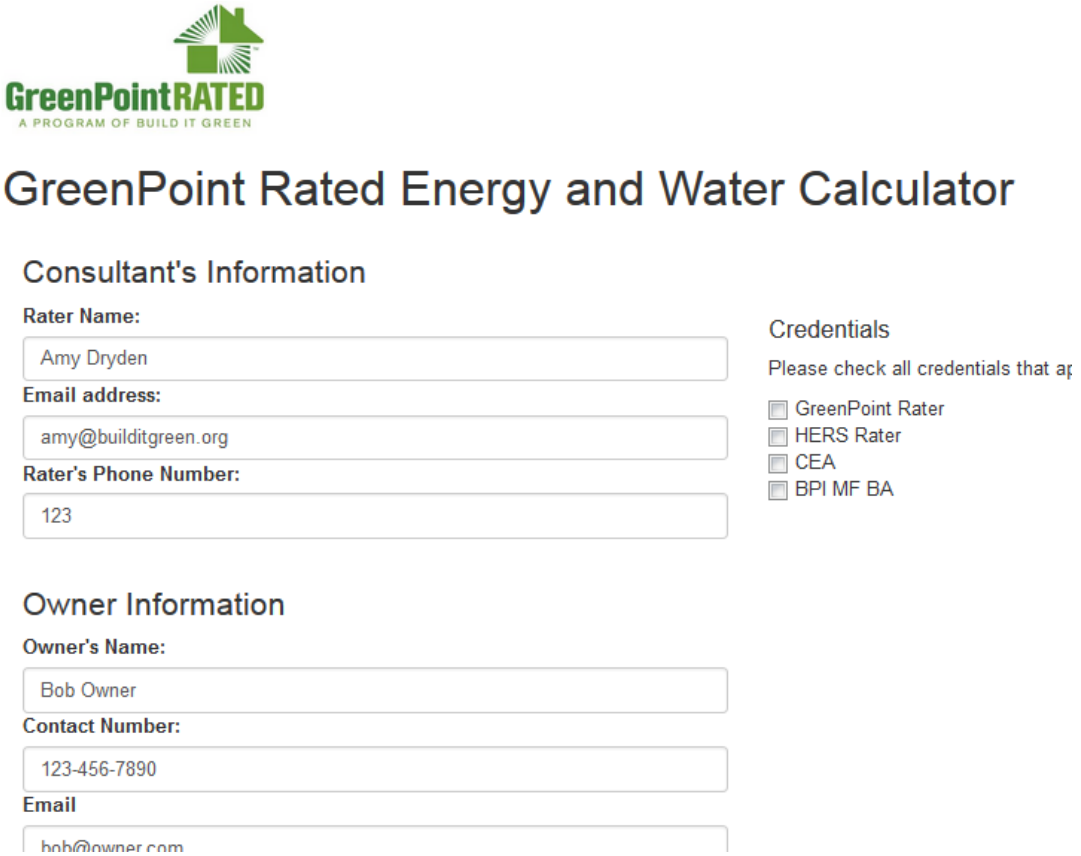
Multifamily – 100% below poverty

Proposed/ Actual Residence for all units per type	1 Bed	2 Bed	total for project	Improvement over CA baseline	Improvement over National baseline
domestic hot water use (gallons/ year)	248,579.37	380,170.86	628,750.23	19%	23%
domestic hot water use (gallons/ day)	681.04	1,041.56	1,722.60	19%	75%
total indoor water use (gallons/ year)	723,902.74	1,107,118.11	1,831,020.86	11%	26%
total indoor water use (gallons/ day)	1,983.30	3,033.20	5,016.50	11%	26%

Monthly Usage	January	February	March	April
Domestic Hot Water	16,840.27	14,982.88	16,556.90	15,428.82

We Are....

- In Alpha and Ugly...but
- Refining inputs and outputs and making it work
- Then put on a pretty face



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Next Steps for version 2

- Recirculation loop with central domestic hot water
- Correctly recognizing HPWH
- Drainwater Heat Recovery out of Energy Ratio and calculate directly based upon research soon to be available
- Hourly use

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Thank you!

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