

June 4, 2024

Simple Solutions for Complex Problems: Light Commercial HPWH

NEEA PRODUCT COUNCIL



Agenda

- Northwest Water Heating Market Characterization
- Commercial Market Solutions
- Commercial Market Barriers and Opportunities



Learning Objectives

- Learn about the opportunities for residential-style and commercial HPWH up to 120 gallons in light commercial applications
- Understand how building characteristics, hot water use patterns, and existing water heater systems inform which HPWH system is the right fit for a commercial building
- Discuss the barriers and opportunities to HPWH in the light commercial applications



Northwest Water Heating Market Characterization

Improve understanding of the
opportunities and gaps in residential,
commercial and industrial market

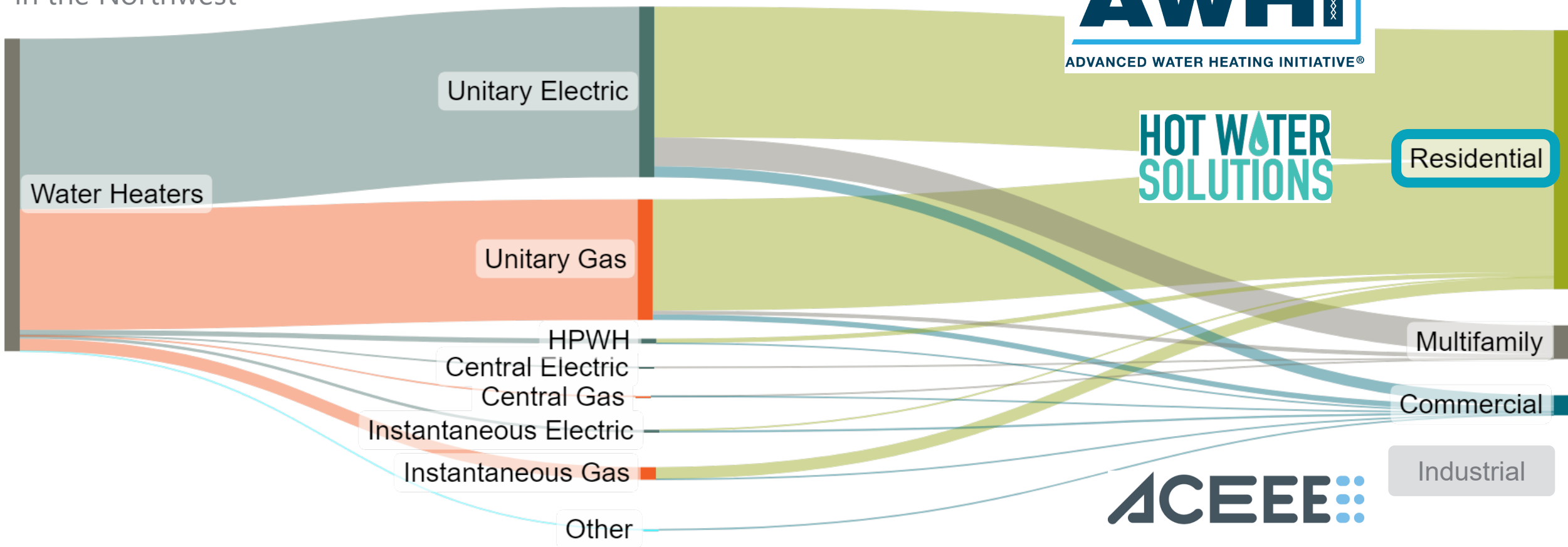
The largest quantity of water heaters in the market are in single family homes.

Number of water heater units in the Northwest

Equipment Type

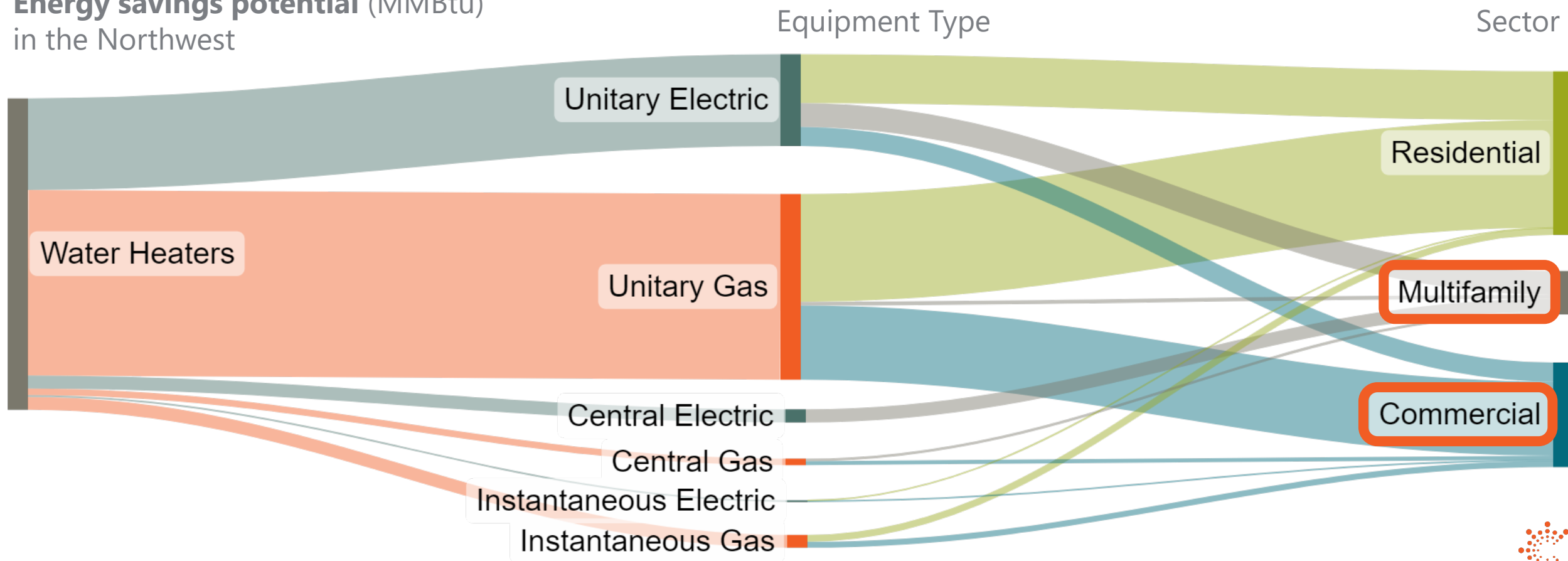


Sector



But multifamily and commercial spaces have a significant portion of the total potential energy savings.

Energy savings potential (MMBtu)
in the Northwest



Commercial HPWH Terminology

Split System

Residential (Consumer)



Integrated

Commercial



Light commercial HPWH

is either a residential-style water heater less than 120 gallons used in commercial applications or an integrated (or unitary) 120-gallon commercial water heater.

Commercial Split System ("Central HPWH" or "Built-Up")

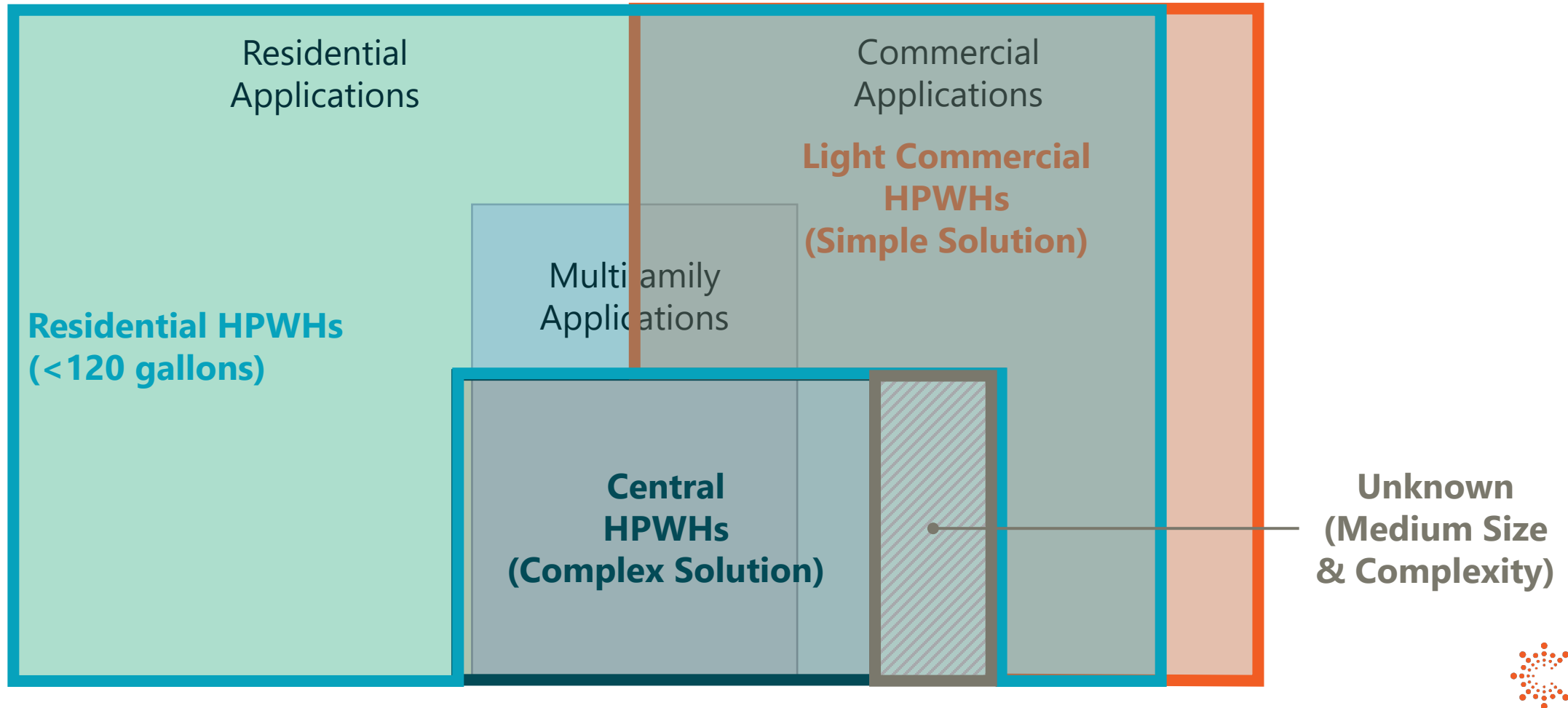


Central HPWH

describes a commercial split system or built-up system that would typically replace a central domestic hot water boiler or water heater larger than 120 gallons.



Commercial HPWH Terminology is not mutually exclusive



Commercial Market Solutions

Opportunities outside of the multifamily, central
HPWH market

Central HPWHs are an ideal solution for some but not all commercial applications.

Building Type	DHW Loads	Recirculation	Large Capacity	Multiple Tanks	Good Opportunity for Central?
Multifamily (NC)	High	✓	✓	✓	Yes
Lodging	High	✓	✓	✓	Yes
Grocery	High	✗	✓/✗	✗	Better suited for unitary
Restaurants	High	✗	✗	✗	Better suited for unitary
Residential Care	High	✓	✓	✓	Yes
Hospital	Med	✓	✓	✓	Yes, but custom
School	Med	✓	✓/✗	✓	Maybe
Office	Low	✗	✗	✓/✗	No
Retail/Service	Low	✗	✗	✗	No
Warehouse	Low	✗	✗	✗	No

Commercial HPWH Solutions Framework

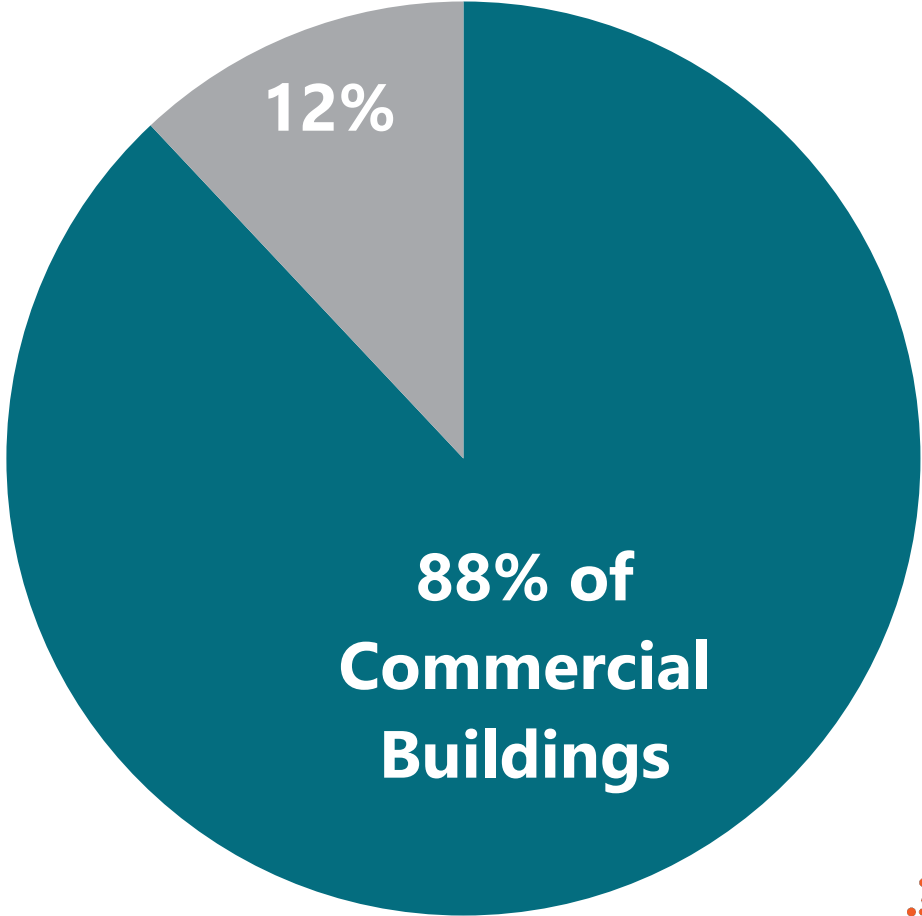
		Smaller/Simpler/Easy	Medium Size & Complexity	Larger/More Complex
Existing Bldg Characteristics	HPWH Solution	Light Comm HPWH	Integrated or less complex Central HPWH	Central HPWH
	Existing WH Size	≤120 gallons ≤12 kW/75 kBtu	<i>A combination of:</i> >120 gallons / >12 kW/75 kBtu	>120 gallons >12 kW/75 kBtu
	# of WH	Single tank	Single tank or multiple tanks	Single tank or multiple tanks
	Plumbing Distribution	No recirc	With or without Recirc	Recirc
	HPWH configurations	Integrated or simple split system* <small>*WH + Storage sized together</small>	Integrated or simple split system Could include a swing tank, larger storage tank	Split system, with or without swing tank, single or multi-pass
	HPWH Design	Doesn't require design/plumber	Could include some design	Are always designed systems
	Target Building Types	Offices, retail, warehouse, schools, restaurant, grocery	Not building-type specific	Multifamily, lodging, residential care, hospitals
Target Markets	Savings Opportunities	Medium hot water users, but <i>many</i> buildings	High hot water users but less complex systems	High hot water users

Recommendation: Pursue low-hanging light commercial HPWH opportunities

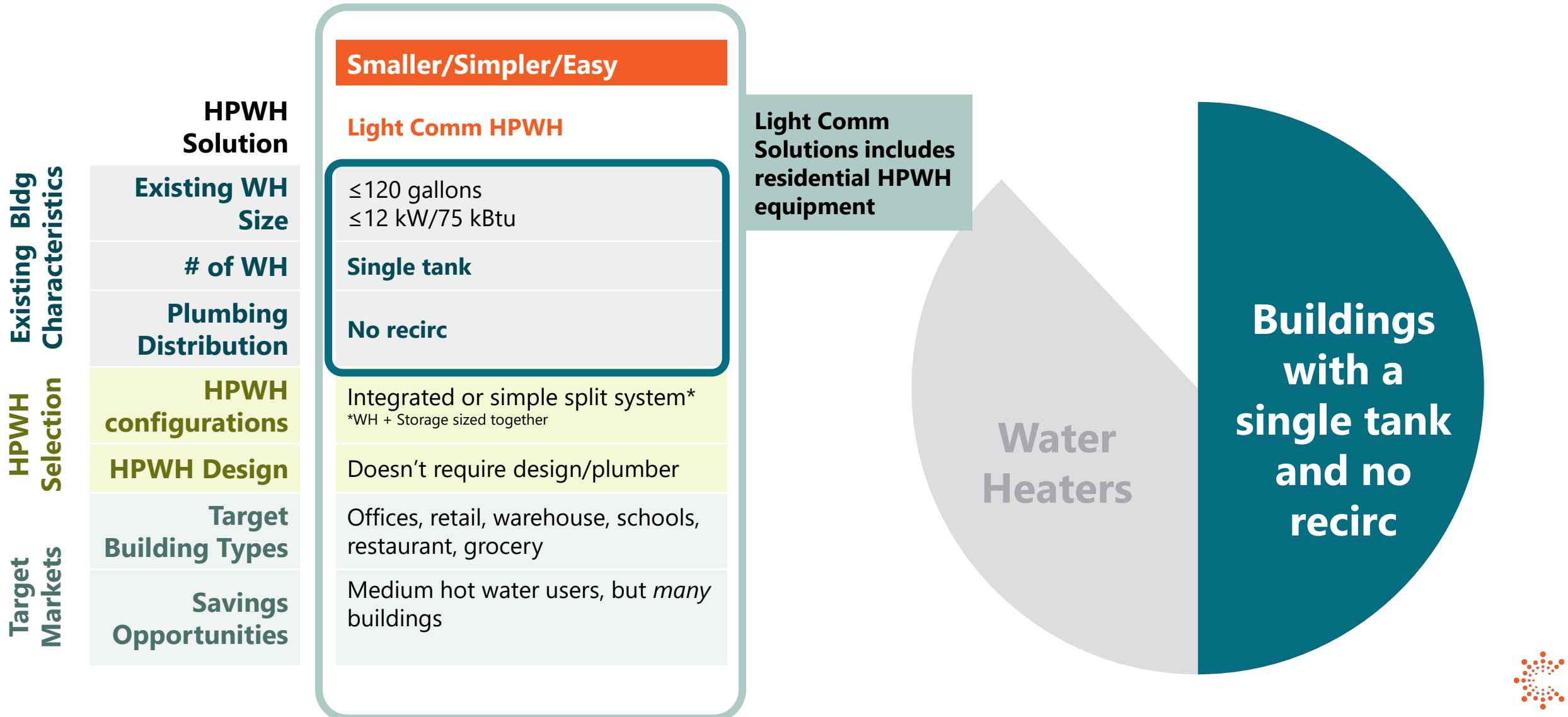
		Smaller/Simpler/Easy	Medium Size & Complexity	Larger/More Complex
Existing Bldg Characteristics	HPWH Solution			
	Existing WH Size	≤120 gallons ≤12 kW/75 kBtu		> 120 gallons > 12 kW/75 kBtu
	# of WH	Single tank	Single tank or multiple tanks	Single tank or multiple tanks
	Plumbing Distribution	No recirc	With or without Recirc	Recirc
	HPWH configurations	Integrated or simple split system* <small>*WH + Storage sized together</small>	Integrated or simple split system Could include a swing tank, larger storage tank	Split system, with or without swing tank, single or multi-pass
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	Savings Opportunities	Medium hot water users, but <i>many</i> buildings	High hot water users but less complex systems	High hot water users

88% of existing commercial buildings have a heated tank that is ≤ 120 gallons and ≤ 12 kW or ≤ 75 kBtu

Smaller/Simpler/Easy	
Light Comm HPWH	
Existing Bldg Characteristics	HPWH Solution
	Existing WH Size
	# of WH
	Plumbing Distribution
	HPWH configurations
	HPWH Design
Target Markets	Target Building Types
	Savings Opportunities
≤ 120 gallons ≤ 12 kW/75 kBtu	
Single tank	
No recirc	
Integrated or simple split system* <small>*WH + Storage sized together</small>	
Doesn't require design/plumber	
Offices, retail, warehouse, schools, restaurant, grocery	
Medium hot water users, but <i>many</i> buildings	



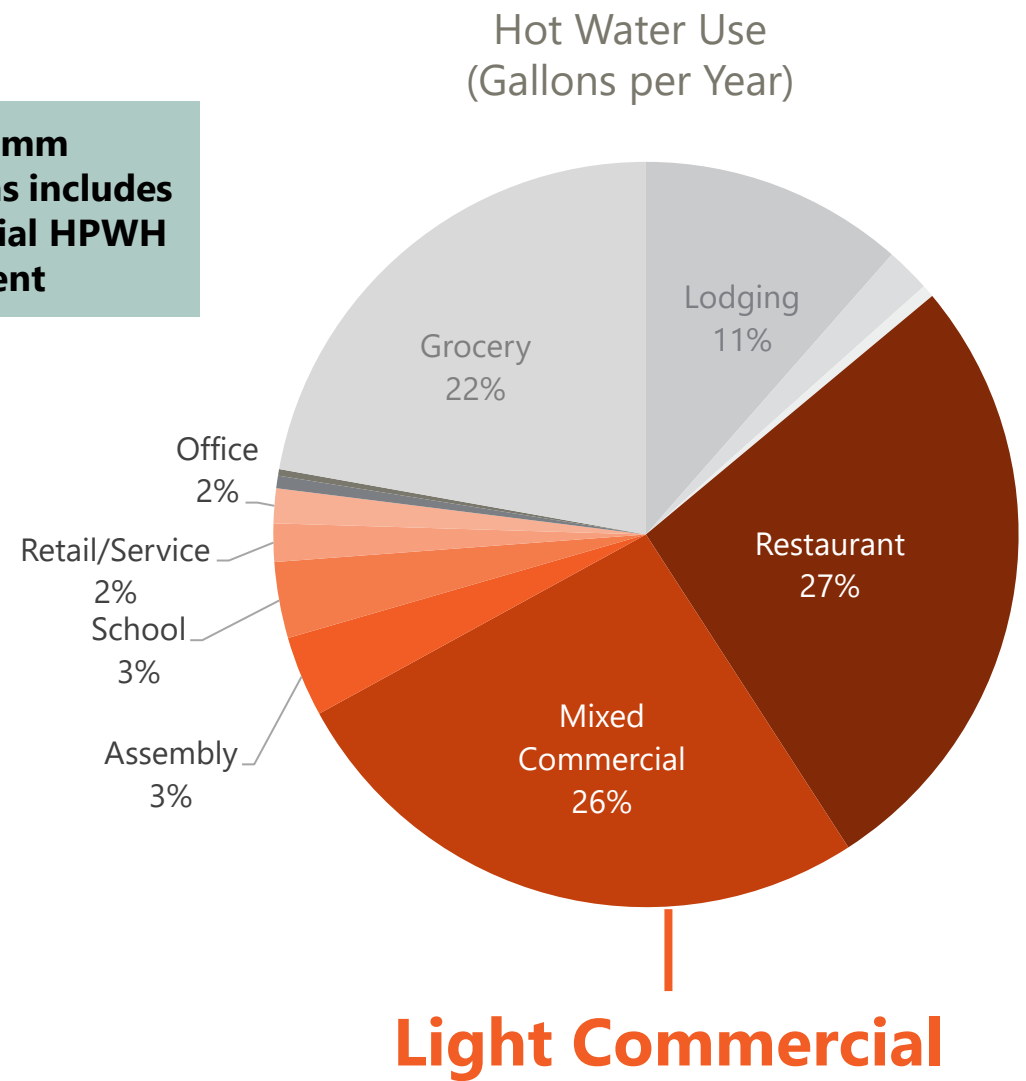
50% of the existing commercial buildings also only have a single tank with no recirculation



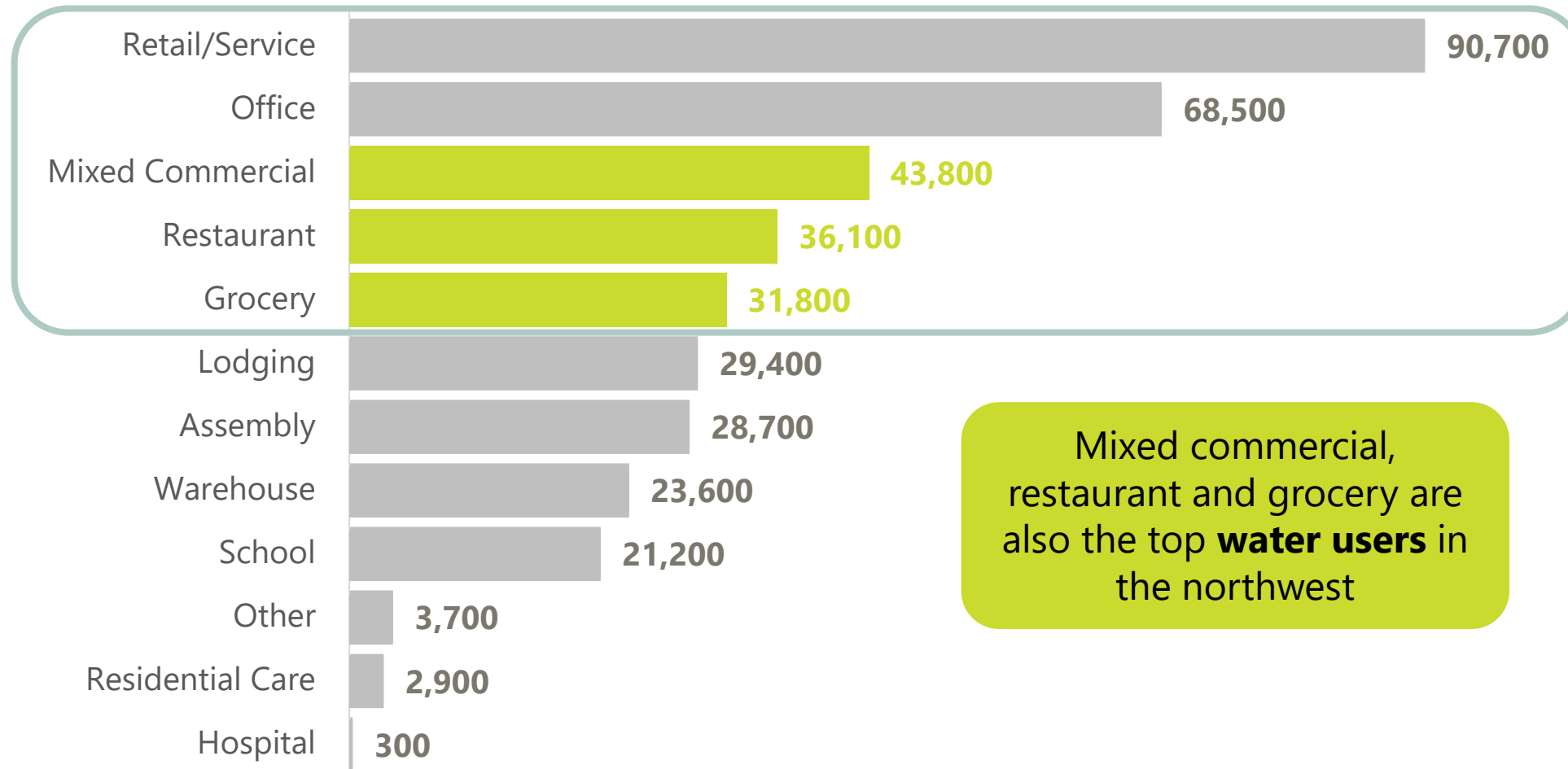
More than 60% of northwest commercial water usage could be met with a simple light commercial HPWH solutions

Target Markets	HPWH Selection	Existing Bldg Characteristics	HPWH Solution	
			Existing WH Size	≤120 gallons ≤12 kW/75 kBtu
			# of WH	Single tank
			Plumbing Distribution	No recirc
			HPWH configurations	Integrated or simple split system* <small>*WH + Storage sized together</small>
			HPWH Design	Doesn't require design/plumber
Target Markets	HPWH Selection	Existing Bldg Characteristics	Target Building Types	Offices, retail, warehouse, schools, restaurant, grocery
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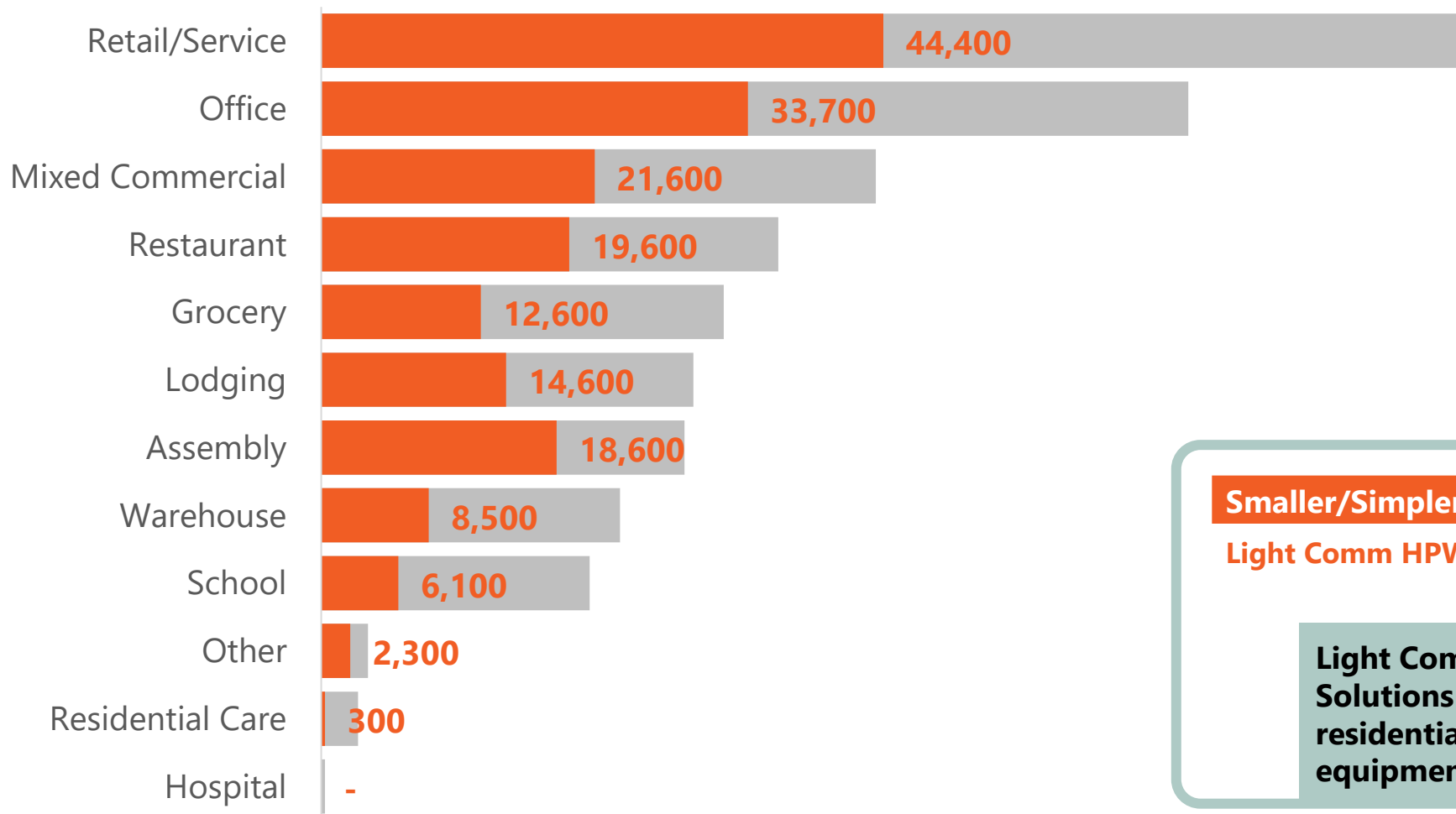
Light Comm Solutions includes residential HPWH equipment



Retail/Service, Office, Mixed Commercial, Restaurant, and Grocery buildings in the northwest have the most water heaters



Retail, Office, Mixed Commercial, Restaurants, and Assembly have the most opportunity for a simple/easy solution



Smaller/Simpler/Easy

Light Comm HPWH

**Light Comm
Solutions includes
residential HPWH
equipment**



Commercial HPWH Barriers

Market barriers and considerations when
selecting, sizing, and installing light
commercial HPWH solutions

Barriers do exist for light commercial HPWH

Barriers include:

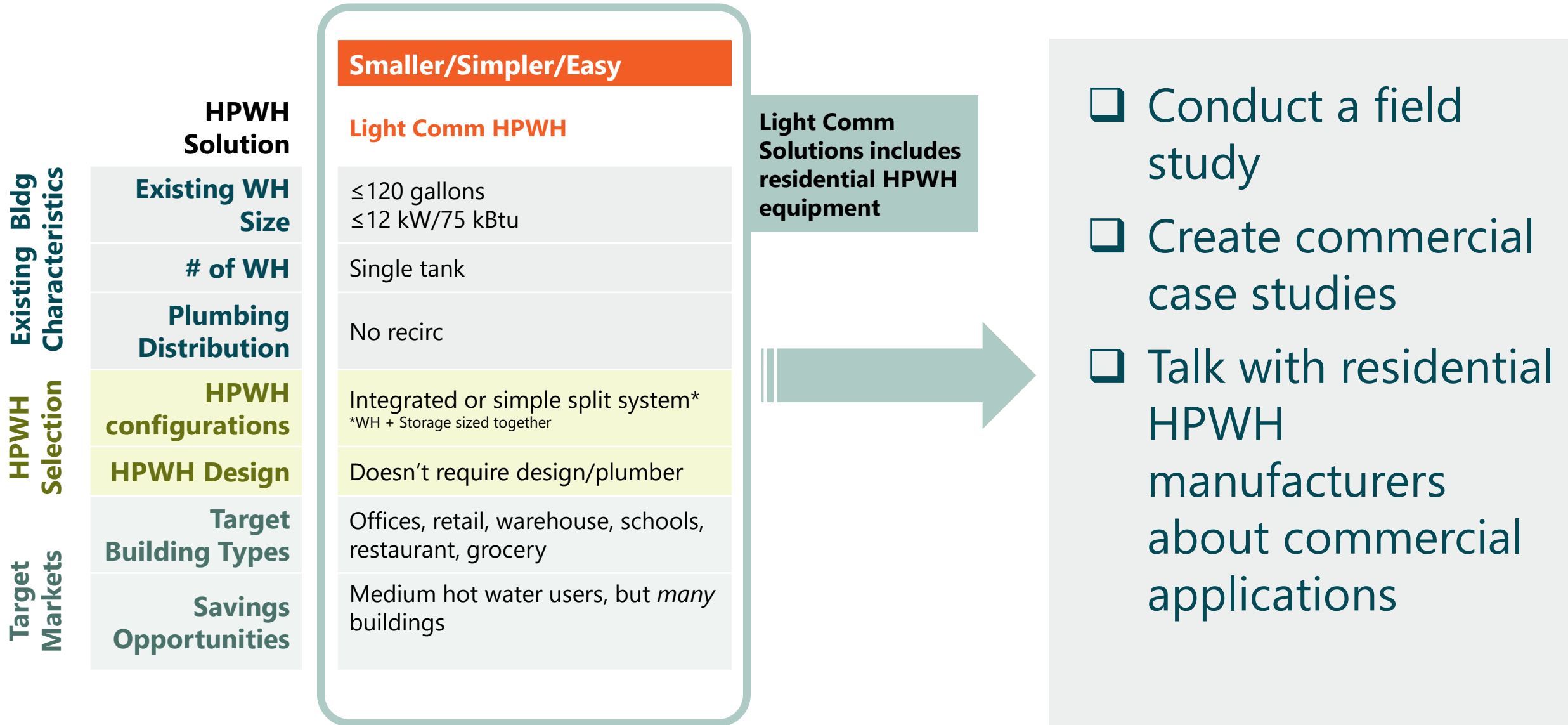
1. Building electrical service
2. Perceived that HPWH can't meet commercial loads
3. Commercial space constraints
4. System selection tools are limited to central HPWH applications
5. Limited installation resources

77% of the water heaters ≤ 120 gallons in existing northwest buildings are electric


Generally existing commercial water heating (and current design practice) is **oversized by 25% to 50%**



Recommendation: Engage with HPWH manufacturers to demonstrate light commercial HPWH performance




Recommendation: Update existing resources to differentiate light commercial HPWH



ENERGY S

Heating & C

- Boilers
- Central Air C
- Commercial
- Furnaces
- Geothermal
- Heat Pumps (Ducted)



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Commercial HPWHs

Central HPWHs for multifamily applications

Commercial HPWH systems are ideally suited for multifamily applications such as apartment buildings, hotels and dormitories. Centrally located systems can provide occupants with high comfort at a low cost while decreasing carbon emissions and improving the living environment.

The Commercial HPWH work group is using a multi-disciplinary approach working with developers, municipalities, design firms and manufacturers to develop plug-and-play “packaged” systems. The approach focuses on three key areas: price, product and customer. Partners have spearheaded development of free tools like the [Ecosizer](#) for sizing central water heating systems.

To learn more please visit the [Central Heat Pump Working Group webpage](#).

Connectivity and controls

Optimizing HPWHs potential for building-grid integration

The Connectivity and Controls work group is focused on the communication capability of all types of HPWHs so they can respond to time-of-use rate and demand signals. This will ensure that the technology harmonizes the energy supply side load and carbon impact of electricity generation. This work group is working upstream of all HPWHs products to develop, validate, and deliver grid integrated control hardware, software, and protocols.

Light Commercial HPWHs



There is a lot of opportunity for easy/simple water heater replacements with light commercial HPWH solutions

Light commercial HPWH barriers can be addressed. The industry needs to:

1. Demonstrate light commercial HPWH performance
2. Update existing resources to differentiate light commercial HPWH



Questions? Discussion?