CREATING A SUSTAINABLE COOPERATIVE FOR A BETTER FUTURE

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HERITAGE PARK COOPERATIVE - ENERGY REVIEW

HERITAGE PARK COOPERATIVE - PROPERTY OVERVIEW

- Affordable cooperative located in Rockville, MD
- 65 units built in 1980
- In good condition, wood framed, stucco siding
- Original windows and original gas heat and electric cooling, each unit with 40 gallon gas water heater
- No indoor common areas except 5 laundry Rooms
- Utilities paid directly by members
- 2 year waitlist

HERITAGE PARK COOPERATIVE - PROPERTY OVERVIEW

- While some roof water is removed underground most of the units are dumping their rainwater on the ground next to the home allowing the water to pool under the slab and causing deterioration of the stucco on the buildings along the ground skirt line of the slab and framing.
- There are 100 parking spaces on-site for the residents and visitors.
- The site is landscaped with mature trees and plantings.
- The site orientation is from West to East.

ENERGY AUDIT OVERVIEW

Energy House performed an energy audit based on a walk through inspection of the buildings and units and the site. Also, included inspection of roofs, crawl spaced.

The review is consistent with ASHRAE Level 1 Audit which is the most basic review designed to give business a starting point for making changes

It is a high level review of building operation and energy use

The purpose of the review is to create a plan to bring the building to a level of Net Zero Energy use

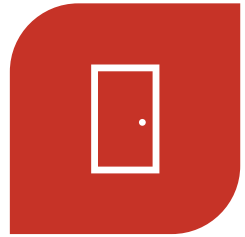
AREAS REVIEWED DURING INSPECTION

SITE ORIENTATION AND PROPERTY CONDITIONS.

GOALS AND DESIRES - MAINTENANCE ISSUES IDENTIFIED.

CURRENT CUSTOMER PROFILE - PROJECTED CUSTOMER PROFILE

MECHANICAL SYSTEMS - HEATING AND COOLING - HOT WATER - VENTILATION



INSULATION & WEATHERIZATION - EXTERIOR WALLS - SLAB ON GRADE

AREAS REVIEWED DURING INSPECTION

Exterior Doors and Windows - Original - Needed Upgrade

Appliances - Non-Energy Star - Gas ranges - Lighting Audit - Interior

Unit Water Reduction - Water Fixture Audit needed

Storm Water Management - Gutters and Downspouts - Banking around buildings - Pooling - French drains and rain gardens.

Impervious Surface Tax - Walkways and Parking Lots being upgraded to impervious

PROJECTIONS BASED ON INITIAL REVIEW

- 65% reduction in current electrical use
- Elimination of all gas consumption
- 55% reduction in water usage
- Elimination of impervious surface tax

REASON TO GO ELECTRIC

THE HEALTH OF THE RESIDENTS

THE HEALTH OF THE PLANET

MORE AFFORDABLE IN THE LONG RUN

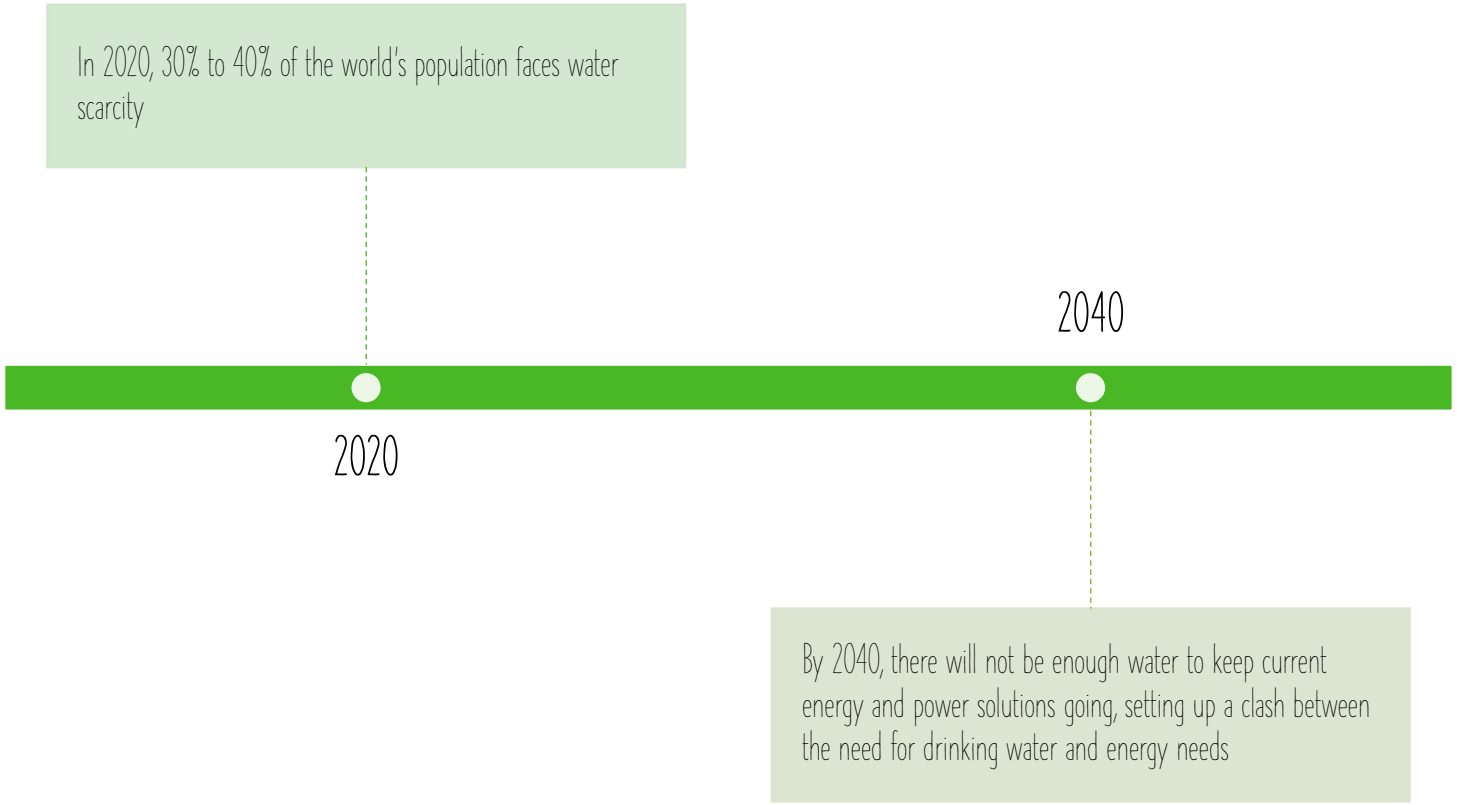
REASONS TO GO ELECTRIC

- The rate and commercial billing program being billed through Pepco still needs to be reviewed for the property. This is the first step in ECM reduction to determine the billing rate program for this property and if it can be renegotiated to a lower tier for savings in electrical cost.
- Gas stoves and gas mechanical systems emit pollutants – like nitrogen dioxide and carbon monoxide leading to asthma and other issues. Electric makes for a safer and healthier home.
- The efficiency of an electric range and a gas stove and cooktop. **Seventy-four percent of the energy produced on an electric range is transferred to food**, compared to about 40 percent on a gas range.
- Electric usage can be off-set by solar energy production.

NO NONRENEWABLE FOSSIL FUELS!

Eliminate Natiural Gas from Heritage Park

WATER


In 2020, 30% to 40% of the world's population faces water scarcity
2040
2020
By 2040, there will not be enough water to keep current energy and power solutions going, setting up a clash between the need for drinking water and energy needs

DID YOU KNOW?

WATER

A single dripping a second from a leaking faucet can waste over 3000 gallons of water every year

WHAT TO DO ABOUT THE WATER ISSUE

- Improve energy efficiency
- Better research on alternative cooling cycles
- Registering how much water power plants use
- Massive investments in wind energy
- Massive investments in solar energy
- Abandon fossil fuel facilities in all water stressed places (which means half the planet)

WHAT CAN HERITAGE PARK DO ABOUT WATER

Behavioral changes to educate and motivate people to become conservation-conscious and engage in conserving practices.

Hardware measures to modify, repair, or remove/replace water-using fixtures appliances. This includes sensors to alert for water leakage.

Reconfiguration of existing plumbing lines in an existing multifamily complex that can be separately metered and billed to the occupant. Experience has shown this switching in responsibilities for payment results in an average of a 20% reduction of usage.

Rain Water Collection and Harvesting - Not considered for this community overall but rather it is suggested that rain barrels be offered to those tenants that are actively using their patios for gardening.

MECHANICAL SYSTEMS

Each unit has it own gas heating and electric cooling system

They are original and have been maintained or replaced through their lifecycle.

The SEER rating for these furnaces is estimated at 3 to 5.

Hot water tanks have been replaced and water pans have been added, but they are not drained to the exterior or monitored with water sensors.

The forced air and ducts systems are original. There is a minimum of 25% leakage of conditioned air loss into the walls

MECHANICAL SYSTEMS

AIR SEALING AND WEATHERIZATION

- Improper air sealing and weatherization account for an energy loss of 25% or more
- Windows are all original. Poor installation and the span of time have made them very inefficient
- All Windows and doors are in poor condition
- Storm doors do not close well and have large air gaps.
- Front doors have no insulation value. Weatherization is missing, as well as door sweeps on most doors
- Sliding glass doors have no weather stripping

AIR SEALING AND WEATHERIZATION

- Wall outlets have no insulation
- Hatches installed without weather-stripping at base
- Esterior wood chimneys used to vent mechanicals not pproperly sealsed and draw conditioned air into the walss and to the outside.

DOORS AND OPENINGS

OUTLETS AND HATCHES

CHMINEYS

INSULATION

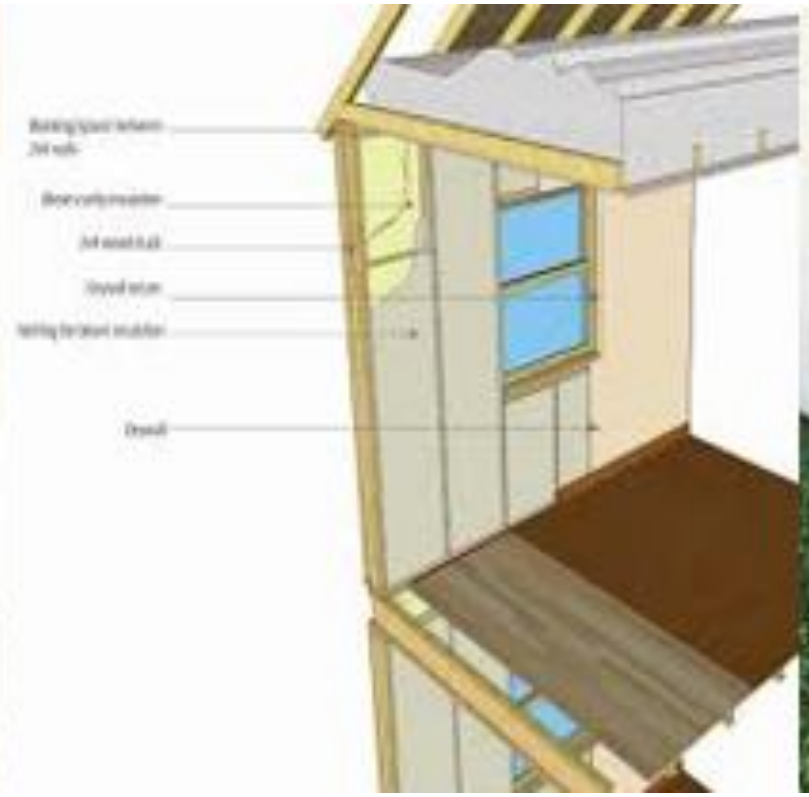
16 inches of blown insulation in attac spaces completed in the past few years through state grant program

Blown insulation has R49 value

Feberglass insulation is walls is R3, current code is R15.

Window frames lack apprriate insulation

INSULATION



APPLIANCES AND FIXTURES

- Fixtures throughout the kitchen and bath are not Energy star
- These are 35% less efficient than current fixtures and appliance

LIGHTING

- No lighting plan at the property
- Mixture of LED compact florescent and Incandescent bulbs

PROPOSED ECM - FULLY ELECTRIC COMMUNITY

Convert all common and unit spaces over to 100% electric

- All mechanical systems including hot water.
- All appliances - kitchens and laundry.
- The current rise in natural gas prices in Europe by 250% is a good indicator of the potential for price increases in that fossil fuel.
- There is no alternative energy offset to natural gas. Electric can be offset by solar and battery backup systems can story energy for when the sun is not shinning.

ECM #1 - EDUCATE MEMBERS

Provide a demonstration of energy efficiency measures to each member in the beginning of the energy upgrade program to acquaint them with the measures taken by the management. This information is suggested that **a change in behavior accounts for 51% of energy saved**. Training classes or a manual should be considered for newly arriving members after the work has been completed.

- LED Lighting - Warranty on bulbs and how to comply with the warranty.
- How to program a programmable thermostat - Savings can be up to 15%. A non-programmed thermostat will not save energy.
- A locked window will save 40% more energy than an unlocked window.
- Cleaning and maintenance of your mechanical systems as well as appliances to help them run more energy efficient.
- Provide an energy dashboard to each unit's Wi-Fi to enable them to see in real-time their energy consumption.
- Correct mechanical settings for occupancy and trips away - never turn off HVAC units unless windows are open during shoulder months

ECM #2 LIGHTING

Have a full lighting analysis done on the entire complex per unit and exterior.

Include LED lighting upgrade throughout the facility - include this study and light bulb replacement in the overall cost of the facility.

Include warranty program from lighting manufacturer for a 10 year automatic replacement of all LED bulbs at no cost to the members or the facility. Including shipping. Not including installation.

LED lighting upgrade will save up to 18% in the overall energy savings each year.

Replacement of LED light bulbs should be the responsibility of the member and should be required in the by-laws.

Automatic sensor should be added to common spaces such as laundry rooms and utility closets to make sure lights shut off when people exit a space..

ECM #3 - HEATING AND COOLING

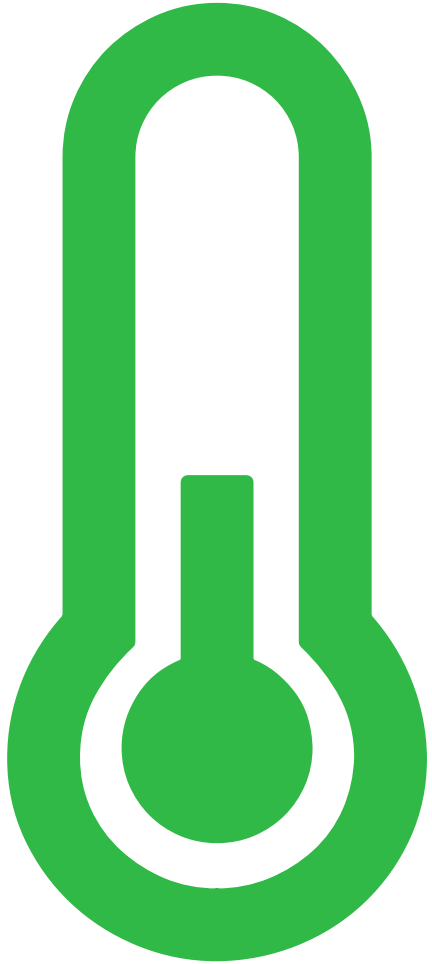
Change all furnace and air handler units in utility closet over to mini split ductless wall mounted units. Utility closet space returned to living area for more storage

- Mini Split Systems can provide heating, cooling, and dehumidification in a unit.
- Each room in a home will have its own programmable thermostat. (Not Baths/Closets)
- The interior units, as well as the exterior compressor, are nearly silent in their operation.
- Mini split systems usually are sold with a SEER rating of around 23.. Current equipment in the units that were inspected for this Energy Review was originally sold at a SEER rating of 8 but are more than likely with age and use operating at a SEER of 3 or 4.
- Maintenance of the system is simple - filters can be cleaned in a kitchen sink. No replacement filters are needed. Routine maintenance is required each year by a trained professional technician.
- Savings potential on this change in HVAC - 35%

MINI-SPLIT SYSTEMS

DEFINITION - SEER RATING

- SEER stands for **Seasonal Energy Efficiency Ratio**. This is the ratio of the cooling output of an air conditioner over a typical cooling season, divided by the energy it uses in Watt-Hours.



ECM #4 - HOT WATER

Change existing 40 gallon hot water tank over to an electric instant hot water system.

- Hot water on demand - no running out of hot water during multiple showers.
- Take up less space in a utility closet.
- Lower risk of leaking.
- Safer.
- Longer lifespan compared to tank reservoir.

Tank-less water heaters to be powered by electricity. These types of water heaters were found to be 22 percent more energy efficient on average than the gas-fired storage-tank models

TANKLESS HOT WATER

- Hot water on demand - no running out of hot water during multiple showers.
- Take up less space in a utility closet allowing for more storage space.
- Lower risk of leaking
- Safer
- Longer lifespan compared to tank reservoir
- Enables water heating to be off-set with renewable energy systems

- Tank less water heaters to be powered by electricity. These types of water heaters were found to be 22 percent more energy efficient on average than the gas-fired storage tank models

TANKLESS HOT WATER

ECM #5 - APPLIANCES AND FIXTURES

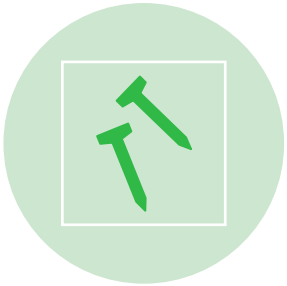
Ensure all appliances and fixtures are Energy Star rated

The Energy Star sores, expressed as a number on simple scale of 1-100, rates performance on a percentile basis

ECM #6 - WEATHERIZATION

- Attic hatches need weather-stripping at their base.
- Wall openings for plugs and switches should be air sealed and insulated on all exterior walls.
- Utility room should be air sealed before being converted into storage.
- All exterior penetrations should be air sealed - utility lines - water lines.
- All exterior doors must have weather-stripping and door sweeps.
- Windows and door installs.
- Recessed lights into attic areas.
- Exterior exposed wall penetrations when opened in siding upgrade.
- Exterior door and window frames.

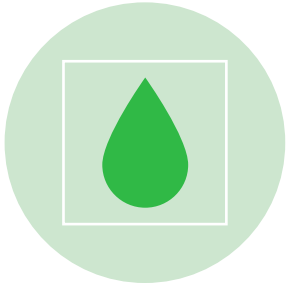
ECM #7 - INSULATION



Remove all fiberglass in wall cavities when exterior work is done on the outside stucco walls.

Use dense packed cellulose insulation to achieve an R15 or better in that area of the structure.

Insulate and air seal all rim joists along the slab and framing to the first floor structure at that the time that the exterior walls are opened.



Insulate all hot water lines that are exposed in the units upgrade.

ECM #9 - WATER AND SEWER

Install a sewer meter into the line leaving the facility to ensure accuracy of that bill.

Do a water audit of the entire facility to determine if water to each unit is capable of being separately metered by management as to be included in the tenant's payment of that utility.

The water audit will identify and recommend all water-using fixtures in the complex by unit and in common areas. Their operating condition and the potential water savings from their upgrade.

Enter into a water management agreement to replace leaking or old water fixtures with a no-cost program to the properties management and a shared savings payment arrangement with the water management firm. Upgrade water fixtures to be Energy Star.

Provide rain barrels for tenants that are watering plants on their patios outside of their units. Rain barrels can be attached to a normal downspout and fill quickly after a rainstorm. This water collection system comes with a diverter in the system that once the unit is full the remaining rainwater will be allowed back into the rainwater disperse design.

Provide rainwater collection method of underground cisterns for the use of the residents for car washing and water use outside.

Install permeable pavers around the complex to enable rainwater penetration into the soil as well as reducing the County Tax on impermeable surfaces.

Install French drains or rain gardens in areas of high runoff from rainstorms

Collect roof water into a designed underground drainage system

ECM #9 - SMART TECHNOLOGIES

Artificial intelligence is one of the best tools in saving energy and water. Providing info to users in real time contributes up tp 20% in managing energy savings.

- WIFI accessible thermostats for easy access by homeowners from their phones of computers.
- Mini Split thermostats now come fully WIFI accessible.
- Alarm sensors for water or smoke detection are also WIFI accessible.
- Security can also be added into a SMART Tech system - Door Bell cameras are a good example.
- Energy monitors can be added into a home SMART Tech system that can report all energy usage in a home on your own smart television.
- Smart Plugs and Occupancy Sensors.

ECM #10 - WINDOWS AND DOORS

It is reported that the existing windows are cold and drafty.

Windows - Replace all existing windows in the residential units.

Use casement windows because of the style of the architecture - Casement windows are hinged on the side and crank open outward to the left or right allowing for full top to bottom ventilation.

Locking system is more secure. When closed, and latched the seal is very tight and the only way to open it would be to break the glass.

Casement windows are the most energy-efficient style of window that's meant to be opened.

Casement windows offer clear views to the outside.

ECM #10 - WINDOWS AND DOORS (CONT)

Window air conditioning units are not possible with Casement Windows.

Install all new windows to an Energy Star specification.

Existing doors in all the residential units visited in this inspection and observed throughout the complex are wooden.

Exterior doors should be metal or fiberglass and be insulated to an Energy Star Standard of an R5 or R6.

All new doors need to be installed to an Energy Star standard.

Storm doors should be included on every entrance door to a residential unit. A triple locking system in the storm door will improve its operation, life expectancy, and added security.

Include Low E glass on all other windows of the residence,

ECM #11 - PASSIVE SOLAR

Due to the orientation of the site Passive Solar must be a consideration in the new energy design of the property. What is Passive Solar – In simple terms, a passive solar home collects heat as the sun shines through south-facing windows and retains it in materials that store heat, known as thermal mass. ...

- No cost to operate Passive Solar features to the resident - Design.
- Include Passive Solar window panes in all windows facing south to increase natural heating.
- Reconsider landscaping to add more deciduous tree placement to improve shading in the summer months with trees that shed their leaves to maximize solar gain in the winter months.
- Install overhangs to front doors to block suns heat in the summer months.
- Consider solar tubes in the units to improve natural lighting in dark areas of the home.
- Operable windows for nighttime ventilation.
- Thermal mass in units with concrete floors retain heat for the unit for free.

PROJECTIONS BASED ON INITIAL REVIEW

- 65% reduction in current electrical use
- Elimination of all gas consumption
- 55% reduction in water usage
- Elimination of impervious surface tax