City of Louisville
Internal Decarbonization Plan

ARTS CENTER
DECARBONIZATION AUDIT REPORT

801 GRANT AVE
LOUISVILLE, COLORADO
AUGUST 18, 2023

City of Louisville
COLORADO • SINCE 1878

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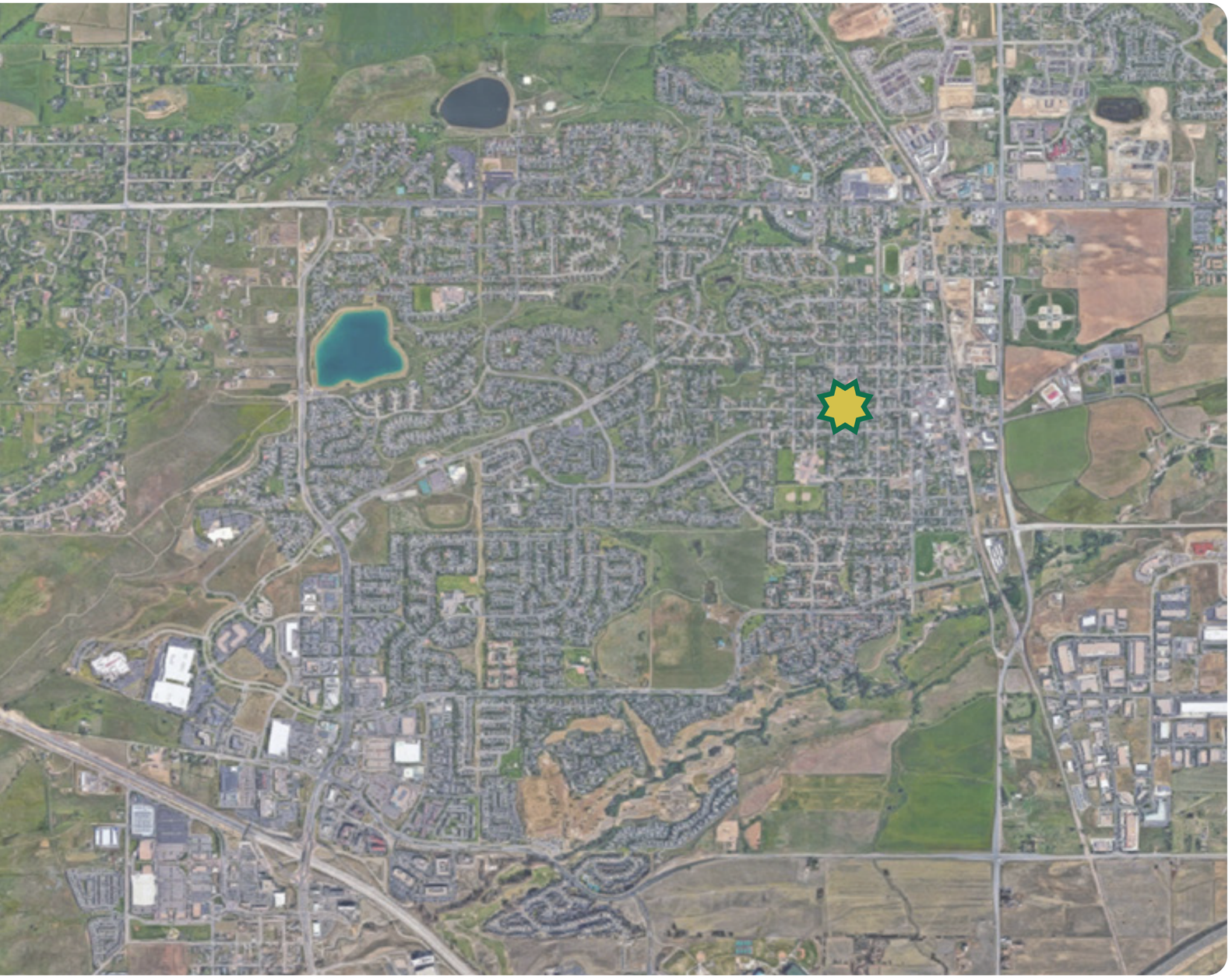
Table of Contents



Date	Version History
8/18/2023	Version 1 - Issued to City

Background

In August of 2019, City Council passed Resolution 25, Series 2019, which set clean energy and carbon emission reduction goals for the municipality and larger community. This resolution sets goals to meet all of Louisville's municipal electric needs with 100% carbon-free sources by 2025, and to reduce core municipal greenhouse gas emissions annually below the 2016 baseline through 2025. The City of Louisville has demonstrated its commitment toward creating a healthy and sustainable environment for its residents, evident through Resolution 25-2019 (Setting Clean Energy and Carbon Emission Reduction Goals), as well as their Sustainability Action Plan (adopted in October 6, 2020). In support of these goals, McKinstry was contracted to identify a strategic roadmap for electrification and decarbonization of all City buildings, fleet, equipment and operations by 2030, and recommend an alternative target if appropriate.

This is an interim report, providing initial directions, findings, as well as a draft set of detailed decarbonization approaches for the Arts Center.

There are many possible pathways for decarbonizing Louisville. With guidance from City staff, this report focuses on identification of strategies that provide the highest value, most fiscally responsible path forward to achieve Louisville's decarbonization goals.

Decarbonization Recommendation

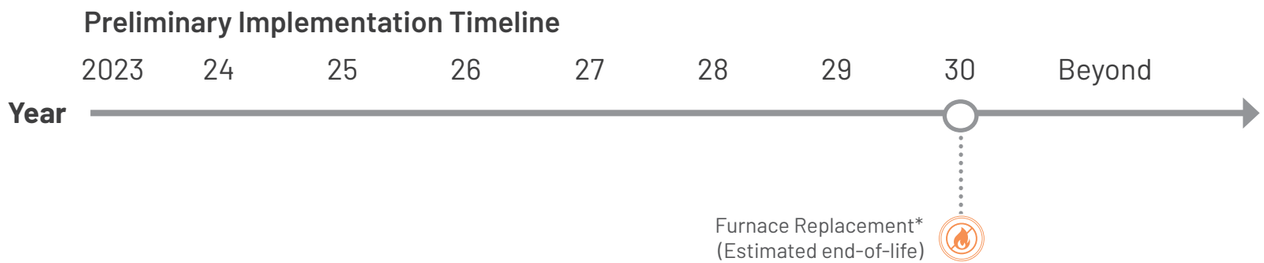
The table below outlines the findings of the study and highlights the opportunity towards a viable and cost-effective path towards carbon neutrality. The total cost is the total amount of money that will need to be allocated for budgetary purposes. The net cost is the total construction costs minus the replacement costs that would've been spent to replace the existing units with like-for-like fossil fuel units. The net cost represents the true cost of this decarbonization effort. All information included in this table is explained in greater detail in this report. **These are "all-in costs" and represent the total cost of construction. They are also Rough Order of Magnitude (ROM) numbers, with a +/-20% range.** See "Construction Pricing Context" section for more detail.

	Scenario	Life Cycle Carbon Reduced	Life Cycle Carbon % Reduction	Total First Cost	Net First Cost Over Business as Usual Cost
⚡	Full Electrification	100 tons	100%	$275k	$215k

Note: The neighboring Memory Square Outdoor Pool is not included in this study since it has intermittent use. The energy and carbon are not included in this report, but are accounted for in the portfolio-wide emissions.

Implementation

A preliminary implementation timeline is shown below, based on the 2023 Capital Improvement Plan (CIP).



**Age of existing equipment is unknown. Replace at end-of-life, estimated to be 2030.*

Baseline Building Use

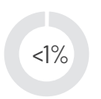
Baseline Year
2019

Building Size
2,000 ft²

Building Energy
1,700 MMBtu

Building Carbon
10 Tons

% of City



Building Information

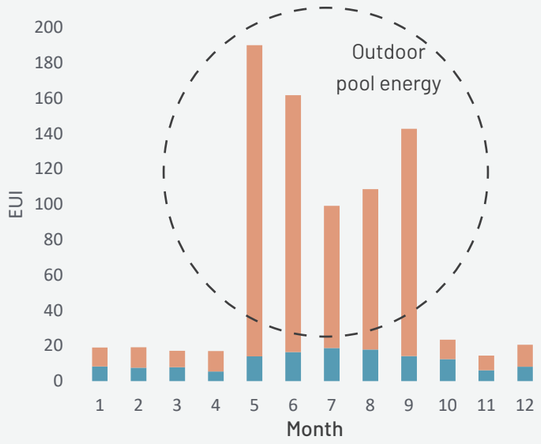
- Residential-turned Arts Center for Louisville.
- Located on eastern edge of the city.
- Open to public, productions 1x every 2 weeks or so.
- Energy use is primarily from neighboring outdoor pool which shares a natural gas meter.

Recent Renovations and Energy Improvements

- Smart T-Stats in 2021.
- R-49 insulation in the attic space.
- Lighting conversion to LED in 2023.

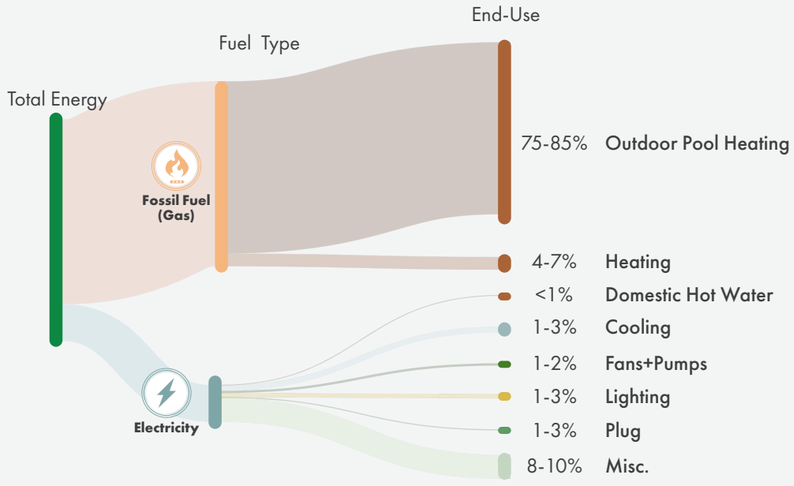
Baseline Energy Use

The majority of the energy consumption on the Art Center meter is attributed to the outdoor pool.



Baseline Energy End-Use

Energy end-use estimates are based on most recent available 2018 Commercial Building Energy Consumption Survey (CBECS) benchmarking data and site audit information.



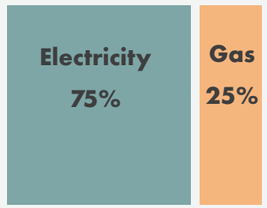
Baseline Carbon Use

The City of Louisville participates in programs to offset their existing electrical consumption with renewable sources. **Therefore, for the purposes of this study the total carbon emissions at Louisville will be solely driven by on-site fossil fuel combustion and emissions associated with electric consumption will be zero.**

The amount of electric consumption offset needed for zero carbon will be addressed in future phases of this study, and will be evaluated at the portfolio level. The offset will be a function of post-decarbonization electrical consumption considering carbon and load reduction measures, on-site renewable energy provided, and the grid emissions of Xcel Energy and zero-carbon utility subscription programs.

1 Car emits 5 tons of CO_2e per year

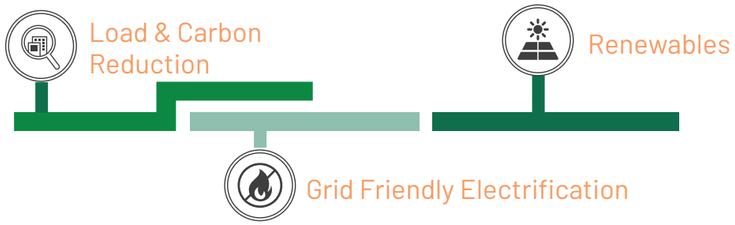
Baseline Energy



Baseline Carbon

Decarbonization Process

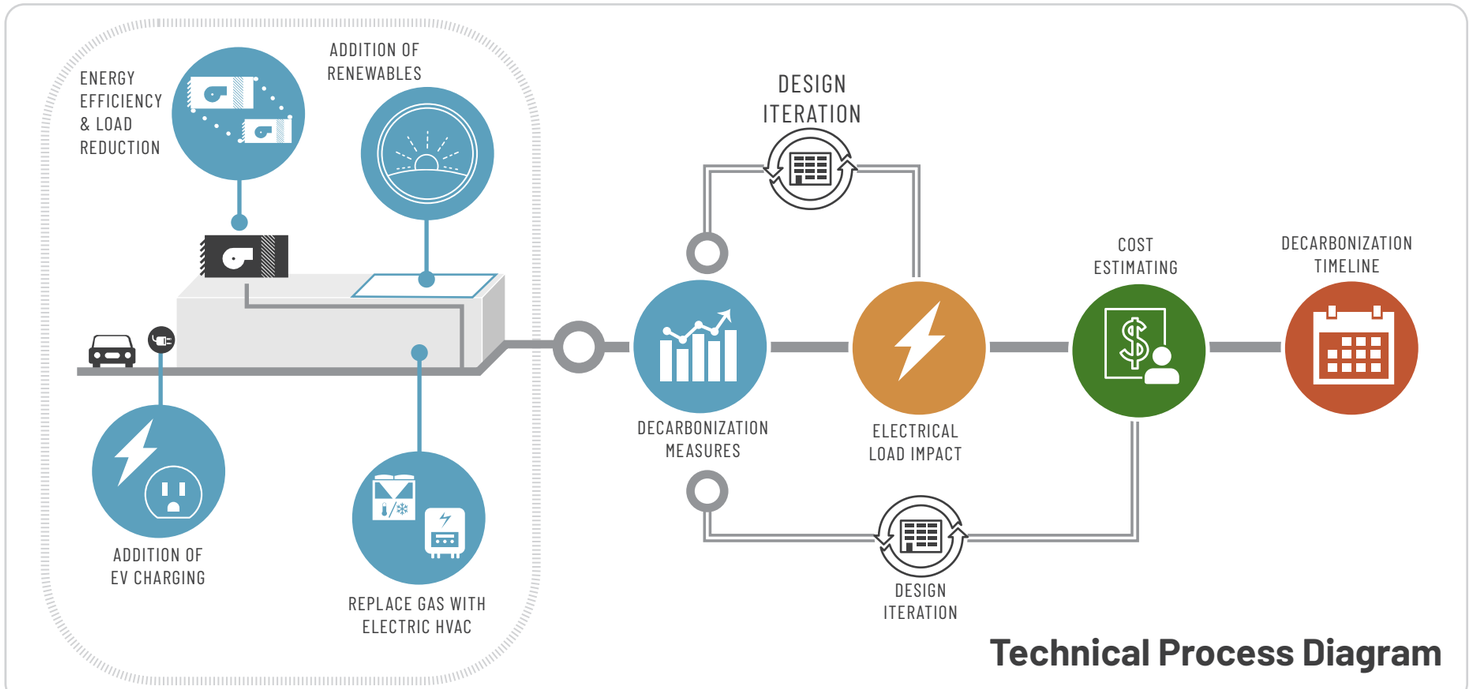
There are a host of measures to employ on the path of decarbonization, ranging from time-tested traditional energy efficiency measures to the more aggressive electrification measures. The key to decarbonization is finding the right balance between measures, as indicated by the graphic below. With this approach, Louisville will find the most cost-effective path to full decarbonization.



The decarbonization solution starts by identifying measures at the building, and continues with design iteration to arrive at the final timeline, as seen in the Technical Process Diagram.

Load & Carbon Reduction

The recent shift towards decarbonization still operates on the core foundation of reducing building's overall energy use. Measures can have two functions: reducing annual energy/carbon consumption and reducing peak building demand load. These measures are often incentivized by Xcel and may have shorter paybacks.

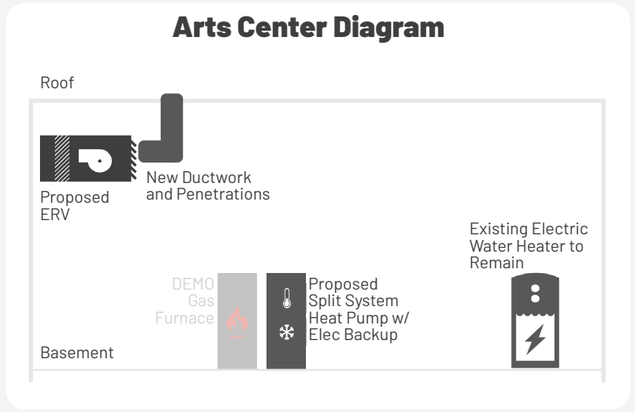


Technical Process Diagram

Load	Carbon	Measure	Description
■	■	ENVELOPE AIR SEALING	Buildings are often remarkably leaky – the wall/parapet junction being a frequent culprit. Ensuring a building is tight and ventilated correctly is an effective efficiency measure that also has durability benefits (condensation often occurs at air leakage points) and improves air quality (mold reduction and limiting outside air infiltration during wildfire events).
■	■	WINDOW REPLACEMENT	Replacing single pane windows with double pane thermally broken windows can greatly improve occupant comfort while also reducing energy use of the space.
■	■	WALL INSULATION	Due to the age of this building, it was constructed with very little insulation. The attic has had additional insulation added, but the walls have not. Additional wall insulation will reduce utility costs and provide better thermal comfort to the occupants of the building.

Proposed Electrification

The Arts Center's primary HVAC system is a gas furnace. A simple diagram of this system and the proposed electrification measures is shown below.



AIRSIDE

The Arts Center contains (1) gas furnace for heating the building. To decarbonize, replace the gas furnace with a heat pump and provide an Energy Recovery Ventilation unit (ERV) for ventilation. ERVs introduce fresh outdoor air into the building and precondition/temper the air via the heat recovery coil. On extreme winter days when heat pump performance is sub-optimal, integral emergency electric backup heat will be utilized.

DOMESTIC HOT WATER

DHW in the Arts Center is currently served by an existing electric water heater, to remain.

All Electric vs Hybrid Systems

Because the electrical service size is unknown, there is not enough information available to estimate a Hybrid electrification solution within existing service capacity. Additionally, with small mechanical equipment and minimal load profile of the building, there is no need for a Hybrid option for the Arts Center.

Beneficial Electrification

Electrification of mechanical systems provides value beyond energy and carbon savings. Additional benefits include, but are not limited to:

- Added cooling to the building with a new split system heat pump
- Enhanced ventilation control (outside-air supply, CO_2 Control, etc.) with a new ERV
- Improved thermal comfort with right-sized equipment and updated controls
- Improved resiliency of newer units

Renewables

When evaluating this site, the available space and racking modality was considered.

Unfortunately, the roof at the Arts Center has less area than needed in order for solar to be viable, and there was not an opportunity for a ground-mount or carport installation at this facility.

Electric Vehicle (EV) Chargers

No fleet vehicles are currently stored at this site.

No EV chargers are recommended at this site because there is no parking lot and usage of the building is limited.

Decarbonization Measures | Electrical and Structural Impacts

Electrical Impacts

There is very little information available about this site. As-built electrical drawings are not available and photos do not tell the whole story. The existing service is a residential-style 240/120V single-phase system with a main load center rated at 150A, but actual service size is unknown.

The HVAC addition will require a service upgrade, likely to 300A as the next standard size is 400A. Additionally, the main service panel within the facility is near end-of-life and should be replaced. Scope and pricing include a new 300A electrical service, 400A service equipment, and panel replacement. If upon further evaluation an electrical service upgrade is not required, first cost will be lower.

Structural Impacts

No structural upgrades are anticipated with proposed mechanical upgrades to be installed at first floor level. All incoming equipment is located at ground level. Concrete housekeeping pads can be configured to support new equipment as required.

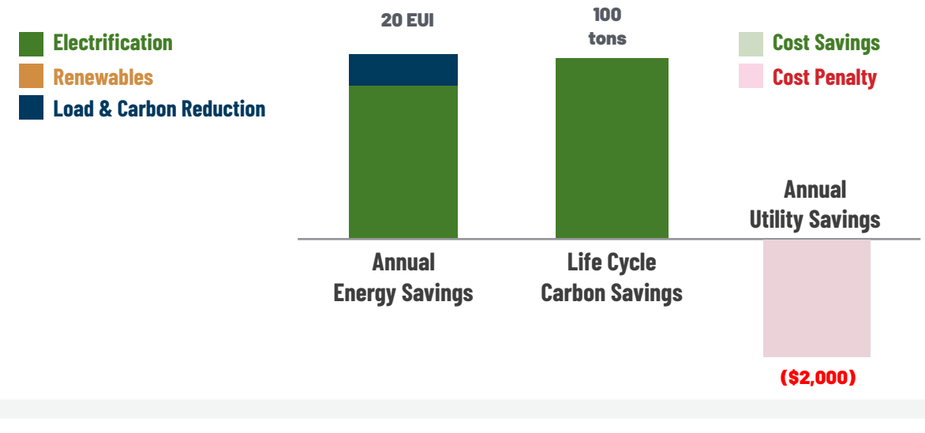
Electrification

FULL ELECTRIFICATION – Full electrification at the Arts Center, including a new heat pump and energy recovery ventilation unit with full electric backup.

	Load & Carbon Reduction	Grid Friendly Electrification
	Envelope Air Sealing Window Replacement Wall Insulation	Electrification Full
Total Cost	**$25k**	**$275k**
Base Cost	N/A	$60k
Net Cost of Electrification	**$25k**	**$215k**

Proposed Annual Measure Savings

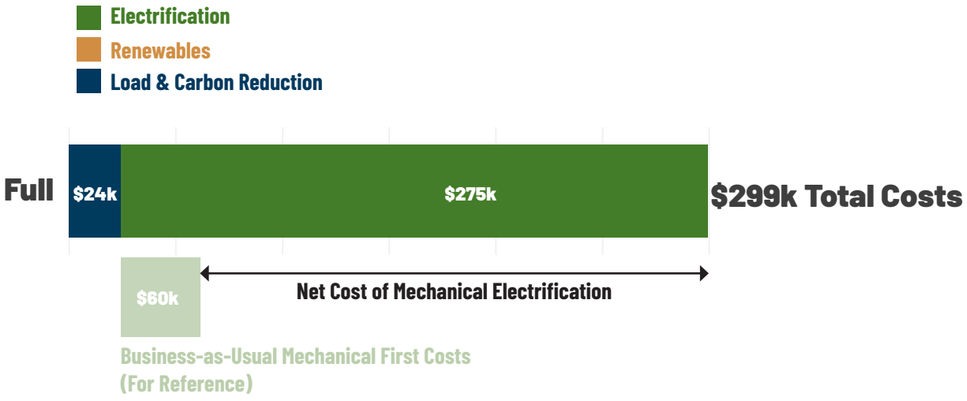
Energy, carbon, and utility cost savings for the full electrification project are shown here. Note that all of the carbon savings come from the electrification measures.



Proposed Total Measure Costs

Proposed measure costs are shown below, including any structural and electrical upgrades needed for each option. **They are also Rough Order of Magnitude (ROM) numbers, with a +/- 20% range.**

The total cost is the total amount that will need to be allocated for budgetary purposes. The net cost represents the total cost minus the replacement cost that would've been spent to replace the existing units with like-for-like fossil fuel units.



Construction Pricing Context

The MEP scope narratives described in previous sections and included in the appendices were used by McKinstry's construction division to provide Rough Order of Magnitude (ROM) pricing. This early ROM budgeting process sought to be reasonable but conservative wherever possible. **Typically for ROM-level pricing a range of +/- 20% is applied to the total construction and start up costs.** This range can be reduced, and the pricing further refined, via a deeper understanding of existing building conditions and detailed design. Note this does not account for escalation, which is addressed separately. This pricing represents the total construction and startup cost to Louisville, including:

- General contractor markup
- Design fees
- Engineering energy analysis
- Controls
- Equipment startup, commissioning, testing, and balancing
- Placeholders for miscellaneous trades (e.g. carpentry).
- Allowances specific to each building for construction conditions (e.g. crane time)

All construction costs are in 2023 dollars unless noted otherwise.

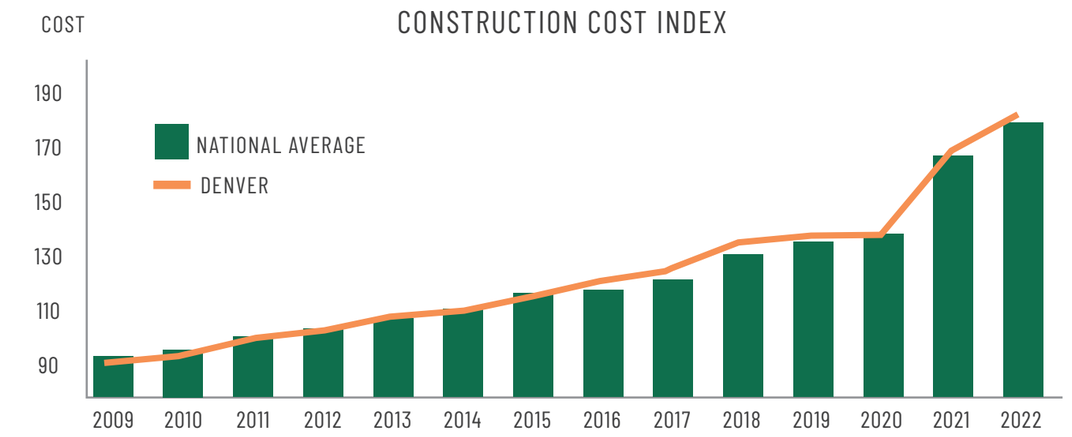
Using These Construction Costs

Throughout this report, differentiation is made between "total construction costs" and "net cost over business-as-usual fossil fuel systems"The distinction between the two is:

- Total costs: these are the total construction costs. This is the total amount of money that will need to be allocated for budgetary purposes.
- Net Cost: these are the total construction costs minus the replacement costs that would've been spent to replace the existing units with like-for-like fossil fuel units. These numbers represent the true cost of this decarbonization effort.

Note the numbers in the 2023 City Budget are budget numbers, and do not represent all costs for replacing the existing units. As such, they should not be used when determining the costs of decarbonization. In addition, the cost estimates in this report assume miscellaneous equipment (e.g. expansion tanks, domestic hot water storage tanks) need to be replaced. This assumption should be validated in detailed design, and could result in the total construction cost being lower if equipment can be reused.

As shown in the graph by the Mortenson, construction costs have been steadily rising since 2009. However, costs rose drastically from 2020 to 2022 (approximately 35%) due to global supply chain issues and unforeseen consequences of the COVID-19 pandemic.



SOURCE: MORTENSON CONSTRUCTION

Constructibility

Recent upheavals in the global supply chain and labor workforce have caused uncertainty in the construction market. Our construction teams are seeing the following trends as of March, 2023:

ELECTRICAL LEAD TIMES:

- Most commodity items, such as conduit, wire, fittings, etc. are readily available.
- Lead times for Switchboards are being quoted 50-80 weeks. Panel-boards can be 20-40 weeks depending on complexity.

MECHANICAL LEAD TIMES:

- Equipment needs to be ordered earlier in detailed design process to accommodate long lead times. Requires additional coordination earlier in design.

In order to combat these lead time challenges, design teams may need to be flexible with their specifications and the products/manufacturers they are selecting.

LABOR MARKET:

While we are seeing a general relaxing of labor shortages in other markets around the country, the contractor and labor shortages continue to persist in the Denver market.

Implementation

A preliminary implementation timeline is shown below, based on the 2023 Capital Improvement Plan (CIP). Given the CIP replacement schedule, the Arts Center will likely implement measures beyond 2030, at equipment end of life. The summary below is the implementation recommendation based on age of equipment as well as additional thoughts on emerging technologies and sequence of upgrades.

FURNACES

- As furnace reaches end of life, replace with heat pump and energy recovery ventilation unit.

RENEWABLES

- Solar PV is not recommended for this site.

ELECTRIC VEHICLE CHARGER

- EV charging is not recommended for this site.

Preliminary Implementation Timeline

**Age of existing equipment is unknown. Replace at end-of-life, estimated to be 2030.*

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Appendix

1. Mechanical System Matrix Options
2. Mechanical Decarbonization Scoping
3. Electrical Decarbonization Scoping
4. Structural Scoping
5. Electric Vehicle Charging Narrative (N/A for this Building)
6. Renewables Scoping (N/A for this Building)
7. Cost Estimating

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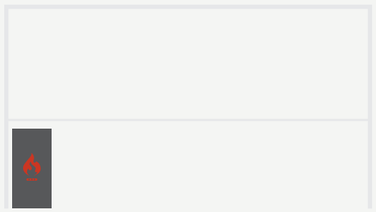
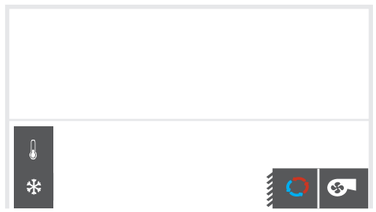
HVAC System Matrix: Arts Center

	Existing System	Recommendation
General	Gas Furnace	ERV+ASHP
		
Plant Equipment	-	None
	-	None
Extent of Retrofit	-	**Medium** Energy Recovery Ventilator (ERV) will require new ductwork and penetrations to the exterior for outdoor air and exhaust air.
Electrical Impacts	-	**Upgrade Potentially Needed.** There is very little electrical information available about this site. Will likely require a service upgrade, but actual existing service size is unknown.
Limiting Factor	-	**None**
Verdict	-	**Proceed w/ Detailed Scoping**

Note: No high-performance option was considered due to the small size of the building.

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Arts Center - Mechanical Scope Narrative

Option 1 – Full Electrification

Demo Scope of Work:

- Includes removal and disposal of (1) gas furnace
    - Assumes cut, cap and make safe gas piping from furnace

New Scope of Work:

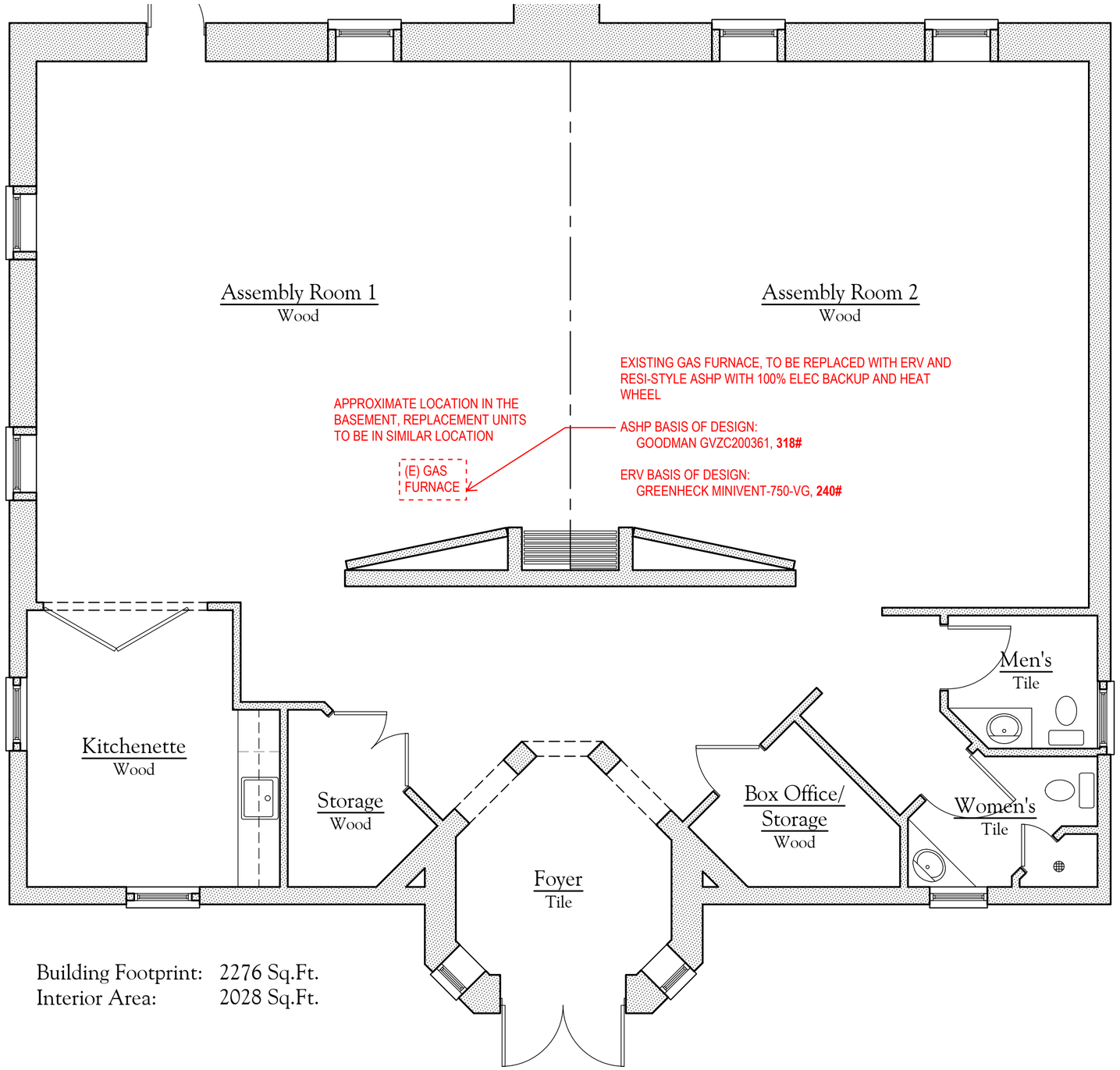
- Includes (1) new 4-ton residential-style air-source heat pump
    - Located in basement in approximately same area as existing gas furnace
    - Includes auxiliary 10kW electric coil for 100% electric backup capabilities
- Includes (1) new 500 cfm ERV with heat wheel
    - Located in basement in approximately same area as existing gas furnace
    - Includes new supply and exhaust ductwork to exterior
    - Includes roof penetrations for new ERV ductwork
    - Includes 5kW duct heater downstream of unit for additional capacity

Mechanical General Inclusions, Clarifications, & Exclusions

- Includes allowance for crane/rigging
- Includes allowance for permits
- Includes allowance for carpentry
- Carrying Seattle labor rates
- Pricing in today's dollars
- Excludes temp HVAC and plumbing
- Excludes overtime work
- Excludes parking
- Excludes any new sound attenuation scope. Assumes ductwork and existing sound attenuation to remain.
- Excludes duct smoke detectors and wiring
- Excludes any heat tracing
- Excludes good faith survey
- Excludes demolishing gas distribution lines/piping back to meter
- Excludes condensate drain piping to roof drains. Assumes piping directly down onto roof.

LOUISVILLE ARTS CENTER - MECHANICAL PRICING DOCUMENT
BASE OPTION - FULL ELECTRIFICATION

NARRATIVE:
-FULL ELECTRIFICATION OF THE BUILDING BY REPLACING ALL GAS-FIRED EQUIPMENT WITH NEW ELECTRIC-ONLY EQUIPMENT
-EXISTING GAS-FIRED FURNACE IN BASEMENT TO BE REPLACED WITH RESIDENTIAL-STYLE AIR-SOURCE HEAT PUMP WITH 100% EMERGENCY REHEAT AND ERV WITH DUCTED CONNECTIONS TO EXTERIOR FOR OUTDOOR AIR AND EXHAUST AIR
-EXISTING ELECTRIC WATER HEATER TO REMAIN AS IS



Building Footprint: 2276 Sq.Ft.
Interior Area: 2028 Sq.Ft.

1 Main Floor Plan
Scale: 1/4" = 1'-0"

N

Louisville Center for the Arts
City of Louisville
801 Grant Street, Louisville, CO

DRAWING TITLE: MAIN FLOOR PLAN
DATE: FEBRUARY 10, 2012
DRAWN: JVS | CHECKED: JVS

ISSUE RECORD	DATE

REVISION	DATE

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Arts Center - Electrical Scope Narrative

Option 1 – Full Electrification

- General: Added load requires ~120A of capacity under the assumption that the heat pump and resistive backup loads can operate concurrently. The load on the existing service is unknown. A service upgrade to 200A could (but is unlikely to) provide sufficient capacity combined with 30 day metering, however an upgrade to 300A would be certain to have sufficient capacity and given the uncertainty, this option has been scoped.
- Electrical Demo:
    - Demolish existing meter base
    - Demolish service conductor:
        - Transformer to meter
        - Meter to main load center
    - Demolish main load center, 16 pole 150A NEMA 1
        - Retain existing branch circuits and feeders for reconnection to new load center at this location
- Electrical New Work:
    - New 300A service option
        - Provide new 400A meter base
        - Provide new 300A service conductors 4#2/0, 1#4/0N from pad mount transformer
        - Install new 42P 400A, 300A MCB NEMA1 service panelboard at location of demolished load center
            - Assume 15’ of 4#2/0, 1#3/0, 1#3/0G. Assume 15’ of new 2 ½” EMT.
        - Panel shall contain:
            - (qty 1) 150A 2P
            - (qty 1) 60A 2P
            - (qty 1) 40A 2P
            - (qty 3) 30A 2P
            - (qty 3) 20A 2P
            - (qty 1) 30A 1P
            - (qty 6) 20A 1P
        - Allow for provision of new ground rods and GEC.
        - Refeed existing sub panel load center (150A). Assume existing conductors can be reused.
        - Refeed existing loads from supplied circuit breakers.
        - Provide new branch circuiting and equipment disconnects for HVAC equipment:
            - (qty 1) 60/2, allow for 40’
            - (qty 1) 30/3, allow for 40’
            - (qty 2) 30/2, allow for 40’
        - Update labelling on existing distribution and provide an as-built drawing sketch.

Electrical Exclusions

- Applicable sales, use and B&O tax
- Performance and Payment Bonds
- Utility company charges.
- Refurbishing existing lighting (cleaning, re-lamping, re-trimming, repair, restoration).
- Roof and building envelope penetrations, waterproofing.
- Moving, placing and (re)-calibrating owner equipment.
- Mechanical and plumbing control devices, including wiring, conduit, and components.
- Correcting existing code violations
- Hidden conditions.
- Removing, re-installing and replacing ceiling tiles.
- Opening and repairing walls and ceilings for electrical work.
- Patching and painting.
- Access panels.
- Temporary power and lighting
- Handling hazardous material including but not limited to asbestos, lead and PCB's.
- Overtime and shift premiums.
- Work stoppages, hindrances, multiple trim passes and out-of-sequence installation.
- Electrical engineering, calculations, drawings, peer review services.
- Structural and Seismic Engineering
- Material cost escalation.
- Plywood and specialty backing.
- Low voltage systems (telecom, CCTV, access control, audio visual, etc.).
- Any work not specifically included in this proposal.
- No thermostat relocations are included

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LOUISVILLE ARTS CENTER
MECHANICAL PRICING DOCUMENT WITH STRUCTURAL

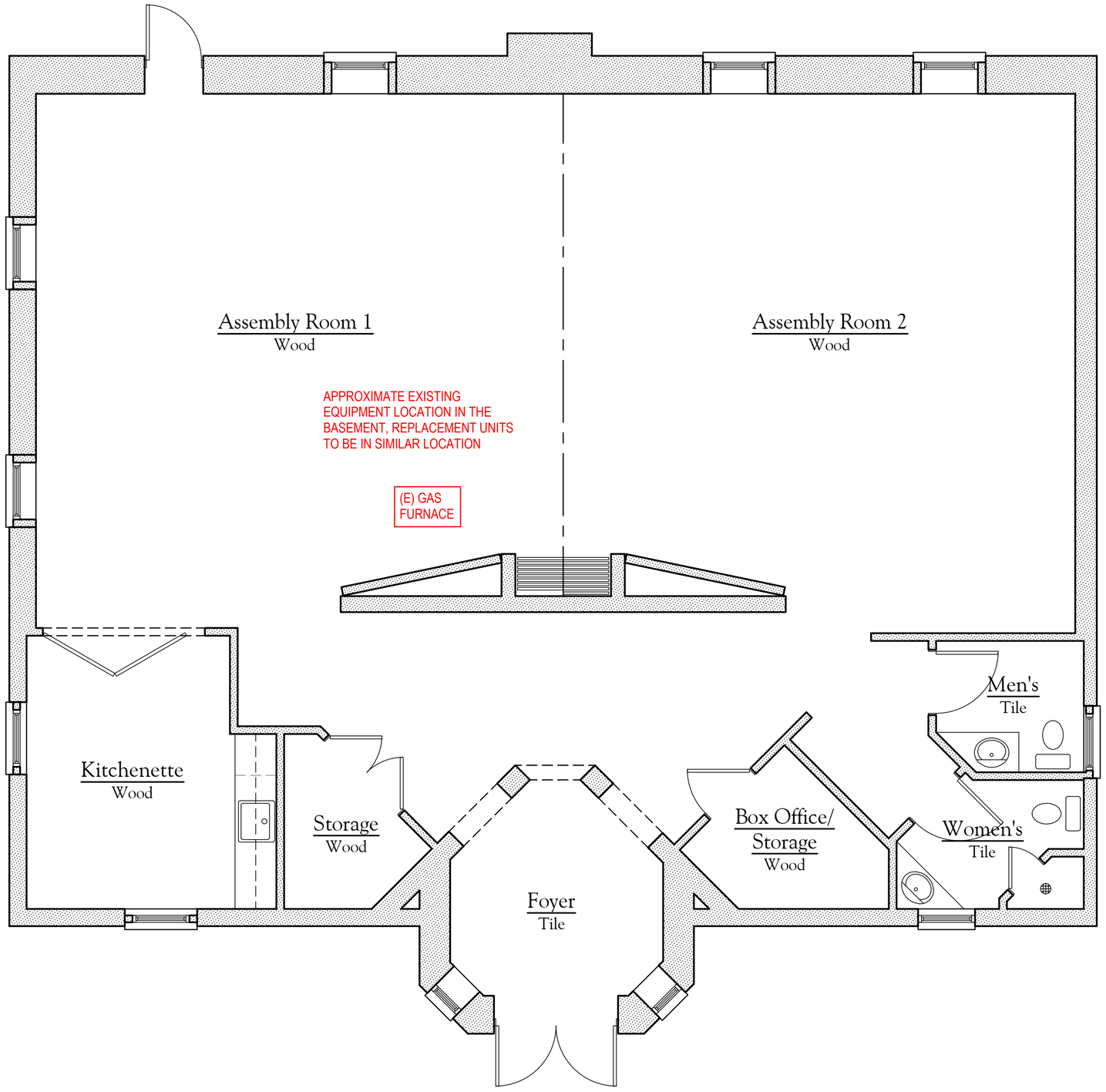
CURRENT MECHANICAL DESIGN INCLUDES:
- RESIDENTIAL GAS FURNACE
- RESIDENTIAL ELECTRIC WATER HEATER
- OPERABLE WINDOWS FOR VENTILATION

REPLACEMENT DESIGN:
- REPLACE GAS FURNACE WITH RESIDENTIAL-STYLE AIR-SOURCE HEAT PUMP WITH 100% EMERGENCY ELECTRIC REHEAT [BASIS OF DESIGN: GOODMAN GVZC200361, **318#**] AND ERV [BASIS OF DESIGN: GREENHECK MINIVENT-750-VG, **240#**] WITH DUCTED CONNECTIONS TO EXTERIOR FOR OUTDOOR AIR AND EXHAUST AIR
- LEAVE ELECTRIC WATER HEATER AS IS

STRUCTURAL NOTES PERTAINING TO MECH SCOPE:
1. PROVIDE CONCRETE EXPANSION ANCHOR FASTENING ASHP AND ERV TO STRUCTURE.
--CONC ANCHORS = 3/8" DIA HILTI TZ WITH 2-1/2" MINIMUM EMBED; QNTY = 4

2. MECH EQUIPMENT IS FLOOR MOUNTED (ASSUMED).

3. HK PAD CAN ALSO BE PROVIDED;
--IF HK PAD OPTION IS SELECTED PROVIDE 3-1/2" THICK CONC HK PAD WITH EQUIPMENT FOOTPRINT + 6" ALL AROUND;
--PROVIDE MIN STRENGTH = 3000 PSI, REINF WITH #4@18 IN OC AT MID DEPTH OF PAD;
--PROVIDE #4 EPOXY DOWEL WITH STD HOOK AT EACH CORNER AND INFILL AT 16" SPCG ALL AROUND WITH 2FT OC FIELD SPACING; SET WITH HILTI HY-200 EPOXY DOWEL WITH 2-1/2" EMBED.



1 Main Floor Plan
Scale: 1/4" = 1'-0"

N

Louisville Center for the Arts
City of Louisville
801 Grant Street, Louisville, CO

DRAWING TITLE: MAIN FLOOR PLAN
DATE: FEBRUARY 10, 2012
DRAWN: JVS | CHECKED: JVS

ISSUE RECORD	DATE

REVISION	DATE

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LODESTONE DESIGN GROUP

A1.1

LOUISVILLE ARTS CENTER
MECHANICAL PRICING DOCUMENT WITH STRUCTURAL

MEPS Coordination Matrix - Arts Center

Existing General (from nameplates/dwgs)									Existing Electrical (from nameplates/dwgs)						New Electrical (Elec. Only w/ Wheel, Resistance Backup)									Structural	
ype d vs ction)	UNIT	MAKE	Tonnage	Model #	Serial #	Year	Natural Gas Input (Btu/h)	Calculated Equivalent kW (@3412 btu/kWh, 80% eff)	Voltage	Phase	kW (either nameplate or calculated)	FLA	MCA	MOCP	Make	Model	Voltage	Phase	kW (electric heater)	kW (either nameplate or calculated)	FLA	MCA	MOCP	Existing Weight (lbs)	New Weight (lbs)
	FURNACE	LENNOX	4	XC14-048-230-07	5814J03666	2005?	132,000	30.9	208	1			26.6	45											
	EWH	BRADFORD WHITE		RE230L6	NM38702062	2016			208	1	3.5														
															Option #1: ERV + Heat Pump (Replaces gas furnace)										
															GOODMAN	GVZC200361	208	1	10	6.2		29.8	30		318
															GREENHECK	MINIVENT-750-VG	120	1	5	2.5		20.5	25		240

Goodman
Air Conditioning & Heating

GVZC20

Cooling Capacity: 22,800 - 52,500 BTU/H
Heating Capacity: 23,400 - 52,000 BTU/H

High-Efficiency, Split System Heat Pump Up to 21 SEER

ComfortBridge technology · CoolCloud · COMFORT SPEED

Contents

Standard Features

- Variable-speed swing compressors
- High-density compressor sound blanket
- Integrated communicating ComfortBridge™ Technology
- Commissioning and diagnostics via indoor board Bluetooth with the CoolCloud™ phone and tablet application
- Goodman control algorithmic logic
- In communicating mode, only two low-voltage wires to outdoor unit required
- Diagnostic indicator lights, seven-segment LED display, and fault code storage
- Field-selectable boost mode increases compressor speed during unusually high loads
- Quiet DC outdoor fan motor
- Fully charged for 15' of tubing length
- Field-installed bi-flow filter drier
- Coil and ambient temperature sensors
- Suction pressure transducer (in cooling mode)
- Sweat connection service valves with easy access to gauge ports
- AHRI Certified; ETL Listed

Cabinet Features

- Heavy-gauge galvanized-steel cabinet with grille-style sound control top design
- Custom two-tone gray powder-paint finish
- 500-hour salt-spray tested
- Wire fan discharge grille
- Steel louver coil guard
- Top and side maintenance access
- Single-panel access to controls with space provided for field-installed accessories
- When properly anchored, meets the 2017 Florida Building Code unit integrity requirements for hurricane-type winds (Anchor bracket kits available.)

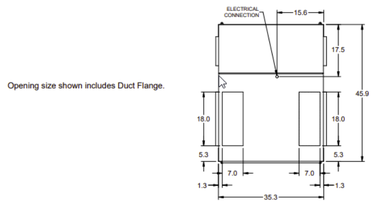
GREENHECK
Building Value in Air.

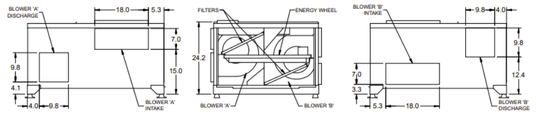
Cut Sheet - Not for Submittal
Printed Date: 03/24/2023
Mark: MV-ERV
Model: Minivent-750-VG

Overview Drawings

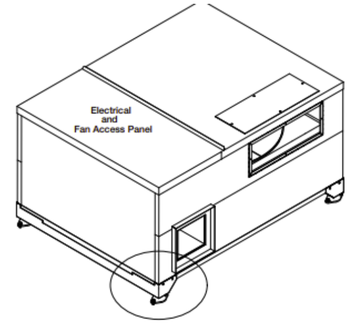
Plan

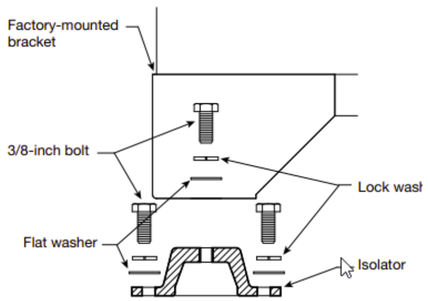
Opening size shown includes Duct Flange.



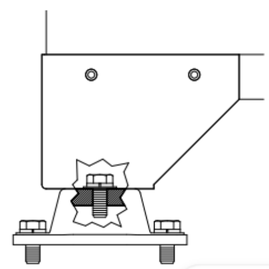


Left End **Elevation** **Right End**





Base Vibration Isolator Assembly



Assembled and Mounted I

This cut sheet was generated from Greenheck iShop Online and is for the product SKU referenced below. Cut sheets for accessories or ancillary products must be printed separately.

GREENHECK iShop Online

SKU
MV-750-VG-208/230

Job Name:
Mark:
Submitted By:
Date: 04/11/2023

Energy Recovery Ventilator, Product # MV-750-VG-208/230

The MiniVent is an energy recovery ventilator designed for indoor installations in commercial and institutional applications. The compact design provides an economical solution for individual spaces, such as school classrooms and small offices and may be floor mounted or ceiling hung. A removable panel enables easy access to filters and enthalpy wheel.

- Energy efficient, Vari-Green motor
- Total enthalpy wheel certified to AHRI Standard 1060
- Speed controllable with a motor potentiometer or a 0-10 VDC Signal

Certifications
UL 1812
AHRI 1060

Performance Characteristics

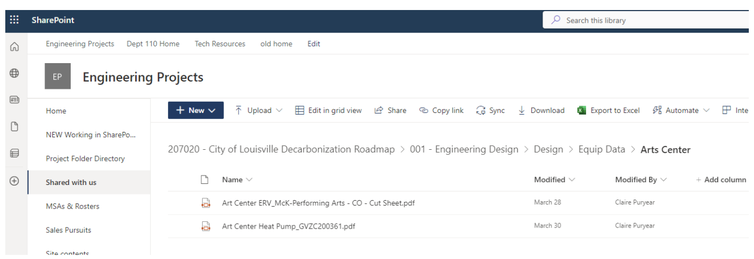
No Fan Curve Available.

Construction Features

Housing Material	Galvanized Steel
Drive Type	Direct Drive
Impeller Type	Centrifugal Wheel
Includes	1 inch pleated filters
Certifications	UL 1812 AHRI 1060
Speed Controllable	Yes

Motor Information

Motor Insulation	B
Motor Phase	1
Service Factor	1
Voltage	208 230
HP	3/4
Hertz	60
RPM	1800
Thermal Protection	Auto
Nominal Efficiency	85



City of Louisville
COLORADO • SINCE 1878

Appendix

1. Mechanical System Matrix Options
2. Mechanical Decarbonization Scoping
3. Electrical Decarbonization Scoping
4. Structural Scoping
5. Electric Vehicle Charging Narrative (N/A for this Building)
6. Renewables Scoping (N/A for this Building)
7. Cost Estimating

McKinstry
For The Life Of Your Building

City of Louisville
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Arts Center Cost Estimates

Three sets of numbers are listed below:

1. Cost Delta of Decarbonization – These are the total construction costs minus the replacement costs that would've been spent to replace the existing units with like-for-like fossil fuel units. These numbers represent the true cost of this decarbonization effort.
2. Total Decarbonization Construction Costs – These are the total amounts of money that will need to be allocated for budgetary purposes. The delta between the above numbers and the below numbers represents the cost of decarbonization.
3. Baseline Costs - These are the costs that would be spent to replace the existing gas-based systems with like-for-like gas units.

All numbers are "all-in costs", including all GC markups, permitting, etc. They are also Rough Order of Magnitude (ROM) numbers, with a +/-20% range. See the "Construction Pricing Context" section in the report body for more detail. All costs associated with the solar PV systems (including the electrical infrastructure to support these systems) are included in the Renewables costs as outlined in a separate section of the Appendix.

Cost Delta of Decarbonization

Decarbonization Delta Costs
Arts Center

Scope	Total Cost
Option 1 (Full Electrification)	$ 215,828

Total Decarbonization Construction Costs

Option 1 (Full Electrification)
Arts Center

Scope	Total Cost
HVAC Ductwork	$ 80,000
HVAC Piping	$ 45,000
Plumbing	$ -
Electrical	$ 114,000
Structural	$ 36,000
Total:	$ 275,000

Baseline Costs

Gas Like-for Like Replacement
Arts Center

Scope	Total Cost
Option 1 (Full Electrification)	$ 59,172