



Building the Blueprint

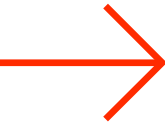
What the 55 Water Street Project Teaches Us About Large-Building Decarbonization

→ Today's Presenters



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Comprehensive Solutions Account Executive, Trane



55 Water Street



→ About 55 Water Street



Owners & management have made a commitment to the community and tenants to reduce the building's impact on the environment, provide resiliency, and create value.

AT A GLANCE

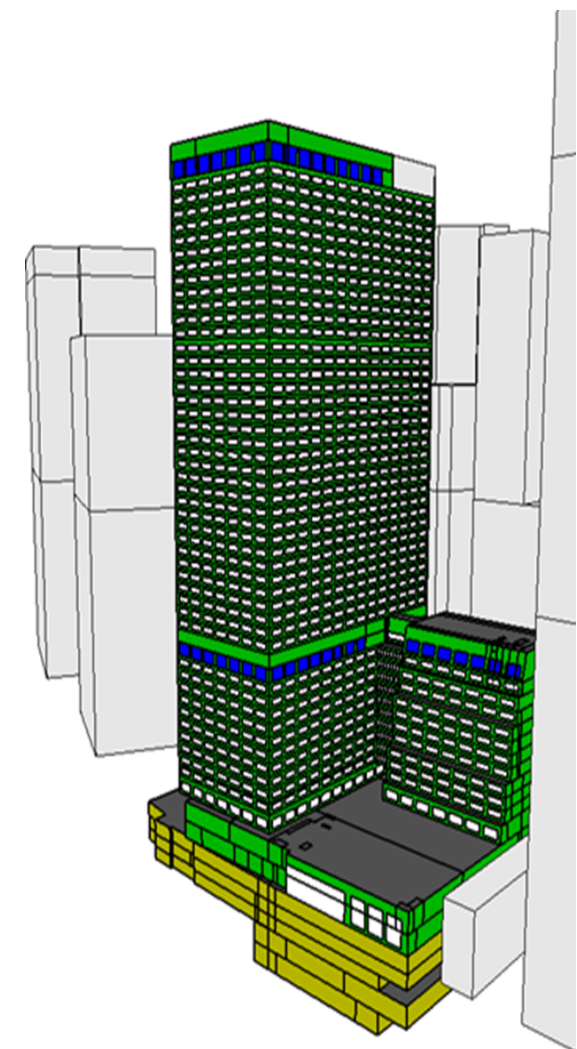
- Purchased in 1993 by the Retirement Systems of Alabama who created a subsidiary to run the building called New Water Street Corporation.
- Built in 1972
- LEED Gold certified
- Largest office building in NYC by floor area
- 3.5M SFT / 53 stories
- 8200 Windows
- 80 Elevators
- 25MW Generators
- 10-15K people/day



→ 55 Water Street Journey (2010-2022)



PROJECT	DESCRIPTION	SAVINGS (MMBTU)	TIMEFRAME
Variable Volume Conv.	Pump/ AHU VFD Installations (7690 HP) w/controls	25,000	2010–2011
Cooling Electrification	Steam turbine to electric centrifugal operation (6500TR)	114,000	2013
Thermal Energy Storage (TES)	17,000 Ton-Hr of ice with 2000 TR ice-making chiller	8,500	2013
Real-Time Energy Mgmt	Electric usage in real-time	12,000	2013
Elevator Modernization	Constant- to variable-speed conversions	18,000	2015–2017
Façade Sealing	Caulking and sealing windows and facades	26,500	2016–2017
GEB Enablement	Tier 4 retrofit w/accelerated switching	850	2018–2019
Steam Management	PRV station DDC controls, resets and monitoring	16,000	2019
Building Energy Modeling (BEM)	Deep carbon study	160,764 (identified)	2019
Lighting Replacement	LED upgrades in BOH areas	2,000	2020
Adv. Building Automation	BMS replacement with advanced algorithms and open integration	30,000 (projected)	2022



→ Electrification Project Drivers



Quantitative Requirements

Return on Investment

- Incentives & Rebates (Federal, State, Local)
- Utility Savings/Energy Star Score Improvement

Local Law 97 Penalty Avoidance

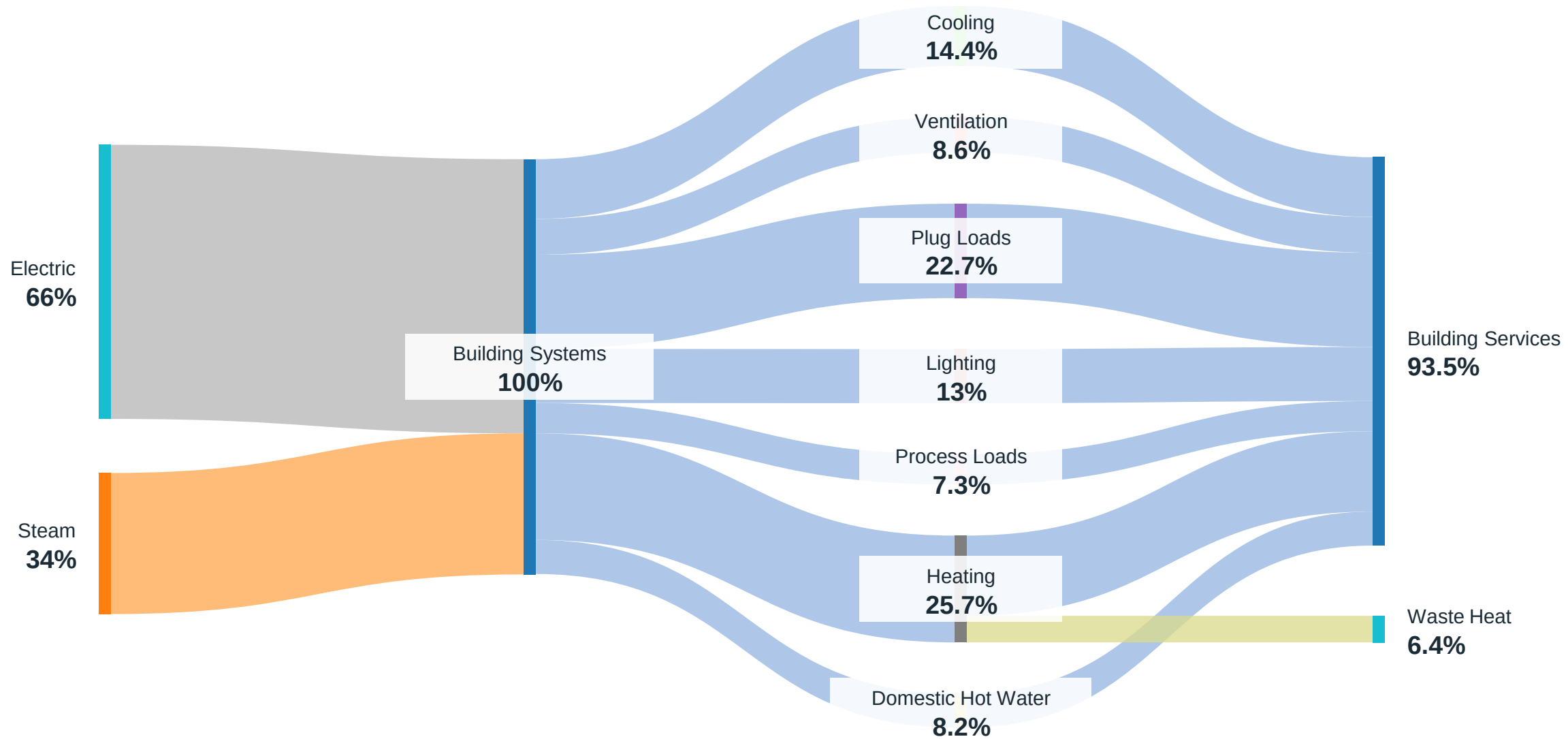
District Steam Cost Avoidance

Maintenance Cost Avoidance

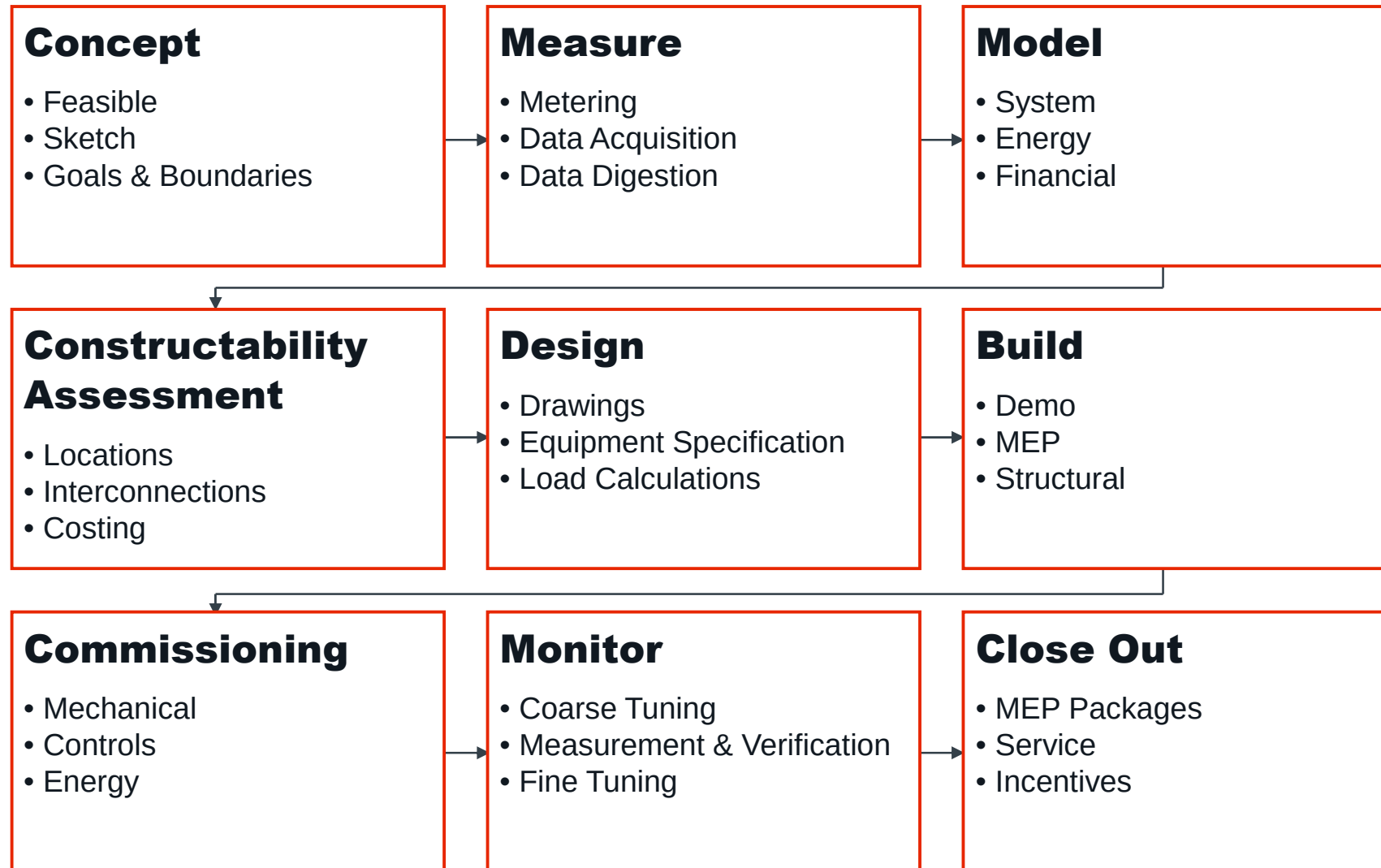
Qualitative Requirements

- Low/Zero GWP Refrigerants
- Reliability
- Flexibility
- System Condition (50+ years old)
- Automation for smooth operation

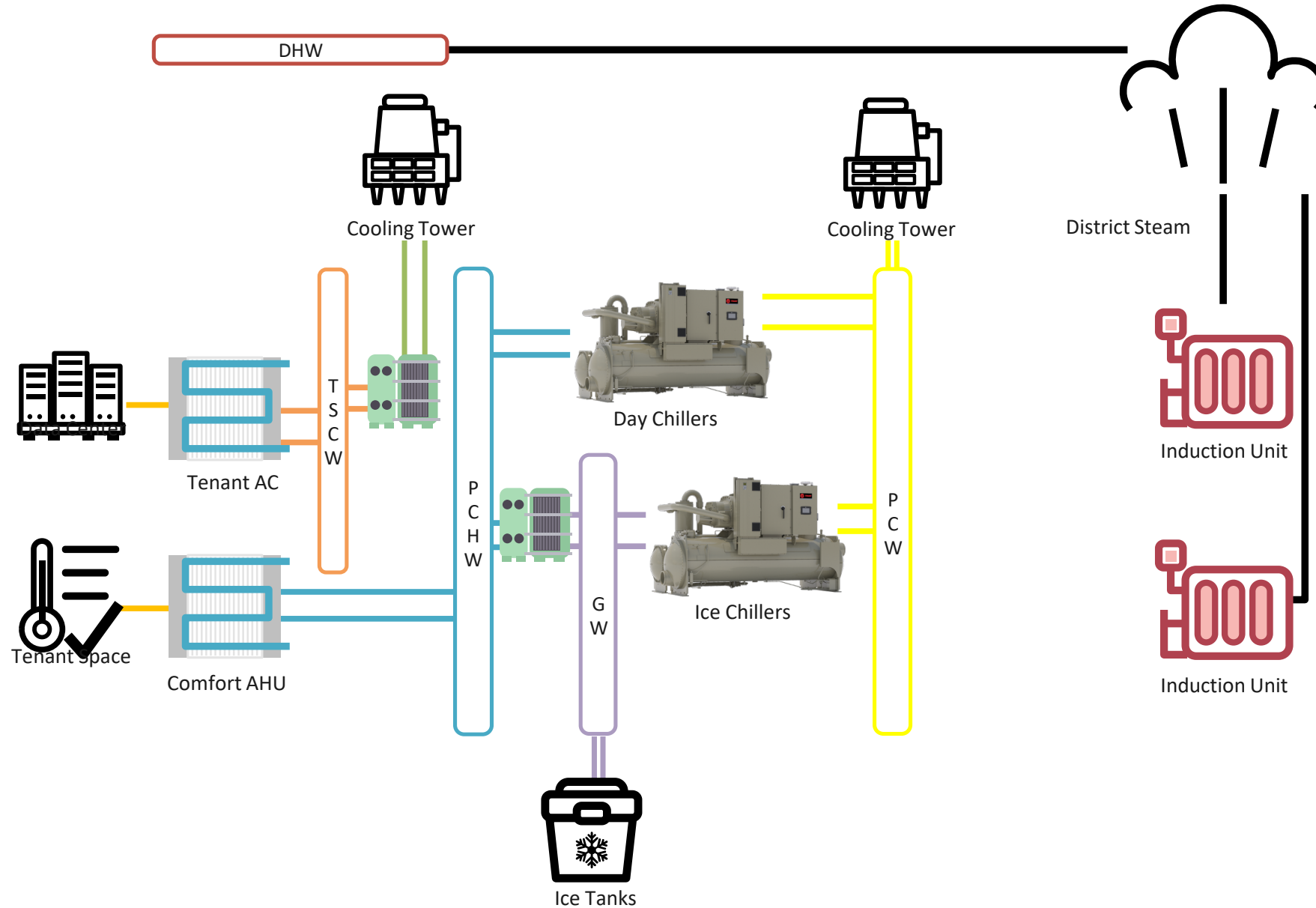
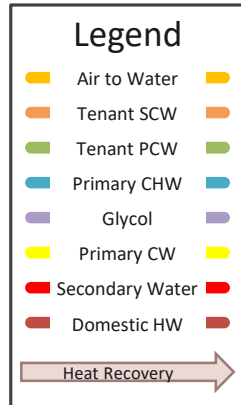
→ 55 Water Street Original Energy Profile



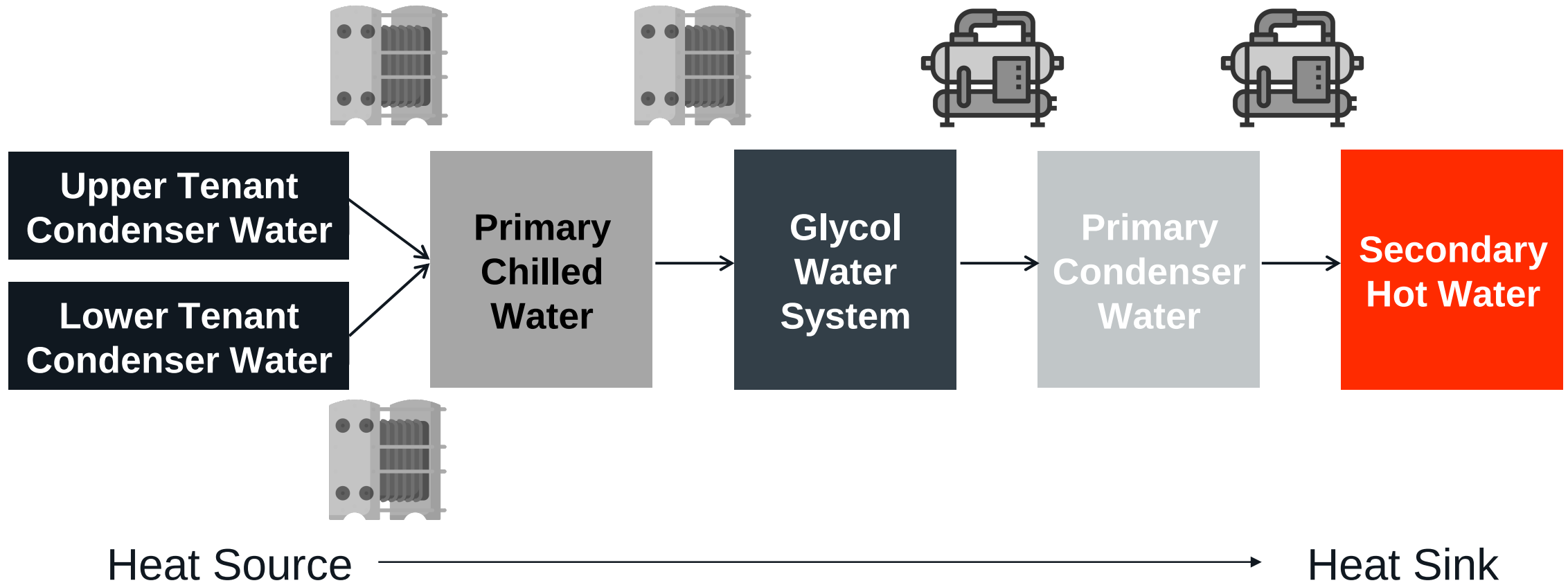
→ Process



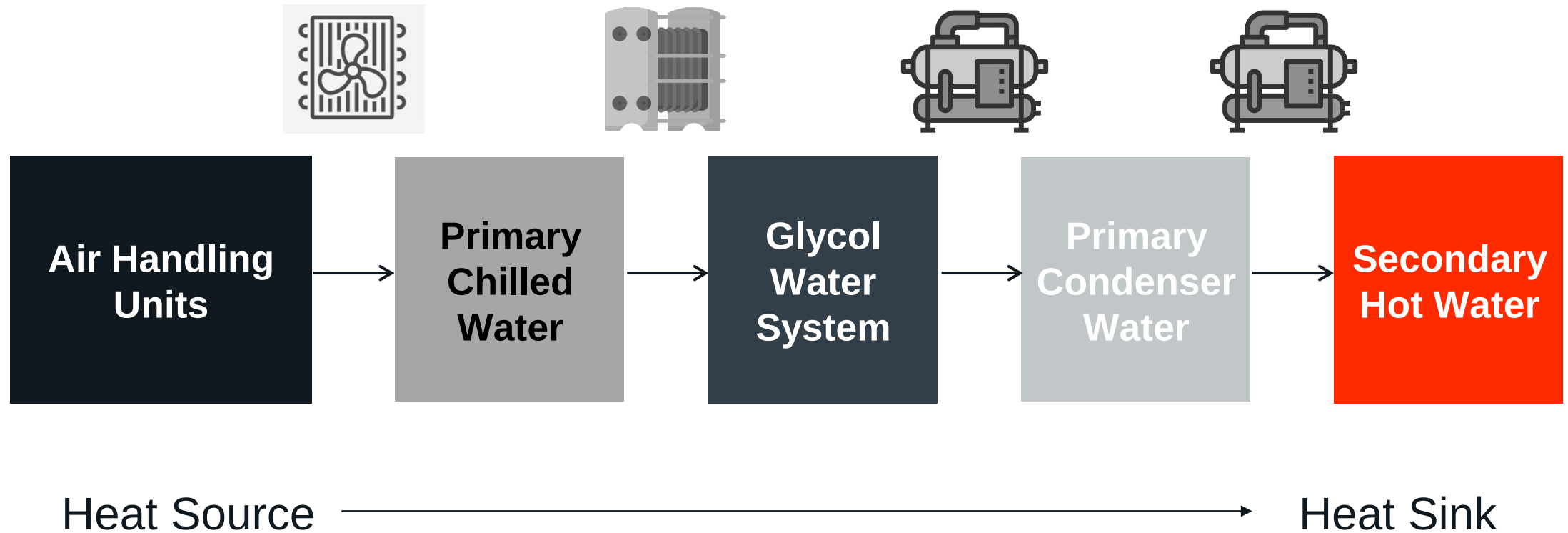
→ Pre-Project Infrastructure



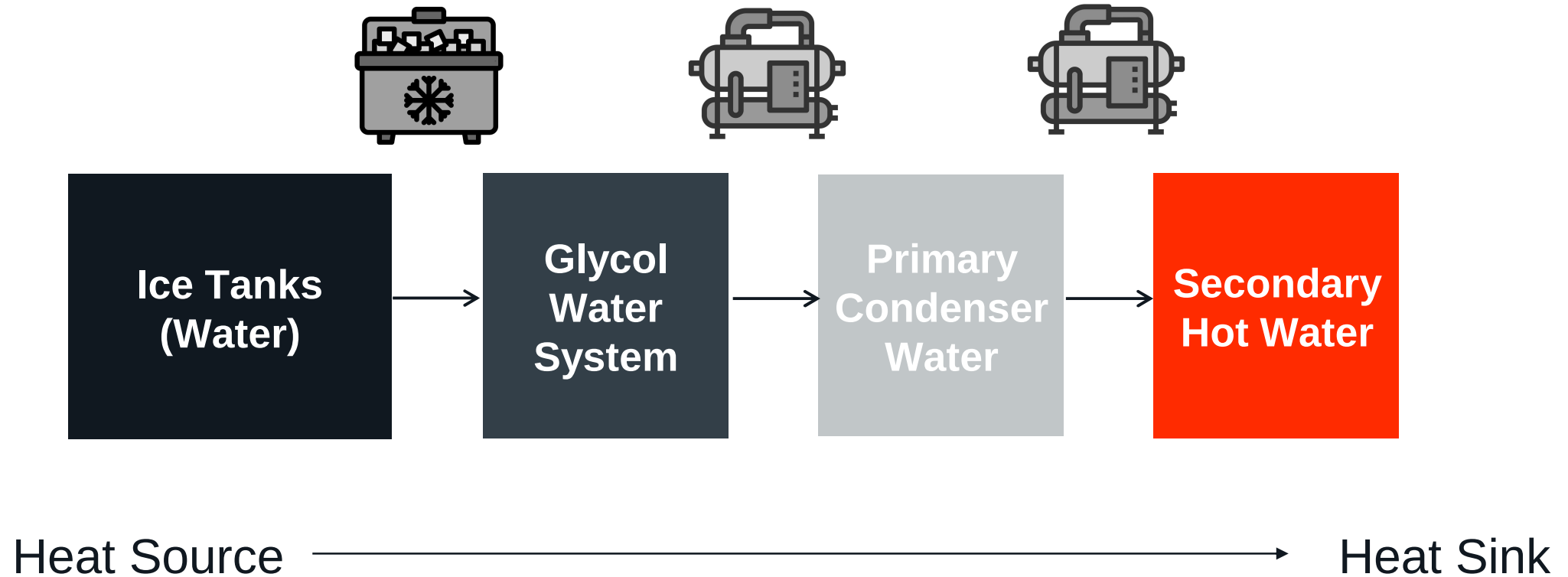
→ Stage 1: Tenant Heat Recover



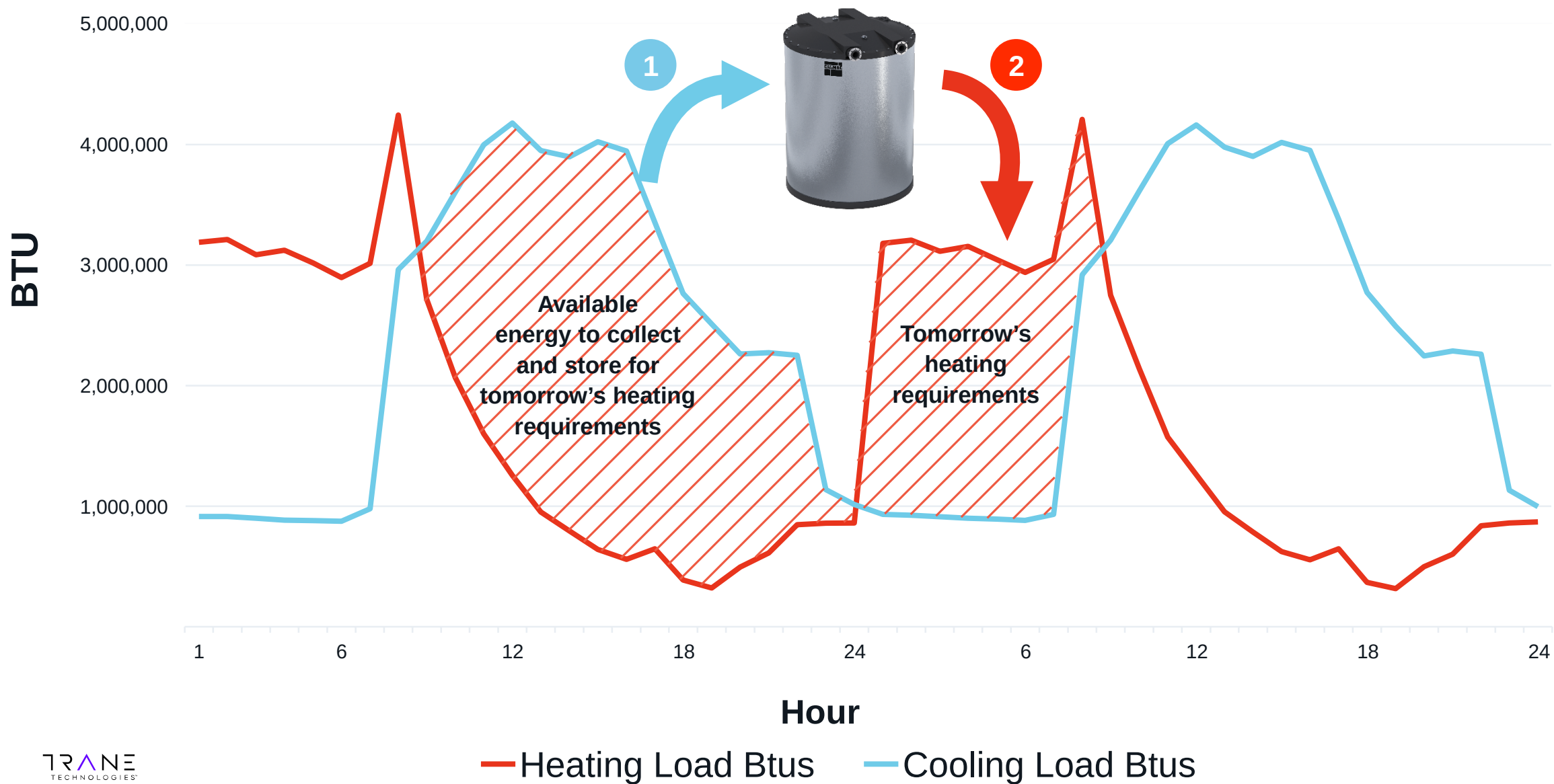
→ Stage 2: Interior Heat Recovery



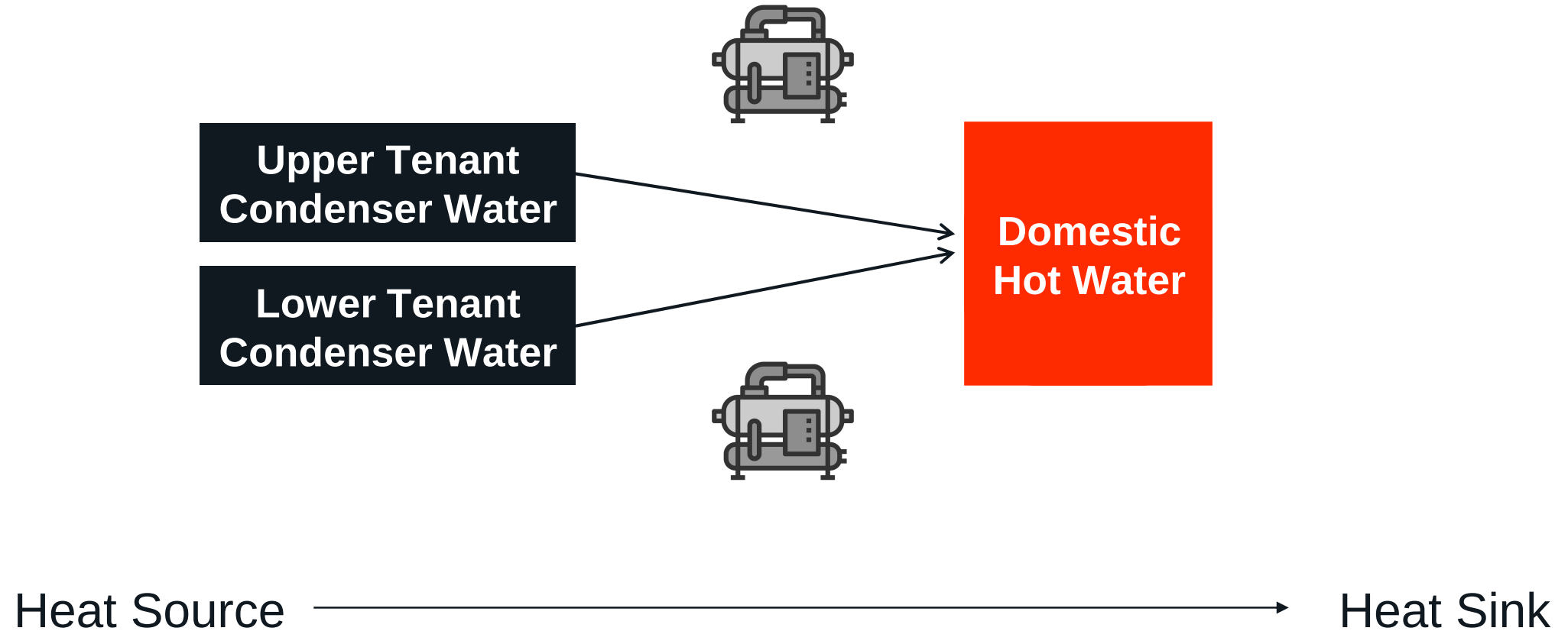
→ Stage 3: Ice Heat Recovery



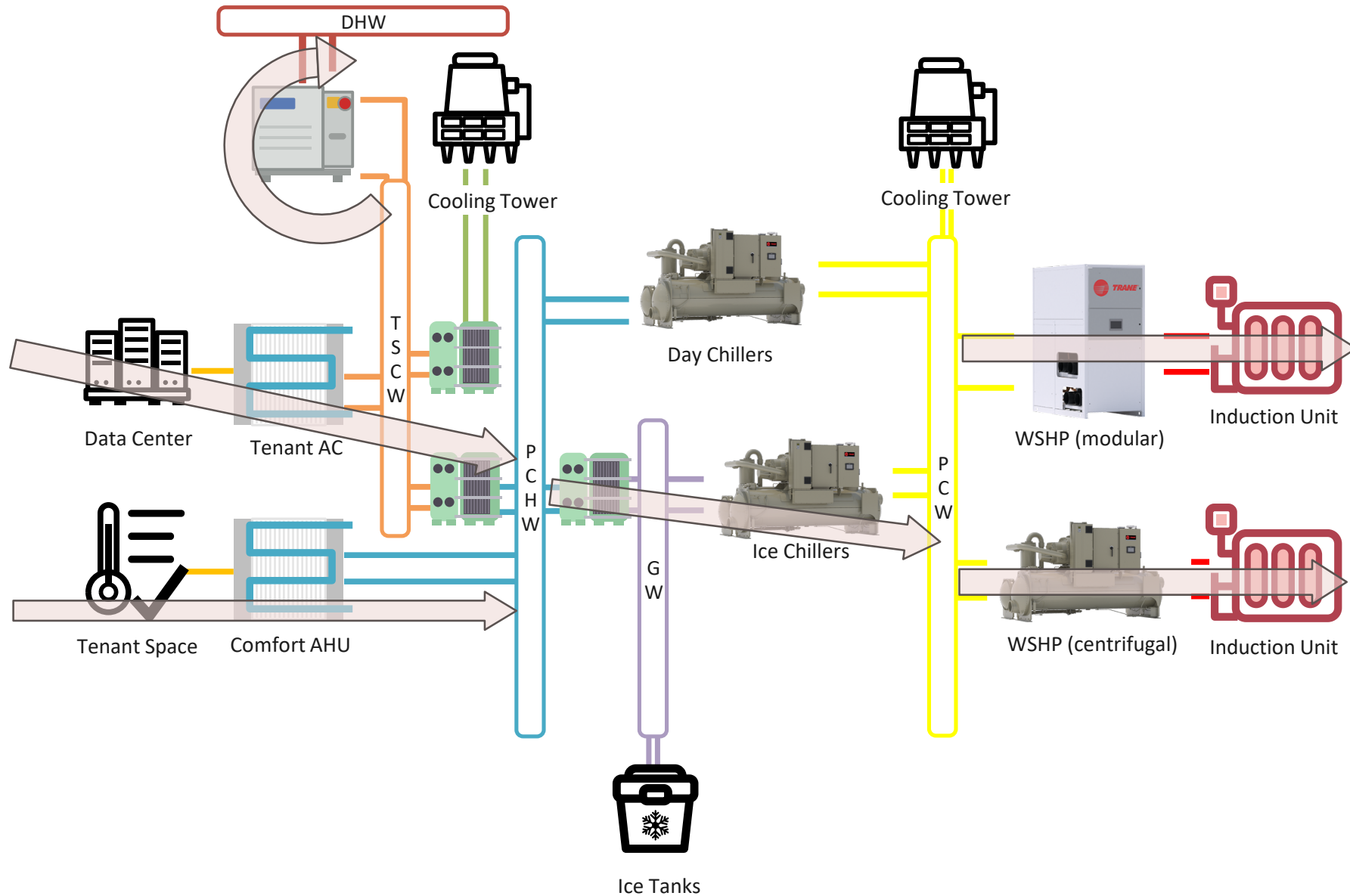
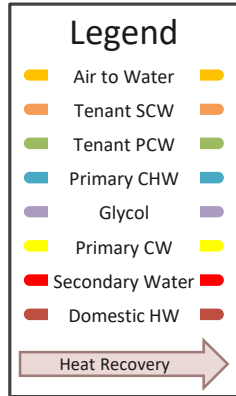
→ Assessment Results



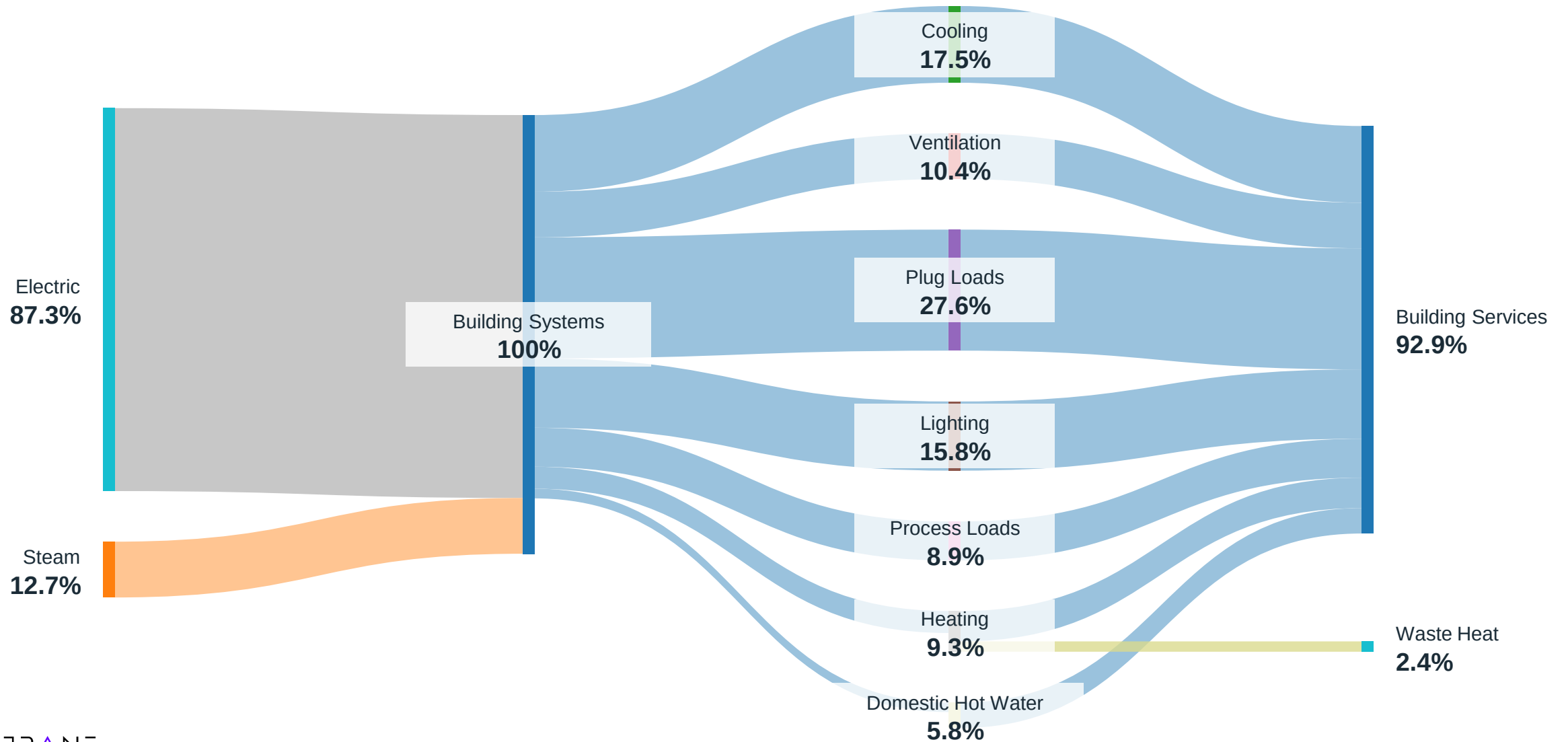
→ All Year: DHW Heat Recovery



→ Post-Project Infrastructure



→ Post-Project Energy Profile





AGGRESSIVE TIMELINE

12 Month Start to Finish



December 30, 2023:

Project commences

February 2024:

Demolition completed at night

March 2024:

Working two shifts/day. Loud and hot after-hours work.

April/May 2024:

Trane Chiller Equipment Delivery

May/June 2024:

Electrical/Mechanical install ramps up

June 2024:

Trane centrifugal chiller-heaters delivered to the site.
Requires a partial shutdown of Water Street over a weekend.

July 2024:

Modular chiller-heaters delivered through building elevators.

Ongoing:

Plumbing, controls, electrical and mechanical installation continues

December 30, 2024:

Project substantially complete

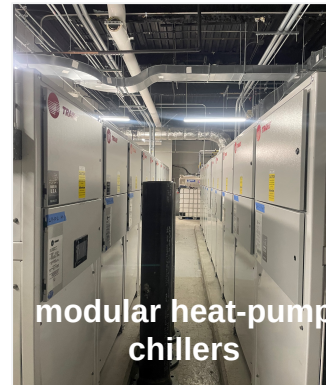
Rigging in the Trane
Centrifugal Heat Pump Chiller



Demolition



Centrifugal heat-
pump chiller



modular heat-pump
chillers

Challenges

Occupied Building: Most work on 2nd Shift

Tenant Shutdowns: Throughout Project

Ensure **minimal impact** to ongoing building operations

→ Demo: 14th Floor South



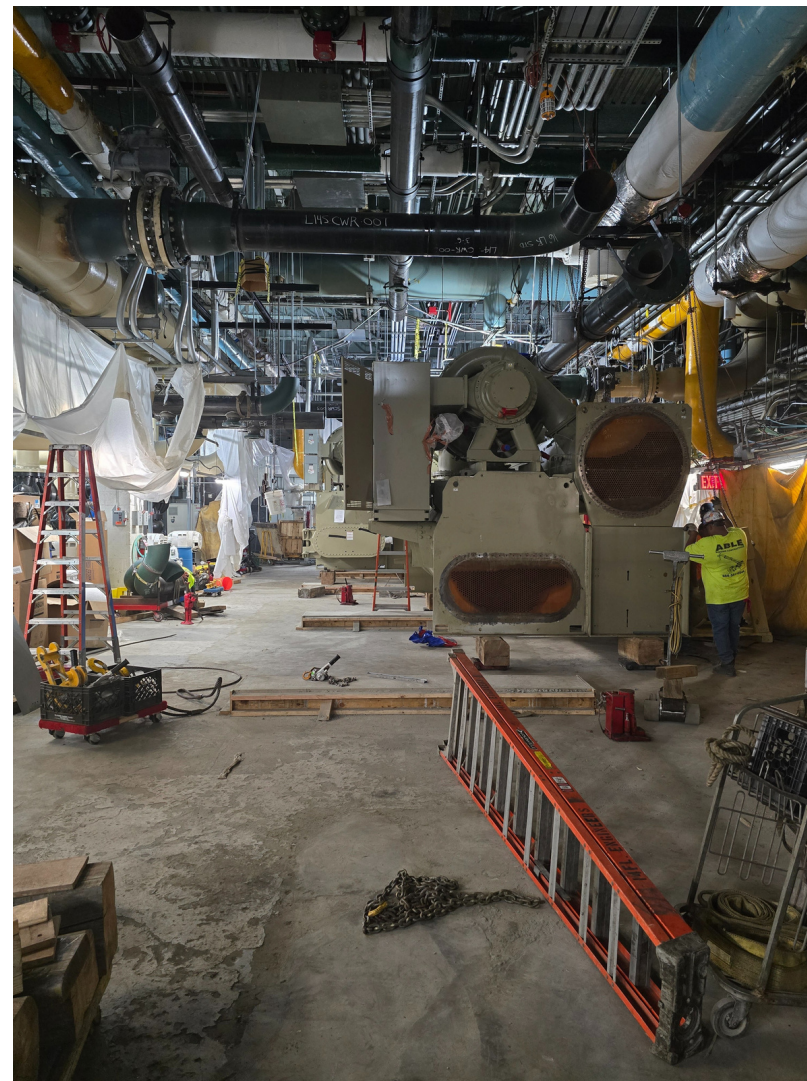
→ Demo: 14th Floor South



→ Demo: 52nd Floor South



→ Build: 14th Floor South



→ Build: 52nd Floor



→ Build: 52nd Floor





→ Results

→ Performance



	Metric	Units	Raw 2023	Weather Norm. 2023	Electrification & Heat Recovery
DD	Weather Conditions	HDD	3,376.75	3,941.89	
	Weather Conditions	CDD	1,400.80	1,644.48	
Existing Heating	Domestic Hot Water Steam Heating Total	MMBTU	16,026.71	16,026.71	9,224.19
	Secondary Water Steam Heating Total	MMBTU	22,561.51	26,337.41	960.66
	Reheat Water Steam Heating Total	MMBTU	3,207.50	3,744.31	
	Reheat Water Steam Heating Total	MMBTU	2,074.52	2,421.71	
	Other (Preheat Coils) Steam Heating Total	MMBTU	13,467.68	17,564.59	3,985.01
New Heating	Ice Chiller Heating Total	kWh	0.00	0.00	168,408.53
	WSHP Electric Heating Total	kWh	0.00	0.00	1,507,924.55
	HPWH Electric Heating Total	kWh	0.00	0.00	1,249,597.75
	Supporting Equipment (Add'l Pumping) Electric Total	kWh	0.00	0.00	1,208,365.42
Totals	Steam Heating	MMBTU	57,337.91	66,094.73	20,335.88
	Electric Heating	MMBTU	0.00	0.00	14,106.22
	Energy (including energy waste)	MMBTU	70,578.83	81,357.84	39,138.21
	Energy Saved	MMBTU			42,219.63

→ Measurement & Verification



Month	Steam, Mlb	Steam, Mlb Avg	Steam, Mlb Delta	Steam Savings %	OAT, Avg	HDD	HDD, Avg	HDD, Delta
Jan	4,988.91	13,686.67	(8,697.76)	-63.55%	32.31	1,016.50	910.17	106.33
Feb	3,294.20	12,632.83	(9,338.63)	-73.92%	35.39	829.00	773.00	56.00
Mar	2,362.26	11,675.67	(9,313.41)	-79.77%	48.15	522.50	611.67	(89.17)
Apr	896.40	4,753.83	(3,857.43)	-81.14%	55.53	303.00	340.50	(37.50)
May	65.80	1,884.50	(1,818.70)	-96.51%	63.29	97.00	128.17	(31.17)
Jun	7.87	967.24	(959.37)	-99.19%	74.45	13.00	3.83	9.17
Jul	0.70	976.69	(975.99)	-99.93%	80.38	-	0.33	(0.33)
Aug	0.60	587.94	(587.34)	-99.90%	75.14	0.50	-	0.50
Sep	5.40	713.23	(707.83)	-99.24%	71.22	0.50	23.17	(22.67)
Oct	66.70	1,910.33	(1,843.63)	-96.51%			186.50	(186.50)
Nov	1,068.68	5,667.50	(4,598.82)	-81.14%			500.83	(500.83)
Dec	1,896.44	9,373.33	(7,476.89)	-79.77%			774.83	(774.83)
Total	14,653.97	64,829.76	(50,175.79)	-77.40%		2,782.00	4,253.00	(1,471.00)

Month	Electric, kWh	Electric, kWh Avg	Electric, kWh Delta	Electric Savings %	OAT, Avg	HDD	HDD, Avg	HDD, Delta
Jan	4,276,090.00	4,058,380.50	217,709.50	5.36%	32.31	1,016.50	910.17	106.33
Feb	3,761,592.00	3,747,653.83	13,938.17	0.37%	35.39	829.00	773.00	56.00
Mar	3,764,212.00	3,906,392.17	(142,180.17)	-3.64%	48.15	522.50	611.67	(89.17)
Apr	3,430,444.00	3,649,062.67	(218,618.67)	-5.99%	55.53	303.00	340.50	(37.50)
May	3,212,161.00	3,952,024.00	(739,863.00)	-18.72%	63.29	97.00	128.17	(31.17)
Jun	3,290,563.00	4,127,301.00	(836,738.00)	-20.27%	74.45	13.00	3.83	9.17
Jul	3,864,559.00	4,786,970.33	(922,411.33)	-19.27%	80.38	-	0.33	(0.33)
Aug	3,672,257.00	4,569,442.17	(897,185.17)	-19.63%	75.14	0.50	-	0.50
Sep	2,392,569.00	4,201,535.33	(1,808,966.33)	-43.05%	71.22	0.50	23.17	(22.67)
Oct	4,060,330.10	3,926,629.17	133,700.94	3.40%			186.50	(186.50)
Nov	3,698,743.43	3,537,811.83	160,931.59	4.55%			500.83	(500.83)
Dec	4,116,404.79	3,854,757.50	261,647.29	6.79%			774.83	(774.83)
Total	43,539,925.32	48,317,960.50	(4,778,035.18)	-9.89%		2,782.00	4,253.00	(1,471.00)

Month	Energy, MMBTU	Energy, MMBTU Avg	Energy, MMBTU Delta	Energy Savings %	OAT, Avg	HDD	HDD, Avg	HDD, Delta
Jan	20,546.78	30,189.07	(9,642.30)	-31.94%	32.31	1,016.50	910.17	106.33
Feb	16,767.83	27,870.60	(11,102.77)	-39.84%	35.39	829.00	773.00	56.00
Mar	15,664.03	27,269.36	(11,605.33)	-42.56%	48.15	522.50	611.67	(89.17)
Apr	12,774.98	18,126.68	(5,351.70)	-29.52%	55.53	303.00	340.50	(37.50)
May	11,038.46	15,734.40	(4,695.94)	-29.85%	63.29	97.00	128.17	(31.17)
Jun	11,236.80	15,237.23	(4,000.43)	-26.25%	74.45	13.00	3.83	9.17
Jul	13,186.71	17,499.31	(4,312.60)	-24.64%	80.38	-	0.33	(0.33)
Aug	12,530.46	16,292.94	(3,762.48)	-23.09%	75.14	0.50	-	0.50
Sep	8,169.89	15,187.23	(7,017.34)	-46.21%	71.22	0.50	23.17	(22.67)
Oct	13,933.49	15,678.60	(1,745.11)	-11.13%			186.50	(186.50)
Nov	13,896.12	18,838.01	(4,941.89)	-26.23%			500.83	(500.83)
Dec	16,309.53	24,344.19	(8,034.67)	-33.00%			774.83	(774.83)
Total	166,055.07	242,267.61	(76,212.55)			2,782.00	4,253.00	(1,471.00)

→ Business Case



		Units	Pre-Project	Post-Project	Savings
Electric	Building Usage	kWh	46,333,370	50,467,666	(4,134,296)
	GHG Emissions (2030)	Tonnes	6,719	7,349	(630)
Steam	Building Usage	Mlb	68,140	20,965	47,175
	GHG Emissions (2030)	Tonnes	3,645	907	2,738
Total	Energy	MMBTU	239,447	197,228	42,220
	GHG Emissions (2030)	Tonnes	10,364	8,256	2,108
	LL97 Penalty Avoidance	\$/Year	145,622	-	145,622

→ Business Case



	Units	Value
Utility Savings	\$/Year	2,099,625
ROI	Years	5.9
LL97 Cost Avoidance	\$/Year	145,622
ROI w/LL97 Avoidance	Years	5.6

Leveraged: NYSERDA, Con Ed , and Inflation Reduction Act SPB

PAYBACK ON INCREMENTAL SPEND = 2.6 YEARS

→ Building Resiliency and Redundancy

Electrification KPIs



Energy savings
42K MMBTU



Carbon Footprint Offset
2,108 tons of CO₂e



Local Law 97
Compliant



ROI
2.6 Years



Utility Spend Savings
\$2.1 million/year



Reduce Steam
Consumption by 70%

→ Questions?



Corey Letcher

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