RMHC® Dayton

GBBN

CMTA
A LEGENCE Company

Ronald McDonald House Dayton

REBUILD | 10/3/2024

1. Project Introduction
2. Design & Performance
3. Discussion

AGENDA

THOM ANDERSON
PRINCIPAL
CMTA

HUNTER SWOPE
BUILDING SCIENCE ENGINEER
CMTA

TIFFANY BROYLES YOST, AIA
DIRECTOR OF SUSTAINABILITY & RESILIENCE
GBBN

LEARNING OBJECTIVES

- Attendees will be able to explain the benefits and cost savings of implementing an aquifer-connected geothermal HVAC system.
- Attendees will be able to conduct a comprehensive envelope study to identify and address thermal performance and infiltration issues.
- Attendees will be able to analyze strategies to optimize building square footage in conjunction with geothermal systems for overall cost reduction.
- Attendees will be able to summarize insights into the practical application of energy-efficient technologies in a real-world charity organization setting.


PROJECT
INTRODUCTIO
N

RMHC DAYTON

- Home away from home for families traveling to receive medical care for their children
- 14 Rooms, now 350 SF min.

A PLACE THAT RECALLS HOME

Create an image and experience of place that facilitates communal gathering, promotes serendipitous and comforting interaction, and enables reflection.

REDUCE ENERGY CONSUMPTION

Minimize unwanted heat transfer, use efficient systems, and target net zero readiness.

PROMOTE WELLNESS

Enhance each family's experience through access to daylight and views. Provide ease of movement and high-quality healthy air and materials.

EXPANSION FLEXIBILITY

Preserve the ability to expand and capitalize on potential opportunities through flexibility and adaptation.

OPTIMIZE LONG TERM BUDGET

Balance the needs of now with the future to optimize operational spending while providing the greatest value over time.

Motivated RMHC to prioritize sustainability and energy efficiency?


DESIGN &
PERFORMANCE

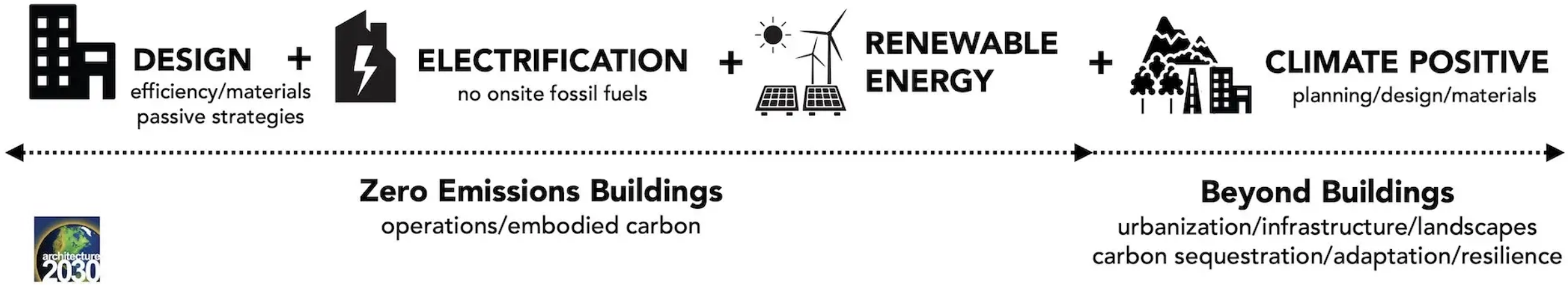
EMPOWERING CONNECTIONS

ENHANCING LIFE-CHANGING CARE

LIFTING THE COMMUNITY

COMFORTABLE, FLEXIBLE, FUTURE READY

- Enhance comfort, reduce stress, promote well-being.
- Start with passive design strategies, be efficient, reduce waste, generate energy.
- Minimize operational and embodied energy while considering cost.
- Include a variety of high-quality indoor and outdoor environments.



LEVEL ONE


SERV ELEV. 76 SF
STAIR 1 237 SF
RECEIVING 470 SF
TRASH 78 SF
TOY CLOSET 86 SF
VOLUNTEER KITCHEN 603 SF
HOUSE PANTRY 287 SF
FAMILY KITCHEN 272 SF
FAMILY PANTRY 168 SF
TOILET 79 SF
ELEV 2 91 SF
ELEV 1 92 SF
UTIL. 60 SF
ELEV LOBBY 229 SF
JAN. 44 SF
MENS 121 SF
WOMENS 164 SF
FRONT DESK 129 SF
MTG ROOM (6) 164 SF
PROGRAM 102 SF
PROGRAM 64 SF
PROGRAM 128 SF
DEVELOPMENT 103 SF
DEVELOPMENT 66 SF
DEVELOPMENT 64 SF
DEVELOPMENT 66 SF
ADMIN 66 SF
ADMIN 113 SF
OPEN OFFICE 882 SF
INTAKE 117 SF
STORAGE 56 SF
BREAK ROOM 122 SF
COMMUNITY 702 SF
VESTIBULE 87 SF
LOBBY 182 SF
UP
LIVING 434 SF
PLAY ROOM 477 SF
ACTIVITY 388 SF
GAMING NOOK 55 SF
DINING (70) 1348 SF

LEVEL TWO AND THREE SIMILAR

- 15 typical rooms (sleeps 4)
- 4 larger rooms (sleeps 6)
- 2 suites
- 21 total rooms per floor on 2 and 3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RONALD MCDONALD HOUSE: SUSTAINABILITY

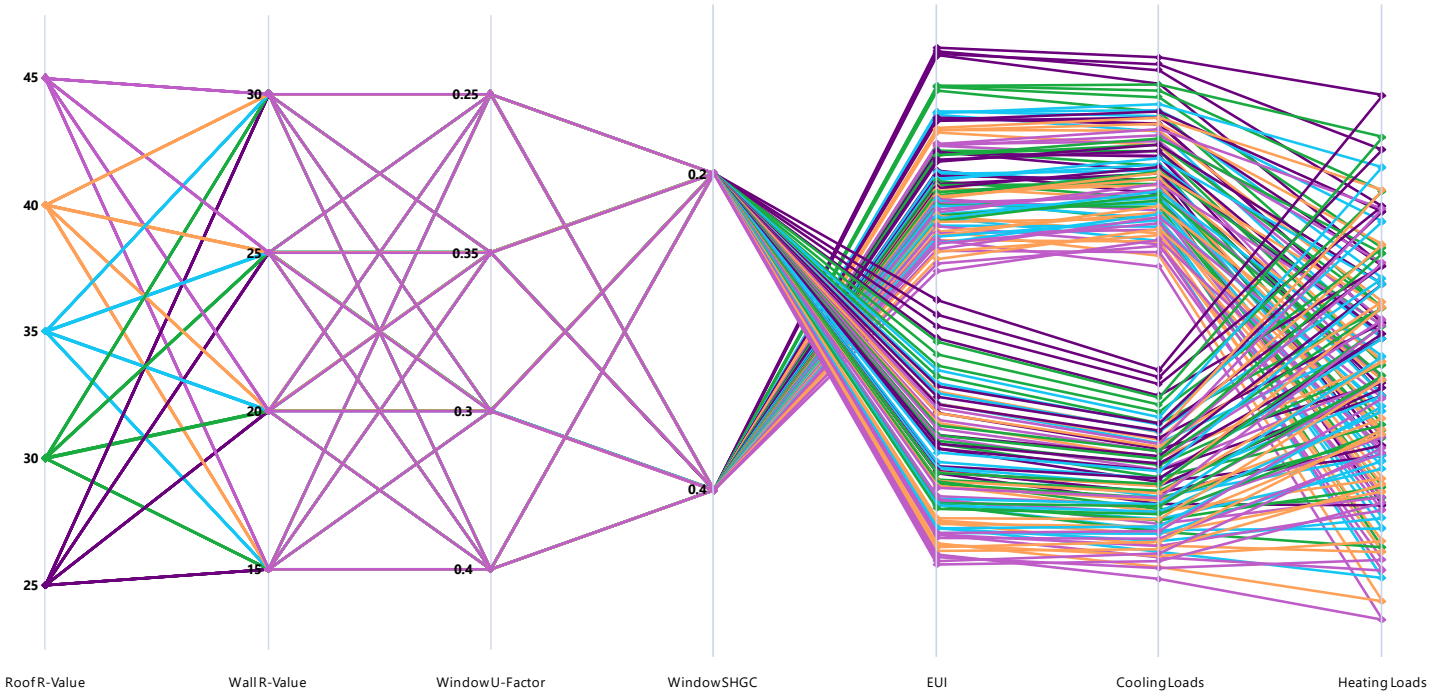
Puebla, Mexico: Features an onsite orchard, stone washing basins, daylight, natural ventilation, and solar thermal water heaters.

Puerto Rico: Solar panels provide renewable energy, with solar thermal installations supplying all heated water.

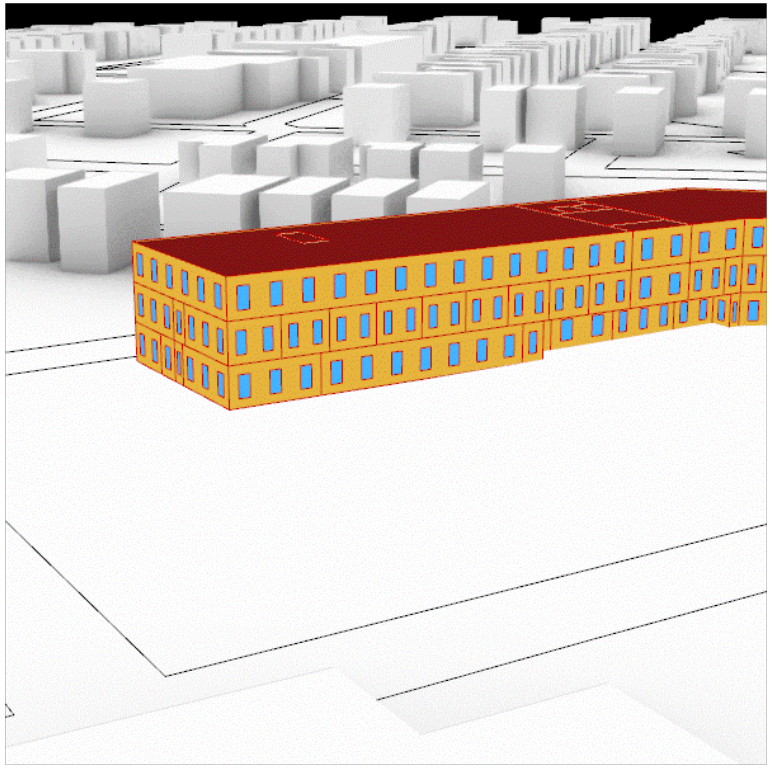
Southampton, UK: Roof gardens with rainwater irrigation and water-efficient fixtures.

Louisville, Kentucky: Repurposed a historical building for expansion, reducing construction waste.

ENVELOPE OPTIMIZATION

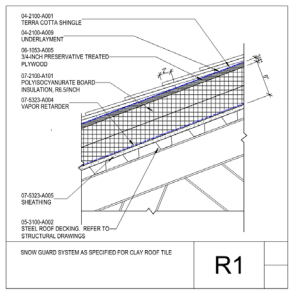


Parallel Coordinates Plot

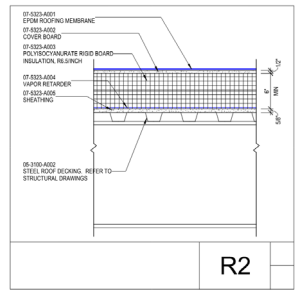


Window to Wall Area Analysis

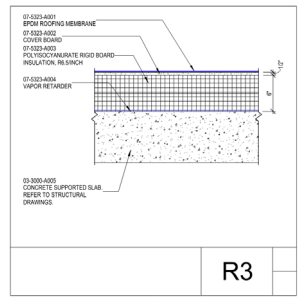
WALL/ROOF SECTIONS



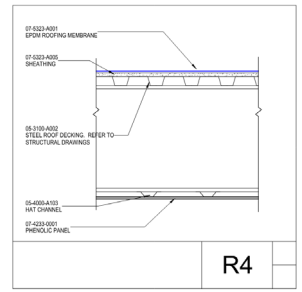
EXTERIOR ROOF TYPE R1



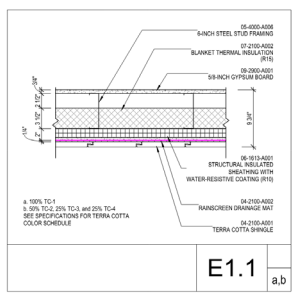
EXTERIOR ROOF TYPE R2



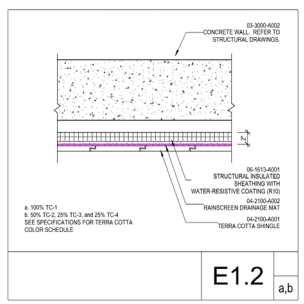
EXTERIOR ROOF TYPE R3



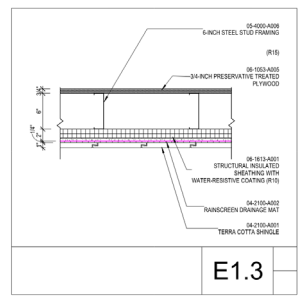
EXTERIOR ROOF TYPE R4



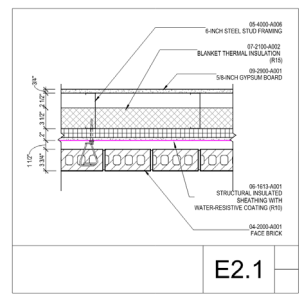
EXTERIOR WALL TYPE E1.1



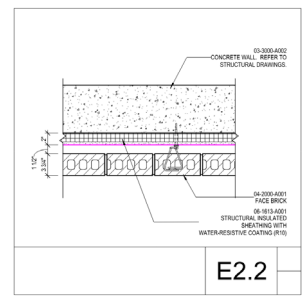
EXTERIOR WALL TYPE E1.2



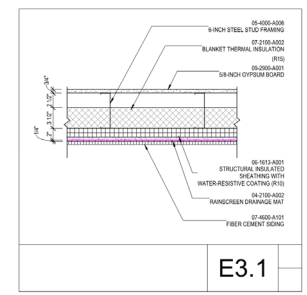
EXTERIOR WALL TYPE E1.3



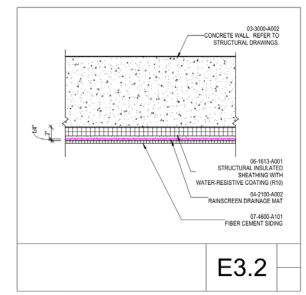
EXTERIOR WALL TYPE E2.1



EXTERIOR WALL TYPE E2.2



EXTERIOR WALL TYPE E3.1

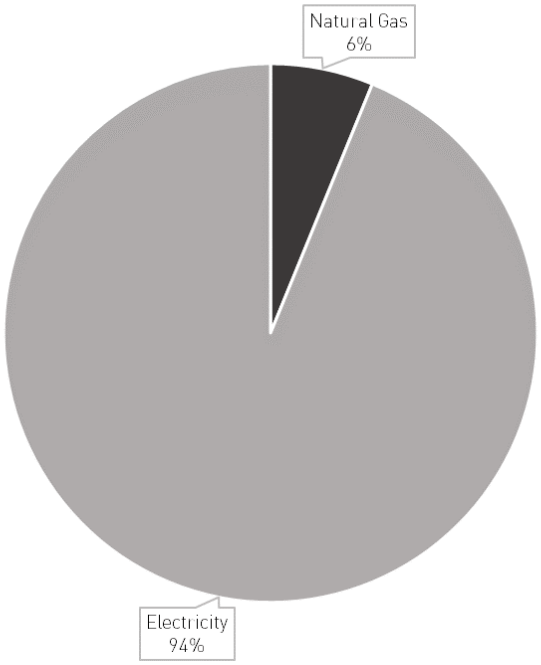


EXTERIOR WALL TYPE E3.2

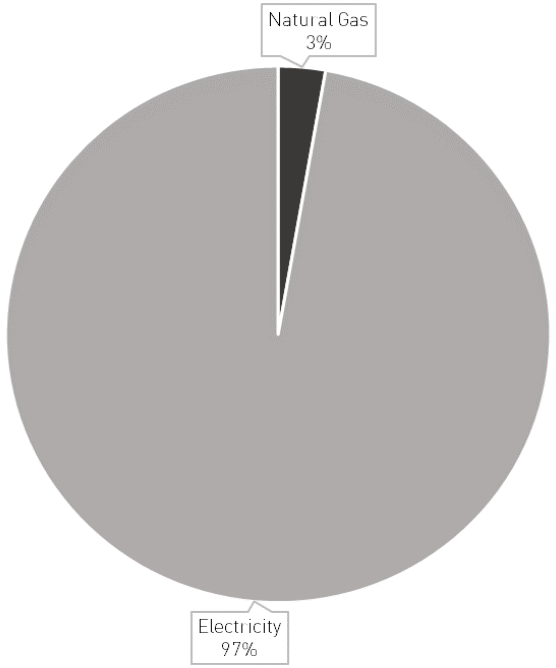
What were the drivers for HVAC system selection?

EXISTING BUILDING PERFORMANCE

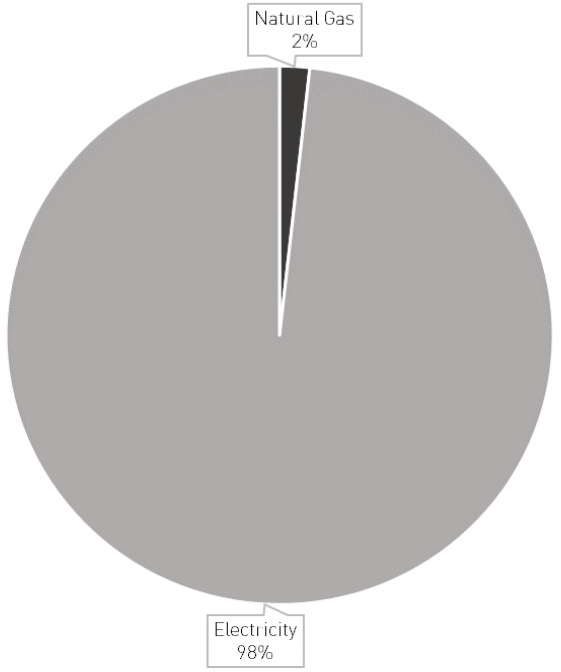
Energy Usage Intensity (kBTU/sqft/yr)



Annual Carbon Emissions (lbs)



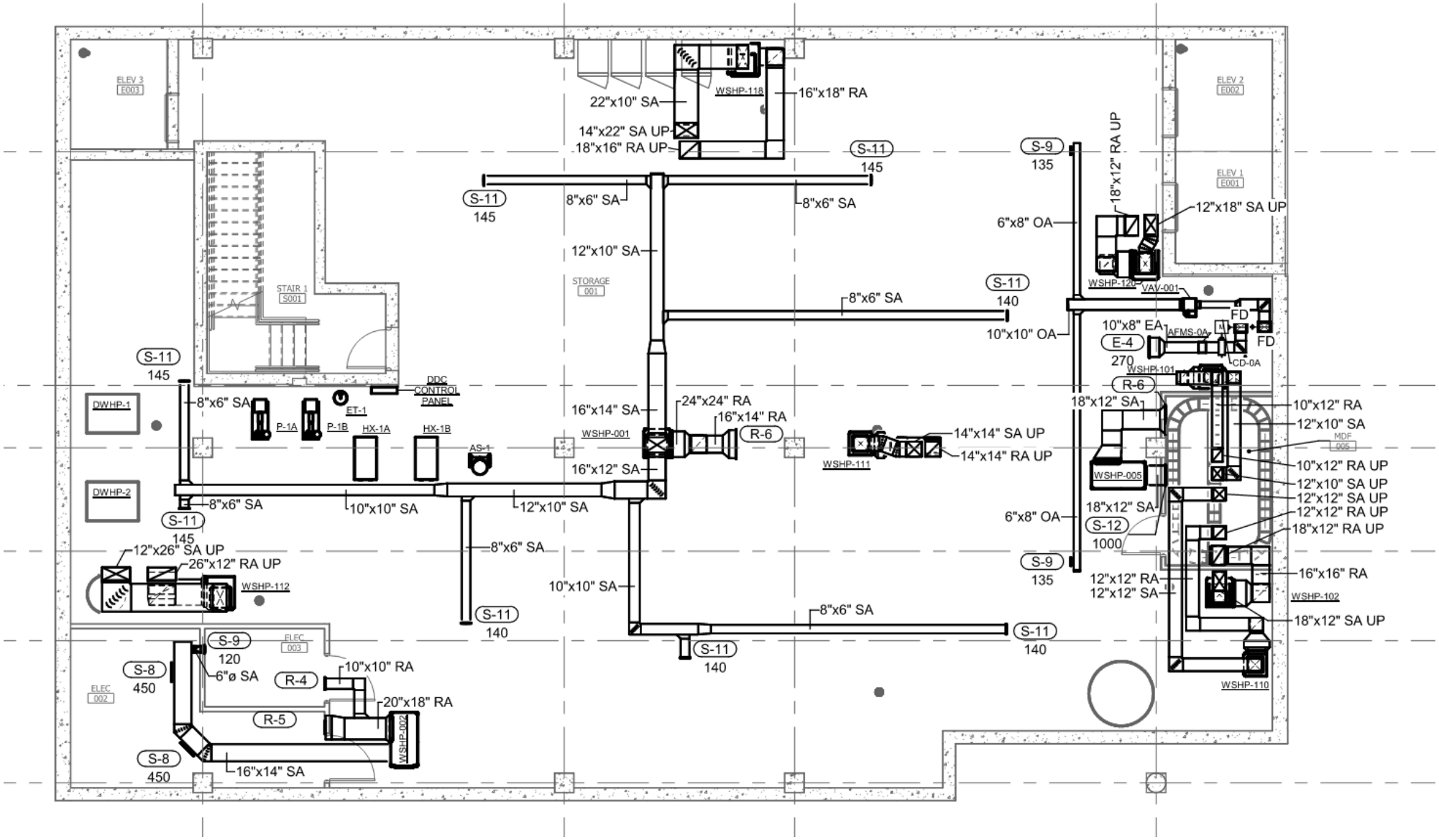
Annual Utility Costs ($)



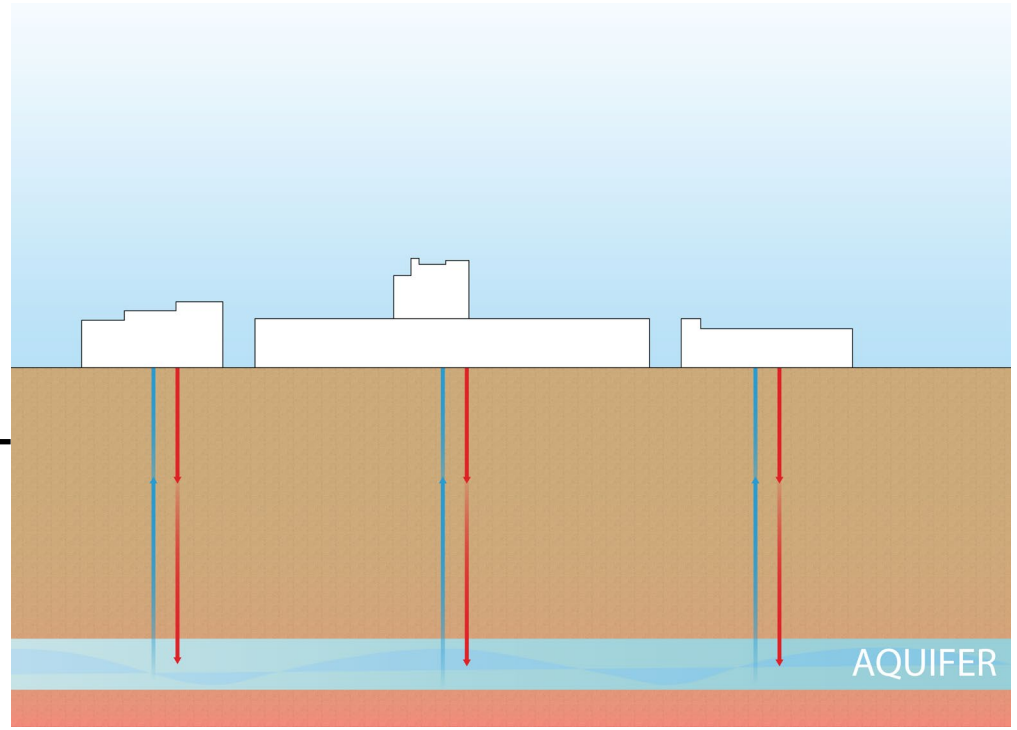
SYSTEM SELECTION

System Type and Heat Rejection		First Cost	Energy and Carbon	Life Cycle Cost	Air Quality	Maint.	Thermal Comfort	Reliability and Redun-dancy	Acoustics	Mechanical space Req.	**Weighted Score**	Description
Importance		3	4	2	4	1	1	1	4	4		
VRF w/ DOAS	Air-Source	3	1	3	1	2	5	2	4	5	**3.2**	A central DOAS will provide ventilation to the entire building. Above ceiling ducted VRF fan coil units located throughout the building will provide cooling and heating to spaces. The VRF heat pumps will be air cooled and will sit outside located around the building. Cost: $39/sf
	Geothermal/ Aquifer	1	2	2	1	2	5	3	4	4	**3.1**	A central DOAS will provide ventilation to the entire building. Above ceiling ducted VRF fan coil units located throughout the building will provide cooling and heating to spaces. The VRF heat pumps will be water cooled through either geothermal or with the aquifer. Cost: $44/sf
Heat Pumps w/ DOAS	Geothermal/ Aquifer	2	5	4	5	4	4	5	3	4	**4.4**	A central DOAS will provide ventilation to the entire building. Water source heat pumps located above ceiling or in closets throughout the building will provide cooling and heating to spaces. Open-loop (aquifer) geothermal wells will be provided for heat rejection and absorption. Cost: $43/sf

SPACE ALLOCATION



LOCAL PRECEDENT



ENERGY, COSTS, & CARBON: HVAC OPTIONS

System	EUI (kBtu/ft² /year	Carbon (lbs.)	Utility Costs ($)
Existing Building	31.3	382,907	$30,066
WSHP with Aquifer	16.6	332,404	$26,377
VRF with Aquifer	16.3	326,352	$25,897
Air-Cooled VRF	46.8	658,526	$46,006

Carbon Emissions Factor

1,235 lb/MWh (Electricity)

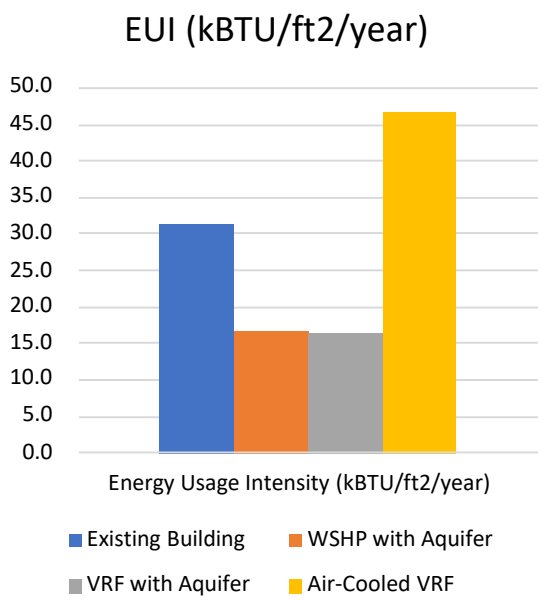
16.25 lb/CCF (Natural Gas)

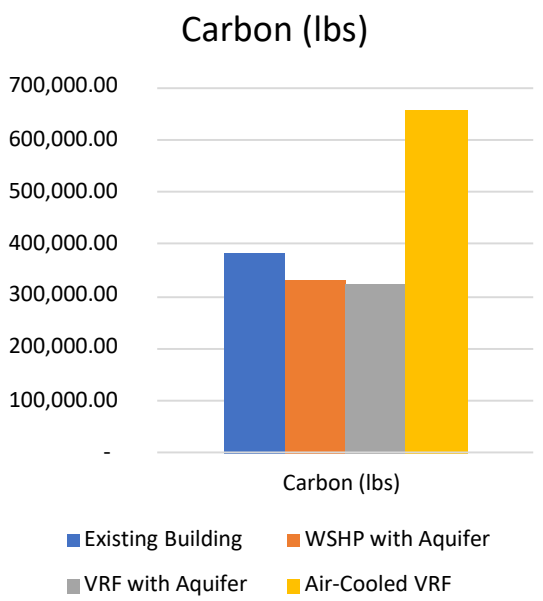
Simple Electricity Rate:

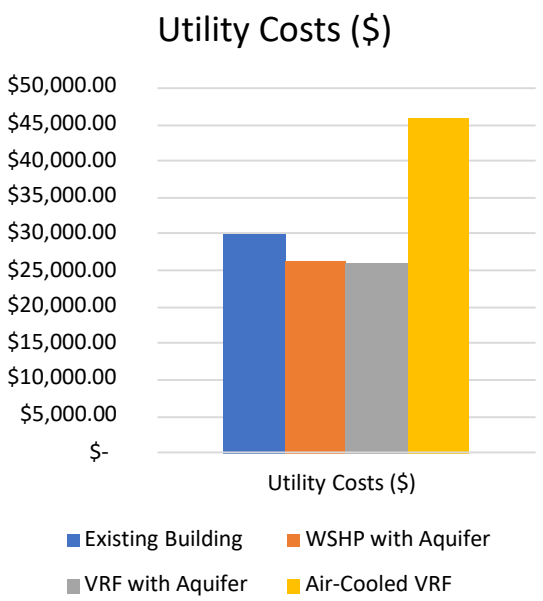
$0.10/kWh

Simple Natural Gas Rate:

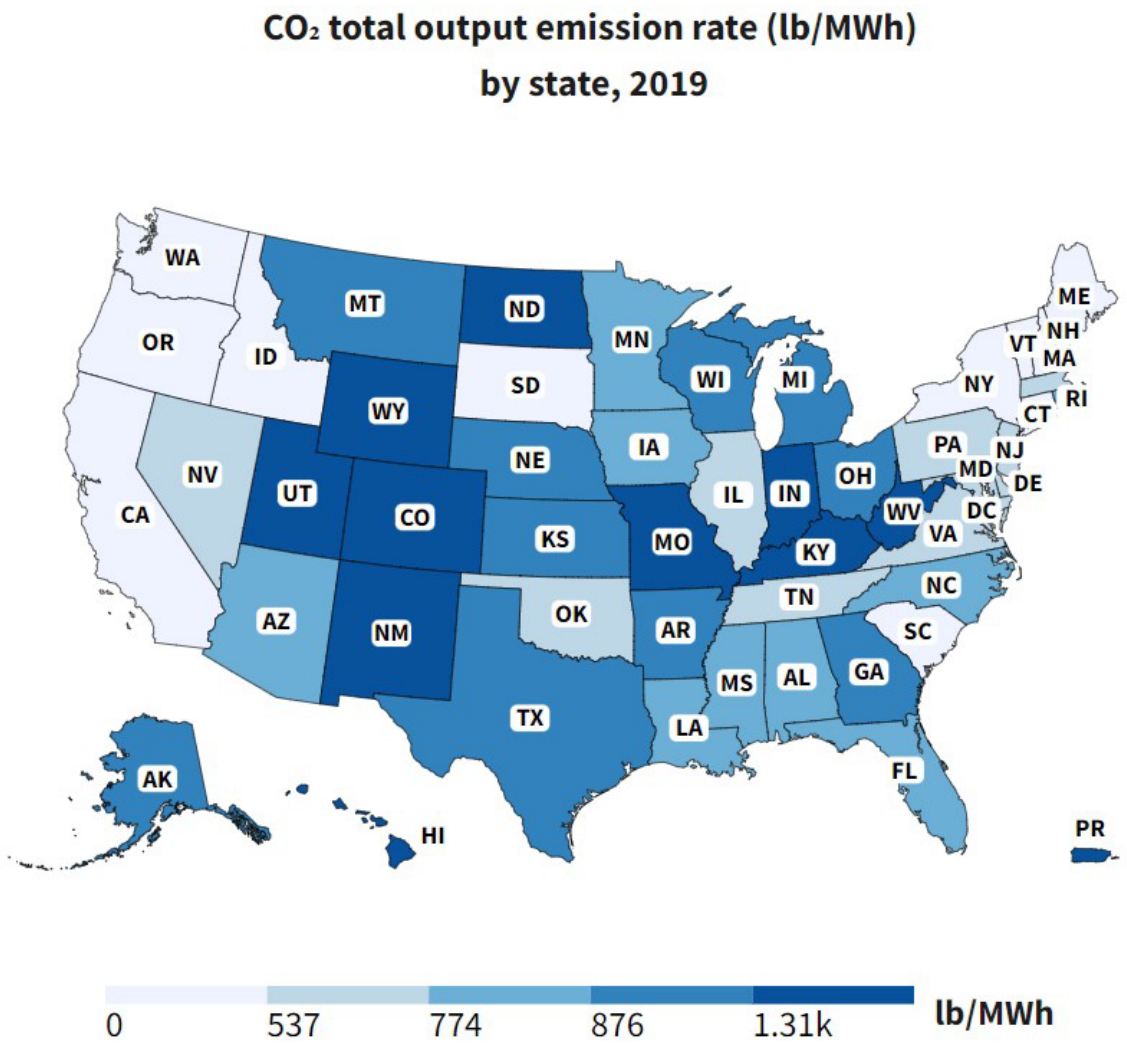
$0.75/CCF

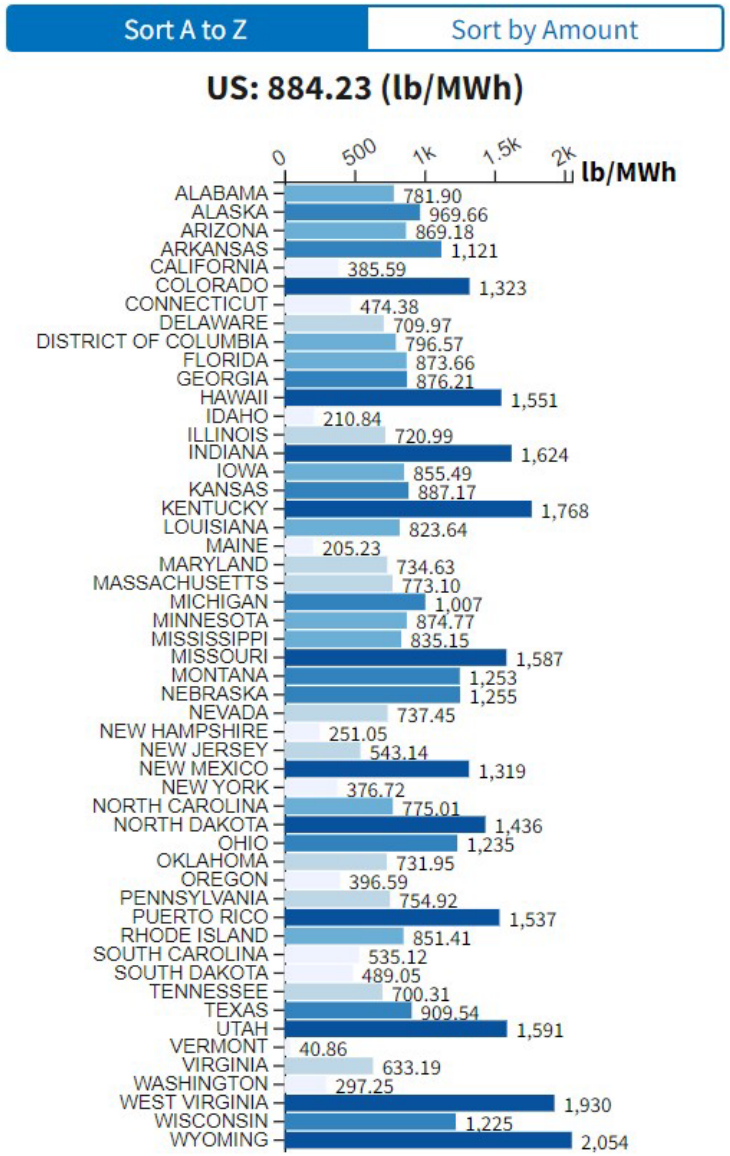




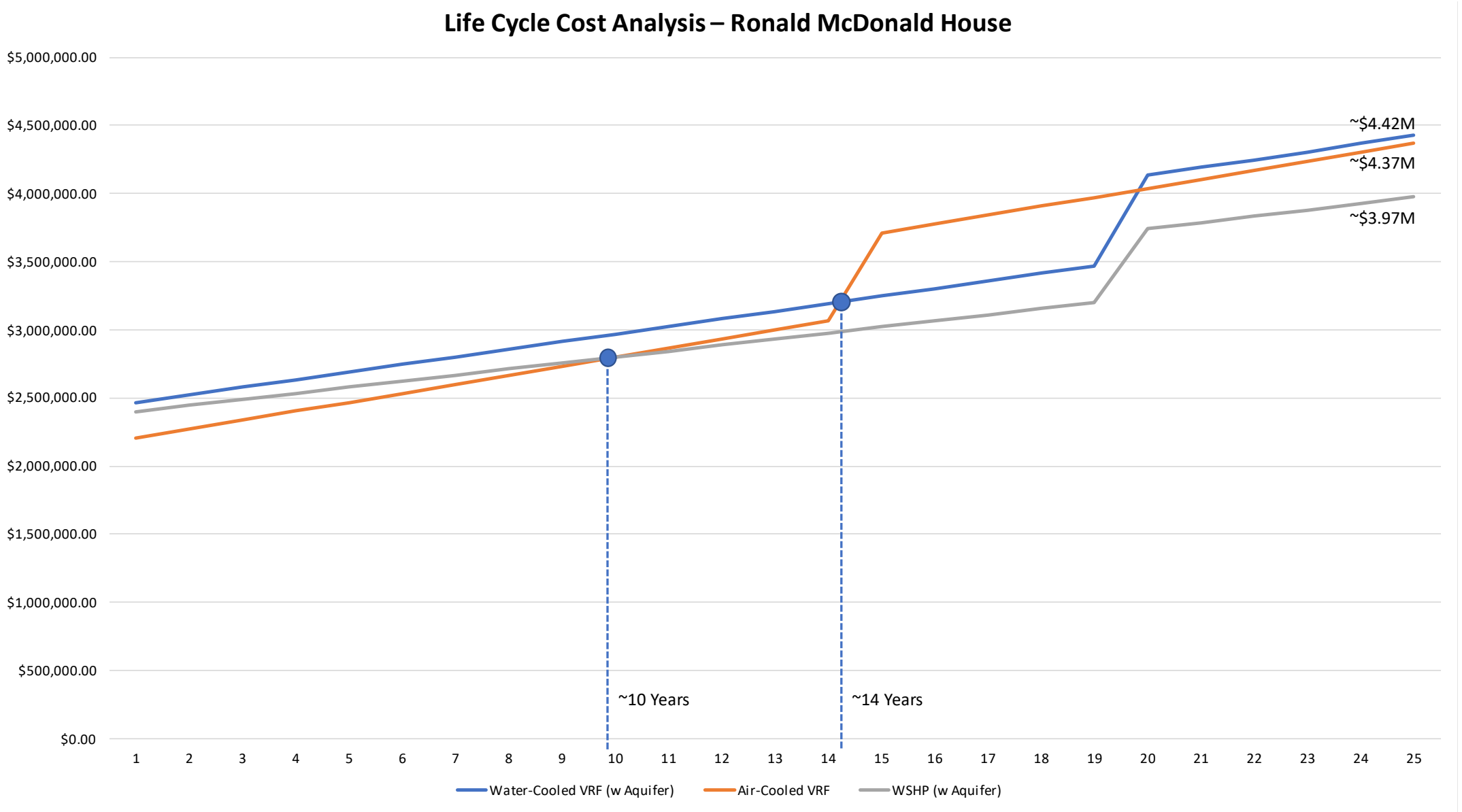


CALCULATING CARBON

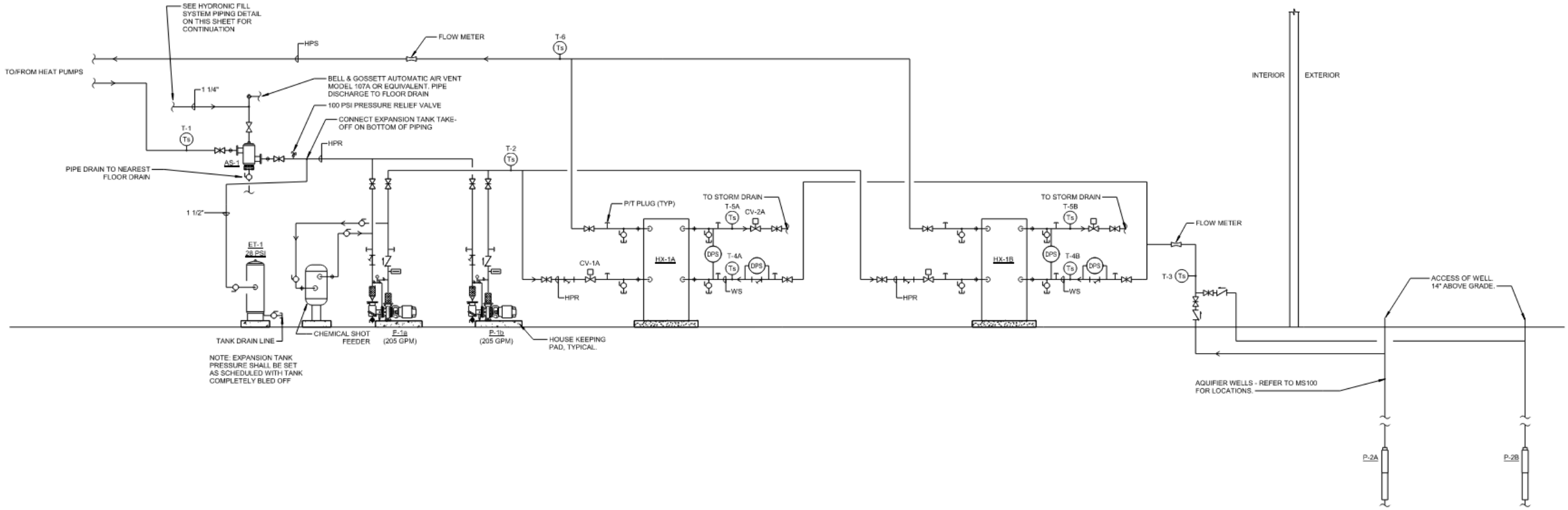




LIFE CYCLE COSTS ANALYSIS

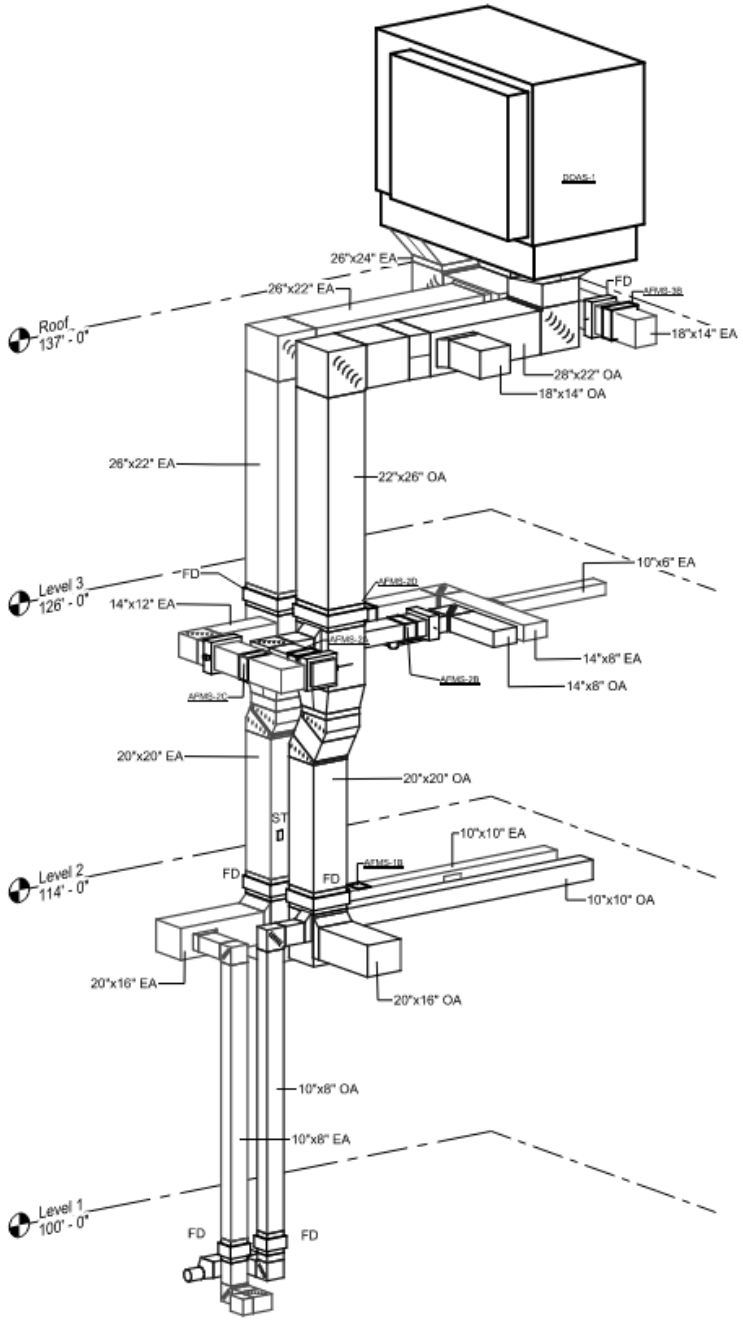


SYSTEM DIAGRAM - PIPING

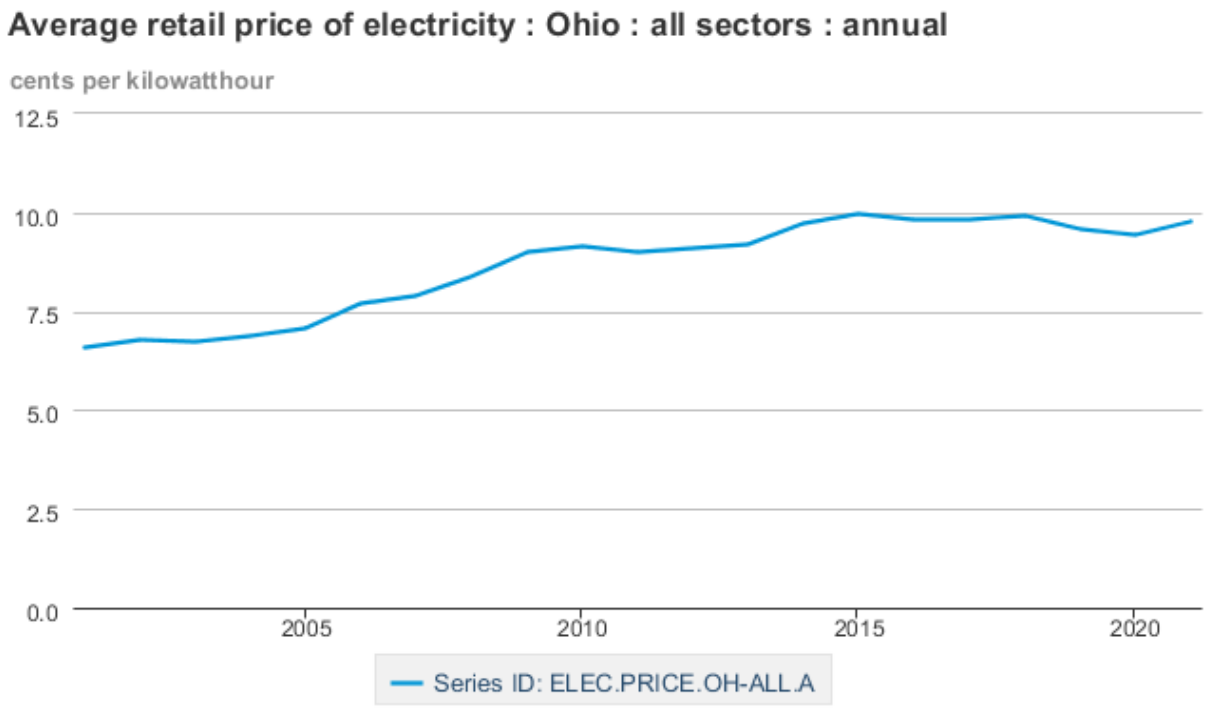


SYSTEM DIAGRAM - DOAS

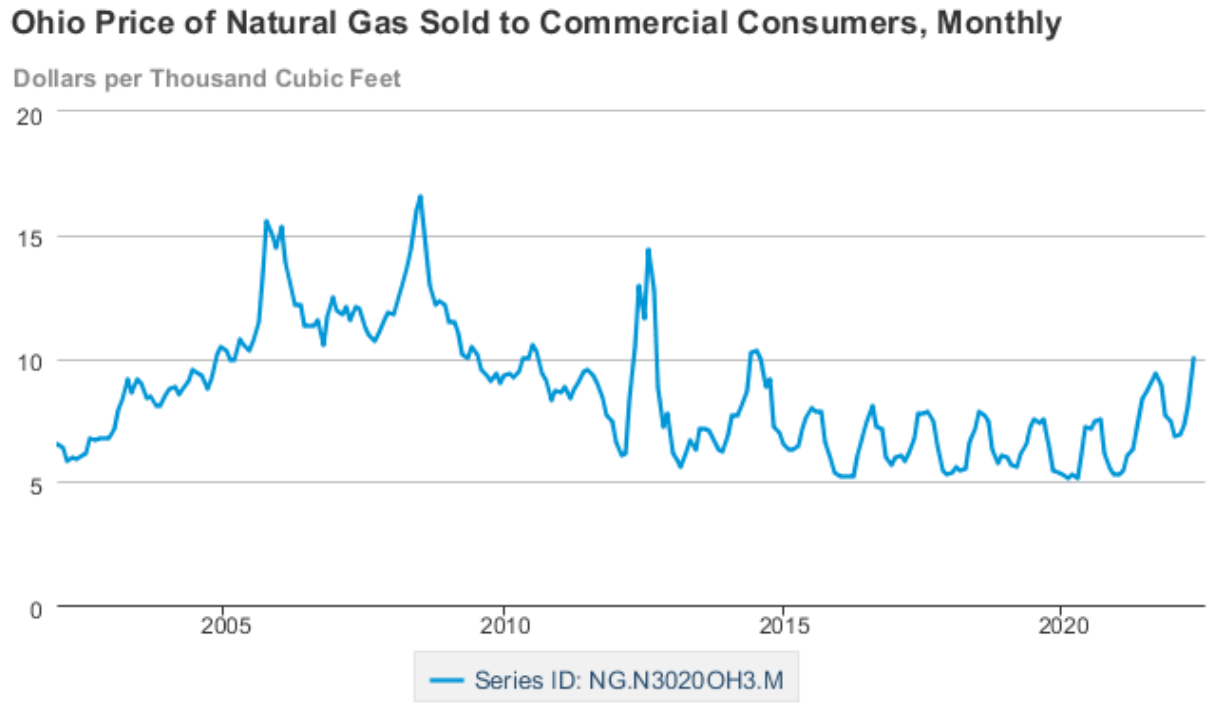
- Thermal Comfort
  - Individual occupant controls/zoning
- Indoor Air Quality Improvements
  - Provides dehumidified neutral air to spaces
  - Demand controlled ventilation



LOCAL UTILITY COSTS



eia Source: U.S. Energy Information Administration

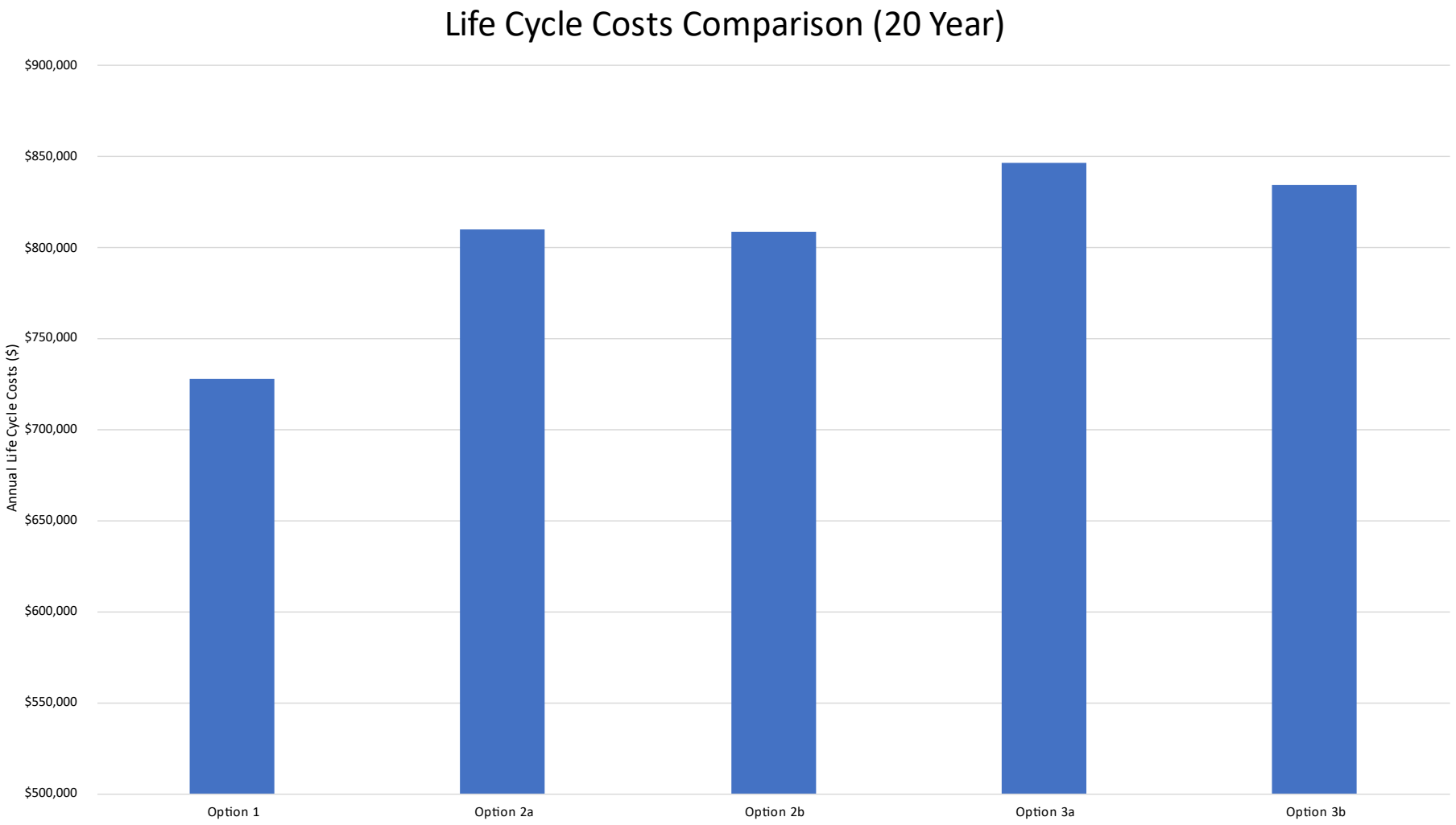


eia Source: U.S. Energy Information Administration

VALUE ENGINEERING

VE Options	Description	First Cost Savings
Option 1a	Leave the design as is. WSHP DOAS unit with energy recovery core, diesel generator, VAV boxes with demand-controlled ventilation in high occupancy areas on the first floor.	-
Option 2a	Swap domestic hot water heat pumps for natural gas water heaters, and switch generator from diesel to natural gas. DOAS unit to remain the same as the DD selection.	$40,000
Option 2b	Swap heat pump water heaters for natural gas water heaters, and switch generator from diesel to natural gas. Swap the energy recovery core with an energy recovery wheel. Unit to be sized for failure for the heating with the heating to be sized for 70°F.	$34,500
Option 3a	Swap heat pump water heaters for natural gas water heaters, and switch generator from diesel to natural gas. Switch WSHP DOAS unit for DX (air-cooled) with furnace heating and energy recovery core and remove condenser water piping from DOAS.	$60,000
Option 3b	Swap heat pump water heaters for natural gas water heaters, and switch generator from diesel to natural gas. Switch WSHP DOAS unit for DX (air-cooled) with furnace heating and remove condenser water piping. Swap the energy recovery core with an energy recovery wheel. Unit to be sized for failure for the heating with the heating to be sized for 70°F.	$54,500

VALUE ENGINEERING

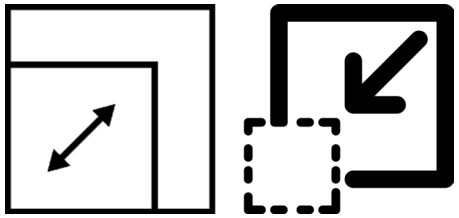



RHHC’S
PERSPECTIVE &
DISCUSSION

What challenges did the project face in construction?

OWNER'S PERSPECTIVE

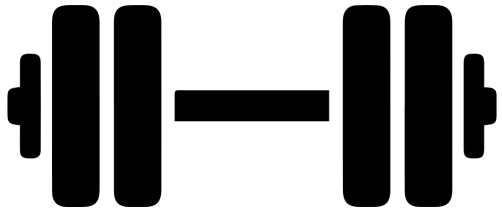
Costs



Right Sizing

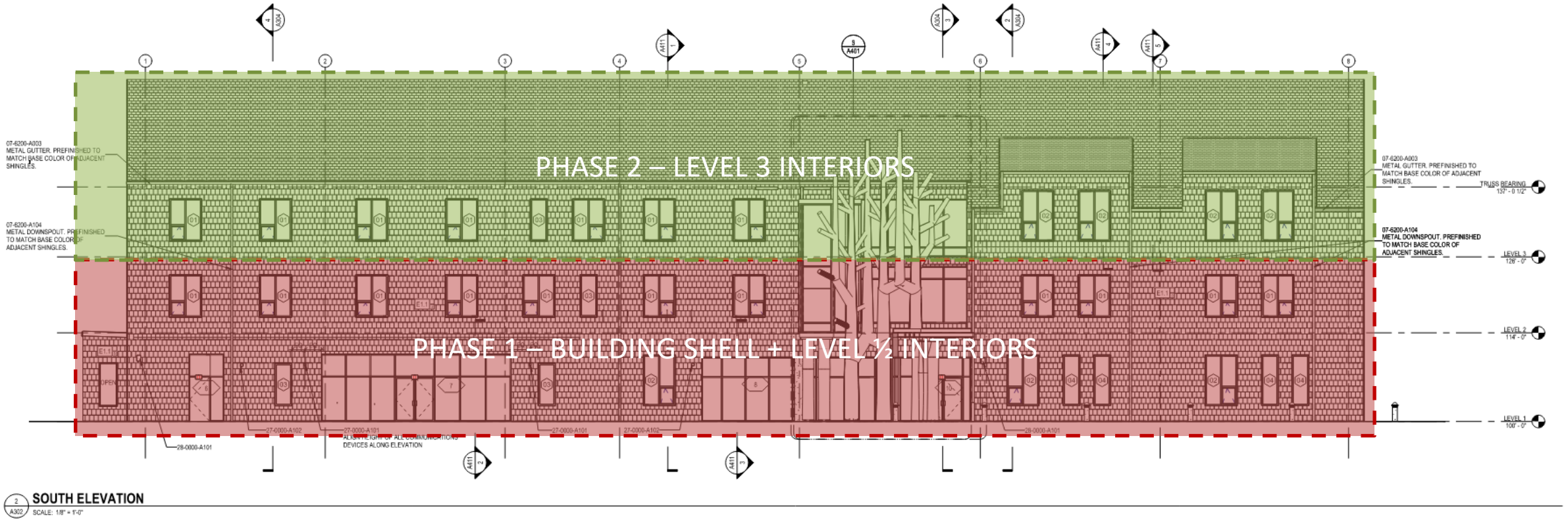
Home

Energy Efficiency



Resilience

PHASING



2 A302 **SOUTH ELEVATION**
SCALE: 1/8" = 1'-0"

FINANCIAL INCENTIVES

ACT OF 2022
INFLATION REDUCTION
UNITED STATES OF AMERICA

IRA Tax Benefits

Millions in new tax credits to boost Ronald McDonald House

Credit: JIM NOELKER

LOCAL NEWS

By Thomas Gnau

Aug 8, 2023

Dayton Region New Market Fund

HONDA

Honda USA Foundation

Honda Sustainability Grant

LAUNCH OF THE IRA CALCULATOR

FINDING FUNDS FOR SUSTAINABILITY: GBBN'S IRA CALCULATOR GOES LIVE!

GBBN has publicly released its Inflation Reduction Act (IRA) Calculator, a tool that helps our clients—and now, the wider public—understand funding opportunities in the IRA for sustainable design. "People generally understand the goals of the IRA, but in conversations with developers and others in the building industry, we've found they frequently don't understand its details [...]

BUILDING DESIGN +CONSTRUCTION

Green Building Alliance

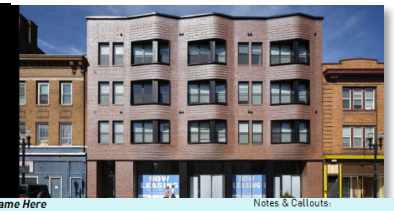
PCRG

MIDWEST REGIONAL SUSTAINABILITY SUMMIT

GREEN BUILDING UNITED
2024 Sustainability Symposium

HISTORIC INFILL

Program: 10 market/7 affordable units, Retail (Vine), 17market/10 affordable units (Republic), 15 market/9 affordable umits, Retail (Pleasant)
Construction Size and Type: 23,990sf (Vine), 24,200sf (Republic), 24,590sf (Pleasant) All New Construction
Location: Cincinnati, Over-the-Rhine Historic District
Expected Start of Construction: 2020
Certifications: LEED Silver
Construction Cost: $3.7M (Vine), $2.39M (Republic), $2.39M (Pleasant)



Tax Incentives (Treasury Dept.) Grants/Loans/Rebates

AMOUNT	PROGRAM
$0 (New construction, not retrofit)	Green and Resilient Retrofit $1B Fund for loans and grants to H- properties for electrification and b
$0 (Funds/admin not available yet)	Greenhouse Gas Reduction F $27B in grants, loans, tech asst. to- cuummunities with zero emssions
$4000 unit, $104K-272K total (counting only for affordable vs. all) (Typical 20% energy savings LEED Silver)	Home Energy Performance E Rebates (DOE) $4.3B Direct Rebates for building c on income level of residents and le
$375,000 50% of appliances, wiring, panels, insulation and including install costs for 50%+ residents at 80-150%AMI (-500K per building for all electric and hvac. Assume 1/2 subject to rebate.)	High-Efficiency Electric Hom $4.5B Direct Rebates for low and m owners and residents for electrific
$2,500/unit, $170,000 total Energy Star, Prevailing Wage	Section 45L Energy Efficienc New Energy Efficient Home Credit and Zero Energy Ready Homes
30-60% credit on $0 system No Renewables in project	Section 48 Renewable Energ Tax Credit and Bonus Credits 30% Tax Credit to assist with Renew installations less than 1 Megawatt for prevailing wage, domestic conte
$72,780 Prevailing Wage but no Apprenticeships assume LEED Silver 25% over ASHRAE 90.1 2019. Amount per Base deduction of $ .50/sf	Section 179D Modification of I Commercial Buildings Deduc Tax Credit for outperforming the m efficiency standards by specified % buildings 4 stories or taller. Requir apprenticeships for credits $. 50/sf
$ 721,780- 889,780	TOTAL

MANUAL CALCULATION

Place Company Name Here
Place Project Name Here
Place Year of Completion Here
Place Project Site Here
Place Contact Name Here
Place Contact Email Here

Notes & Callouts:

IS IRA FUNDING WORTH PURSUING?
(HIGH LEVEL CALCULATOR TO DETERMINE WHICH SECTIONS TO GO AFTER)

##	Are you using prevailing wage on the project?	x	Yes	No
##	Are you using apprenticeship on the project?		Yes	x No
##	Are you electrifying your building?			
##	Are you including affordable units?			
##	Are you considering implementing systems that reduce your energy use?			
##	Is this project an existing section 8?			

IRA CALCULATOR MULTIFAMILY HOUSING
(SPECIFIC CALCULATOR)

##	Are you using prevailing wage on the project?	
##	Are you using apprenticeship on the project?	
##	Will this building be placed into service prior to January 1, 2027?	
##	What is the your building area ?	15
##	How many dwelling units do you have in the project?	
##	How many dwelling units are affordable less than 80% AMI ?	
##	How many dwelling units are affordable at 80-150% AMI ?	
##	Which of the following systems and/or building features apply?	x
##	**Estimated savings over baseline:**	
##	Are you applying any of the following energy saving systems?	x
	If yes, select which technologies apply below:	
	ELIGIBLE FOR ITC CRED	
	ELIGIBLE FOR ITC	
##	Do you meet:	x
##	Are you using materials with a minimum of 10% domestically produced content?	x
##	Is the project located in an energy community? See map link	
##	Is the project located in a low-income community? See map link	x
##	Is your project a qualitfied Low income Residenial Building Project or Economic Benefit Project?	x

VERSION 1.0

IRA Incentive Calculator

The IRA provides incentives in six main areas. If your project includes any of the following strategies, it may qualify for funding. Find out on the next page.

- [ ] Makes the building energy efficient
- [ ] Provides electric appliances
- [ ] Uses prevailing wage and a
- [ ] Provides affordable rental u
- [ ] The project is located withi
- [ ] Provides onsite renewables

Please register your em

VERSION 2.0

IRA Incentive Calculator

The IRA provides incentives in six main areas. If your project includes any of the following strategies, it may qualify for funding. Find out on the next page.

- [ ] Makes the building energy efficient
- [ ] Provides electric appliances or MEP equipment
- [ ] Uses prevailing wage and apprenticeship labor
- [ ] Provides affordable rental units
- [ ] The project is located within a Low-Income Community or an Energy Community
- [ ] Provides onsite renewables and/or storage such as solar panels and geothermal.

Please register your email address to use the calculator and receive your custom report. *

Is this a healthcare project?

Healthcare | Non-Healthcare

VERSION 3.0 https://www.gbbn.com/news/finding-funds-for-sustainability-gbbns-ira-

How does the sustainability of the building align with RMHC's mission?

THANK YOU

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